WORLD METEOROLOGICAL ORGANIZATION

PROGRAMME ON PHYSICS AND CHEMISTRY OF CLOUDS AND WEATHER MODIFICATION RESEARCH

WMP REPORT NO. 25

REGISTER

OF

NATIONAL WEATHER MODIFICATION PROJECTS

1993 and 1994

WMO/TD - No. 745

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I. INTRODUCTION

As part of the activities which WMO carries out in its Programme on the Physics and Chemistry of Clouds and Weather Modification Research, a Register of National Weather Modification Projects is kept. The Register has existed since 1975 when the Seventh World Meteorological Congress agreed that an inventory of activities within Member countries related to weather modification should be initiated and maintained. Periodic reviews have all recommended that the Register be continued.

This present Register is the eighteenth such publication issued. It is based on information obtained from Member countries on experiments and operations sponsored by government agencies or private concerns that took place during 1993 and 1994. Information from each year are separated for ease of reference.

To assist the reader in understanding the content of each of the 12 columns used in the tabular presentation found within, detailed explanations are provided in Section II. These columns contain information that was obtained from WMO Member countries in response to questionnaires sent to them in July 1995. The questionnaires are reproduced as Annexes A and B to ensure that the tabular information will be readily understood by readers. These are printed in the four languages used for relevant reports and publications of the Organization. Annex A refers to present projects reported in Section IV for the 1993 projects and Section VI for 1994 projects. Annex B refers to completed projects or those where physical and/or statistical evaluation have been carried out that are reported in Section VIII.

The names of Member countries who provided the information reported in this Register are listed in Sections III and V. Section VIII provides summaries of completed projects and Sections X and XI indicate which countries reported that no weather modification activities had taken place in 1993 and 1994.

Requests for further information concerning the projects reported may be addressed to the reporting agency for each country which is indicated in Section VII. The WMO Secretariat would be pleased to assist if requested.

II. DETAILED EXPLANATION OF INFORMATION COLUMNS

(The figure in brackets following the column heading title indicates a similar item in the questionnaire, see Annex A).

Column 1: WMO Register No.

This consists of country indicator letters (according to the ISO Standard 3166-1974) and a serial number for each project.

Column 2: Objective of project, type of organization carrying it out (1) and (2)

Dev.	=	Development	PE	=	Precipitation Enhancement
Ext.	=	Extend wet period	(E)	=	Emergency
Fog	=	Fog dissipation	(R)	=	Routine
Hail	=	Hail suppression	PR	=	Precipitation Redistribution
Inc.	=	Increase during wet period	Res.	=	Research
Op.	=	Operational			

Column 3: Approximate size of project area (3)

Given in square kilometres for target and control (if any) areas.

Column 4: Name of project (4)

Reference numbers are also quoted when supplied.

Column 5: Location of project area (5)

In some cases where co-ordinates of several points delineating the area were given, these have been replaced by a single point at approximately the centre of the area. Towns and islands may be denoted by name; A/P = Airport.

Column 6: Year project commenced and continuity (6)

Date	--	year project started
Every year	--	indicates project has operated every year
Interrupted	--	indicates project has not operated every year
No	--	indicates project will not be continued
Yes	--	indicates project will be continued
(?)	--	indicates project status is unknown

Column 7: **Nature of organization sponsoring project (7)**

Indicated by abbreviations as follows:

Agr.	=	Agricultural	Muni.	=	Municipal
Def.	=	Defense	(P)	=	Private
Enr.	=	Energy	Rec.	=	Recreation
For.	=	Forestry	Res.	=	Research
(G)	=	Government	Trans.	=	Transportation
Hyd.	=	Hydrological	Wea. Serv.	=	Meteorological

Column 8: **Apparatus, seeding location (8)**

Abbreviations are as follows:

Air	=	Airborne	G/B	=	Ground-Based
A/C	=	Aircraft	Temp.	=	Temperature

Column 9: **Agents, dispersal rates (8)**

Self-explanatory.

Column 10: **Characteristics of clouds treated, seeding criteria (9)**

LWC	=	Liquid Water content	Temp.	=	Temperature
Obs.	=	Observations			

Column 11: **Active period during reporting year (10)**

Months of activity are inclusive.

Jan	=	January	July	=	July
Feb	=	February	Aug	=	August
Mar	=	March	Sept	=	September
Apr	=	April	Oct	=	October
May	=	May	Nov	=	November
June	=	June	Dec	=	December

Column 12: **Documentation (12) and (13)**

"EIS" indicates that an environmental impact study has been made; "C/B" indicates that a costs and benefits analysis has been made.

III. MEMBER COUNTRIES REPORTING 1993 PROJECTS

Page

[1]Project in Argentina reported by the Russian Federation whose experts performed the project.

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ARGENTINA[2]											
ARG-1[2]	Op. Hail	1,950 km^2	Hail Suppression	Northern Province of Mendoza	1985 Every year (?)	Agr.	In-cloud seeding at temp. levels -3° - -9°C with pyrotechnic flares on rockets	AgI	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: radar reflectivity between 35 and 55 DBZ and extention of 45 DBZ region above 0°C level exceeding 2 km or radar reflectivity > 55 DBZ and said extention > 2.5 km	Nov-Dec	Evaluation based on crop damage data. Report available EIS-Yes C/B-Yes
ARMENIA											
AR-1	Hail	-	Modification of hydrometeological processes	Yerevan area (40°10' N 44°30' E)	1964 Every year (?)	Agr. (G)	-	-	-	-	-

[2]Information submitted by the Russian Federation whose experts performed the project.

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AUSTRALIA											
AU-1	Res. PE Inc.	3,000 km² target. 40,000 km² control	Tasmanian Dry-Ice Cloud Seeding Experiment (DICSE), Stage III	Central Plateau, Tasmania	1992 Every year Yes	Enr. (G)	One A/C dispersing dry ice in clouds and cloud tops at -10°C level where supercooled LWC>0.1 g/m³	Dry ice, 40 kg/hour Total consumption 4800 kg during the year	Stratiform clouds with bases colder than 10°C and top temp. between -3°C and -25°C Seeding criteria: cloud depth greater than half the height of cloud base, average supercooled liquid water in cloud exceeds 0.1g/m³ in St and 0.5g/m³ in Cu	May-Oct 25 days	Evaluation based on randomization, report available. EIS-No C/B-Yes
AUSTRIA											
AUS-1	Op. Hail	1,800 km²	Hail Test Program	Weiz district 46°50' N 15°45' E	1985 Every year Yes	Agr. (P)	4 A/C with acetone burners for seeding cloud bases	17 l/hour of AgI Total consumption 260 kg for year	Convective clouds, bases colder than 10°C and tops colder than -20°C. Seeding criteria: regional forecasts and radar data (C-Band)	May-Sept 36 days	Evaluation based on historical records, crop damage and hail pad data, report planned after 1999 EIS-No C/B-No
AUS-2	Op. Hail	500 km²	Lower Austria - Hail Test Program	Krems district 48°20' N 15°31' E	1981 Every year	Agr. (P)	2 A/C with acetone burners for seeding cloud base	12 l/hour of AgI Total consumption 80 kg per year	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: as AUS-1	May-Aug 27 days	As AUS-1

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BULGARIA											
BG-1	Op. Res Hail	15,000 km^2	Bulgarian Hail Suppression Project (B-1)	42°45' N 23°45' E	1969 Every year Yes	Agr., Wea. Ser. Insurance (G)	Rockets with pyrotechnic flares, in-cloud seeding at temp. between -5° and -10°C	500 g of PBI_2 per rocket. Total consumption 1143 kg per year	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criteria based on radar echo top height, hail cell top, reflectivity	May-Aug 17 days	Evaluation based on historical records, report planned. EIS-No C/B-Yes
BG-2	Res. Dev. PE, PR	2,000 km^2	B-2	42° N 24°E (Southern Bulgaria)	1990 Every year Yes	Res., Wea. Ser. (G)	As BG-1, but seeding temp. are -3° to -10°C	500 g of PbI_2 per rocket Total consumption 74 kg per year	Convective clouds with bases warmer than 10°C. Seeding criteria: cloud top temp. between -10° and -30°C, radar reflectivity ≥35 DBZ	May-Sept 15 days and 12 days with no seeding	Evaluation based on randomization EIS-No C/B-No
CHINA											
CN-1	Op. PE (E) Hail	10,550 km^2	Precipitation Enhancement and Hail Suppression	30°N, 102°E Sichuan Province	1958 Every year Yes	Agr., Wea. Ser.	In-cloud seeding at -5°C level with pyrotechnical flares on rockets and shells	AgI. Total consumption 28 kg/year	Convective orographic and stratiform clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: temp. about -10°C and supercooled region > 1 km (for PE); radar echo ≥ 34 DBZ, tops higher than 8 km (for hail suppression)	Apr-Sept 80 days	Evaluation based on historical records and crop damage data EIS-Yes B/C-No

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-2	Res. Op. PE Hail	60,000 km^2	-	Heilongjiang Province	1975 Every year Yes	Agr. (G) Wea. Ser.	One A/C with acetone burner and artillery shells at temp. below -10°C, in-cloud seeding	AgI. Total consumption 33 kg/year	Convective and stratiform clouds with tops colder than -20°C or between 0 and -20°C	May-Sept 123 days	Evaluation based on historical records and crop damage data, report planned EIS-Yes C/B-Yes
CN-3	Res. Op. PE, Hail	25,000 km^2	-	40°40' N 116°30' E (near Beijing)	1990 Every year Yes	Agr. (G) Hyd.	In-cloud seeding with artillery shells and one A/C. G/B generators and liquid spray used at temp. below 0°C	Liquid nitrogen, 4 kg/min. Total consumption 2000 kg during the year	Convective and stratiform clouds, with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criterion: cloud depth more than 1 km	Jan-Sept, Dec	Estimation based on historical records and hail pad data EIS-Yes C/B Yes
CN-4	Res. Op. PE, (E), (R) Inc., Hail	50,000 km^2 target, 10,000 km^2 control	Precipitation Enhancement and Hail Suppression	41°N 122°E Liaoning Province	1992 Every year Yes	Agr. (G) Res.	In-cloud seeding at temp. -5°C with acetone burners and solid dispersal from 2 A/C, and explosives on shells	80 kg/hour of dry ice and 300 g/hr of AgI. Total consumption 2000 kg of dry ice and 22 kg of AgI	Convective and stratiform clouds with bases warmer than 10°C and top temp. between 0° and -20°C	Apr-Sept 59 days	Evaluation based on historical records EIS-No C/B-No
CN-5	Op. PE, Hail	40,000 km^2	Precipitation Enhancement and Hail Suppression	Ningxia Province	1988 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding with acetone burner from one A/C. Artillery shells for hail suppression	AgI, total yearly consumption 10 kg	Convective and stratiform clouds with top temp. between 0 and -20°C. Seeding criterion: radar echo > 10-15 DBZ in stratiform clouds	May-Sept 150 days	Report planned EIS-No C/B-Yes
CN-6	Op. PE (E)	1,200 km^2	Precipitation Enhancement	Hainan Island	1977 Interrupted Yes	Agr. (G)	In-cloud seeding at temp. between 0° and -4°C with artillery shells	AgI, yearly total consumption 5.2 kg	Convective clouds with bases warmer than 10°C and top temp. between 0° and -20°C	Apr-May 38 days	EIS-No C/B-No

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-7	Res. Op. PE Hail	36,500 km² target 39,800 km² control	-	Hebei province	1990 Every year Yes	Agr. (G) Res.	In-cloud seeding at temp. -4 - -20°C with acetone burner from 1 A/C and pyrotechnic flares in rockets and artillery shells	-	Convective and stratiform clouds with bases colder than 10°C and tops colder than -20°C	Apr-July 92 days	Evaluation based on control modelling. Report planned EIS-Yes C/B-Yes
CN-8	Op. PE, Hail (E), Inc	20,000 km² target 10,000 km² control	Precipitation Enhancement and Hail Suppression	Shanxi Province	1958 Interrupted Yes	Agr. (G) Wea.	In-cloud seeding at temp. -4 - -10°C from A/C	500 g/hour of AgI. Total consumption 30 kg/year	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C. Seeding criteria: cloud top temps. between -5 and -20°C, cloud depth more than 3 km	Mar-Oct 200 days	EIS-No C/B-No
CN-9	Res. Op. PE Hail	10,000 km²	As CN-8	Guizhou Province 27°N, 106°E	1958 Every year Yes	Agr. (G) For. Hyd. Wea. Ser.	In-cloud seeding with rockets and artillery shells	AgI	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion: radar reflectivity	Mar-Oct 214 days	Evaluation based on historical records and hail pad data EIS-Yes C/B-No
CROATIA											
CR-1	Op. Hail	11,000 km²	Hail Suppression	Between Sava and Drava rivers, 46°N, 17°E	1971 Every year Yes	(G)	In-cloud seeding with rockets at temp. -8° to -12°C	2.2 kg/day of AgI. Total consumption 42 kg during the year	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criteria: cloud top temp. below -28°C, 45 DBZ echo top higher than 0°C level plus 1.4 km	May, Oct 21 days	Estimation based on comparison with historical records and crop damage. Report is planned. EIS-Yes C/B-No

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CR-2	Res. Dev. Op. Hail	11,000 km²	As CR-1	Northern Croatia	1970 Every year Yes	Agr (G) Wea. Ser.	In-cloud seeding with rockets at temp. 0° - -10°C	Total yearly consumption 1,061 rockets, with 0.4 kg of pyrotechnics each	As CR-1	May-Sept 150 days	As CR-1 except C/B-Yes
FRANCE											
FR-1	Res. Op. Hail	80,000 km² target 420,000 km² control	ANELFA	Southwestern France	1952 Every year Yes	Agr. (P)	Ground-based seeding with 573 acetone burners	AgI 8 g/hour per generator. Total yearly consumption 908 kg	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criterion: hailstones with diameter exceeding 15 mm being forecasted	Apr-Oct 50 days	Evaluation based on crop damage and hail pad data. Report is available EIS-Yes C/B-Yes
GERMANY											
GE-1	Op. Hail	2,500 km² target 7,500 km² control	Hail Suppression-Stuttgart Area	49°N 10°E (SW Germany)	1980 Every year Yes	Agr. (G, P) Insurance	Cloud base seeding with acetone burners from 2 A/C	AgI Total consumption 120 kg per year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: based on degree of convective instability, radar data	Apr-Oct 31 days	Estimation based on comparison with historical records and hail pad data. Report available EIS-Yes C/B-Yes
GREECE											
GR-1	Op. Hail	5,000 km²	Helenic National Hail Suppression Program	Northern and Central Greece	1984 Interrupted Yes	Agr. (G)	5 A/C with pyrotechnic flares for seeding in clouds, cloud tops and bases at -8° to -10°C temp. levels	AgI at a rate of 240 g/min Total consumption 273.1 kg during the year	Convective clouds with base temp. colder than 10°C and tops colder than -20°C Seeding criterion: 35 DBZ above -5°C level	April-Aug 41 days	Estimation based on comparison with historical records, crop damage and hail pad data EIS-No (planned) C/B-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ISRAEL											
IS-1	Res. Op. PE Aug.	Opera-tional: 4,200 km^2 target 100 km^2 control Experi-mental: 6,800 km^2 target 150 km^2 control	EMS-Rain Enhancement	Operational: Northern Israel Experimental: Central and Southern Israel	1960 Every year Yes	Agr. (G) Hyd	60 G/B acetone burners and 3 A/C with acetone burners seeding at cloud base level	AgI Airborne: 550 g/hour G/B: 12 g/hour	Convective clouds with bases colder than 10°C and tops warmer than -20°C (usually) or colder (sometimes). Seeding criterion: cloud top colder than -8°C	Jan-Apr, Nov-Dec 20 days	Estimation based on randomized experiment. Report available EIS-No C/B-Yes
ITALY											
IT-1	Res. PE, Inc.	3,000 km^2 target, 1,500 km control	Rain Project	Southern Italy 16°N, 41°E	1988 Every year No	Agr. (G)	Cloud base seeding with acetone burner from one A/C	AgI	Convective clouds with bases below 2,400 m and tops colder than -8°C	Feb-May 22 seeded units	Estimation based on randomized experiment EIS-Yes C/B-No
JAPAN											
JP-1	Res. Inc. PR	1-10 km^2	Study of Precipitation Formation in Snow Clouds and Feasibility of Snow Cloud Modification by Seeding	Over sea near Japanese Islands	- - No	Res. Wea. Ser.	Seeding of cloud tops by solid dispersal from one A/C	Dry ice at a rate of 1.8 kg/min. Total consumation 10 kg	Convective clouds with tops warmer than -20°C and LWC > 0.5 g/m^3	Feb 1 day	Estimation based on changes in cloud microphysical structure. EIS-No C/B-No

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
JORDAN											
JOR-1	Res. Op. PE PR, (E)	14,500 km^2	Precipitation Enhancement Program in Jordan (PEP)	East of Jordan Valley (Gohre)	1986 Every year except for 1989-91 rain seasons Yes	Wea. Ser. (G)	G/B and in-cloud seeding with 20 generators and acetone burner from one A/C, respectively. Seeding criteria: cloud top temp. between -5° and -10°C; presence of liquid.water; low ice particle concentration	AgI, airborne and ground base; dispersal rate 420 g/hour and 30 gm/h Total consumption 14.7 kg (A/C) and 75.0 kg (G/B)	Orographic clouds with bases colder than 10°C and tops warmer than -20°C	Oct-May	Estimation based on comparison with historical records Report planned EIS-Yes C/B-Yes
LIBYAN ARAB JAMAHIRIYA											
LI-1	Op., PE, Inc	25,000 km^2 target, 40,000 km^2 control	Libyan Cloud Seeding Project	Tafara Plain, west coast of Libya	1980 Every year Yes	Wea. Ser.	Cloud top and in-cloud seeding from 3 A/C	AgI at a rate of 130 g/h. Total yearly consumption 5.3 kg	Convective and orographic clouds. Seeding criterion: cloud temp. about -10°C	Oct-Dec	Evaluation based on comparison with historical records, report planned EIS-No B/C-No
MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF											
MAC-1	Op. Hail	25,000 km^2	Hail Suppression	Republic of Macedonia	1971 Every year Yes	Wea. Ser.	In-cloud seeding with rockets at -6° - -12°C temp. levels	AgI	Convective clouds with top temp. -28°C or lower and logorithm of maximum reflectivity exceeding 3.5	Apr-Oct 29 days	Evaluation based on comparison with historical records

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
MALAYSIA											
MAL-1	Op. PE (R) PR	1,136 km^2	Pedu Muda Cloud Seeding Operation	Northern part of Peninsular Malaysia	1977 Interrupted Yes	Wea. Ser. (G)	In-cloud seeding from 1 A/C. Solid dispersal and liquid spray used	NaCl Total consumption 6,450 kg during the year	Convective clouds with bases warmer than 10°C and top temp. close to 0°C Seeding criterion: cloud tops between 4.5 and 6 km	Oct-Dec 47 days	Evaluation is not planned EIS-No C/B-No
MOROCCO											
MO-1	Res. PE (E) (R) Inc	16,400 km^2 target 6,000 km^2 control	Programme AL CHAIT	Atlas Mountains, Central Basin	1984 Every year Yes	Wea. Ser. (G)	G/B seeding with 15 acetone burners and propane dispensers. Seeding cloud tops, bases and in-cloud with acetone burners, solid dispersal and pyrotechnics from 2 A/C	G/B seeding: AgI 20 g/hour Total consumption 32.65 kg during the year. Propane 2 kg/hour Airborne seeding: PbI_2 375 g/hour NaI 115 g/h	Convective orographic and stratiform clouds with bases colder than 10°C and top temps. warmer than -20°C Seeding criteria: cloud top temp. between -5° and -20°C, cloud depth ≥ 1 km	Jan-Apr 28 days	Estimation based on comparison with historical records. Report available EIS-No C/B-Yes
NORWAY											
NO-1	Op. Fog	Airport runway area	-	Oslo Airports: Fornebu and Gardermoen	- Every year Yes	Trans. (G)	1 A/C dispersing dry ice at fog top level	Dry ice	Fog at temp. colder than 0° but warmer than -20°C	Jan-Feb Nov-Dec	-

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PERU											
PE-1	Res. Op. Inc.	9,000 km^2	Modification Artificial Del Tiempo	11°20'S; 76°20'W	1992 Interrupted Yes	Enr. (G) Wea. Ser.	G/B seeding with 15 acetone burners and in-cloud, cloud base and top seeding with acetone burner and solid dispersal from 1 A/C	AgI, dry ice, NaCl. Total yearly consumption 300, 2,000 and 3,000 kg, respectively	Convective and orographic clouds with cloud bases warmer than 10°C and tops warmer than -20°C	Jan-Mar	Estimation not planned EIS-No C/B-Yes
RUSSIAN FEDERATION											
RF-1	Op. Hail	771 km^2	Hail suppression	Krasnodar district	1967 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. between -5° and -10°C with rockets and artillery shells	AgI	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: probability of hail Pr $\geq$ 0.4, ratio of radar reflectivities at 3.2 and 10 cm wave lengths $<$ 1	Apr-Sept 40 days	Estimation based on historical data. Report available EIS-Yes C/B-Yes
RF-2	Op. Hail	1,035 km^2	Hail suppression	Northern Caucasas	1967 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. -3° to -15°C with pyrotechnical flares on rockets	AgI	Convective clouds with bases colder than 10°C and tops between 0° and -20°C Seeding criteria: as RF-1	Apr-Sept 38 days	Estimation based on comparison with historical records EIS-Yes C/B-Yes
RF-3	Avalanche prevention	150-200 km^2	Avalanche prevention	Northern Caucasas mountainous areas (Republic of Cabardino-Balcaria)	1983 Every year Yes	Agr. Hyd. Trans. Wea. Ser. (G)	Shelling of snow drifts on mountain slopes to initiate early snow slips.	-	-	Jan-Apr Nov-Dec	Estimation based on comparison with a control area EIS-Yes B/C-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RF-4	Op. PE (E)	26,000 km^2	Cloud seeding for precipitation enhancement	Stavropol District (Northern Caucasas)	1986 Every year Yes	Agr. Wea. Ser. (G)	Cloud top and in-cloud seeding with pyrotechnical flares from 2 A/C	AgI, dry ice Total consumption 6.8 kg and 150 kg, respectively	Convective and stratiform clouds with base temp. colder than 10°C. Seeding criterion: in-cloud temperature between -8° and -15°C	May-July 26 days	Estimation based on comparison with historical data Report available EIS-No C/B-Yes
SLOVENIA											
SLO-1	Op. Hail	9,700 km^2	Hail Suppression Project of Slovenia	Eastern Slovenia	1971 Every year Yes	Agr. Wea. Ser. (G)	In-cloud seeding at temp. -5 to -15°C with pyrotechnic flares on rockets	AgI 8 g/km^3 of cloud Total consumption 35 kg during the year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criterion: radar reflectivity > 40 DBZ at height exceeding 0°C level by 1.5 km	May-Sept 19 days	Estimation based on historical records and crop damage data. EIS-No C/B-Yes
SOUTH AFRICA											
SA-1	Res. PE	Two target areas, 30,000 km^2 each	National Precipitation Research Program	Bethlehem and Carouna, South African Highlands	1990 Every year Yes	-	A/C seeding of cloud bases with pyrotechnical flares	NaCl, KCl 12g/min Total consumption 250 kg during the year	Convective clouds with bases colder than 10°C and tops colder than -20°C Seeding criteria: radar reflectivity > 30 DBZ, well defined updraft area	Jan-Mar, Oct-Dec	Estimation based on randomized experiment and data of microphysical measurements EIS-No C/B-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SPAIN											
SP-1	Op. Hail	8,000 km²	Campana de Lucha Antigranizo en Aragon (Antihail Campaign in Aragon)	Zaragoza and Teruel Provinces	1970 Every year	Agr. (G)	G/B seeding with 151 acetone burners	AgI	Convective clouds with tops colder than -20°C. Seeding criterion: hail predicted in Aragon, Rioja and Navarra	May-Oct 168 days	Evaluation based on crop damage data Report available EIS-No
SP-2	Op. Hail	10,000 km²	Servicio Interprovincial de Defensa Antigranizo de Alava, la Rioja y Navarra	Northern Spain	1969 Every day Yes	Agr. (G)	G/B seeding with acetone generators	AgI. Total consumption 450 kg	As SP-1	May-Sept 139 days	Evaluation based on hail pads and hailstone composition analysis EIS-No C/B-No
SP-3	Res. Op. Hail	5,000 km² target 10,000 km² control	PALA	Leon City region	1985 Every year	Agr. (G) Res.	G/B seeding with 10 acetone burners	AgI and propane. Total consumption 18 kg and 1,000 kg, respectively	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion as SP-1	June-July	Evaluation based on randomization, comparison with historical records, crop damage data, hail pad data and modelling EIS-Yes C/B-Yes
SYRIAN ARAB REPUBLIC											
SY-1	Res. PE (R) Ext. Increase of run-off and ground water reserve	170,000 km² target 10,000 km² control	Rain Enhancement Project	The whole Syria	1991 Every year Yes	Agr. (G)	Cloud top seeding with pyrotechnic flares from 5 A/C	AgI. Total consumption 18,6 kg	Convective and orographic clouds with bases colder than 10°C and top temp. between 0 and -20°C. Seeding criteria: based on routine meteorological data and airborne observations	Jan-Apr, Dec	Evaluation based on comparison with historical records Report available EIS-No C/N-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
THAILAND											
TH-1	Op. PE (E) (R) PR	-	Cloud Seeding Operational Program	Thailand	1972 Every year Yes	Agr. (G)	Cloud top and base seeding by solid dispersal from 3 A/C	NaCl plus exo- and endothermic chemicals at a rate of 2 tons within 20-30 km tracks	Convective and orographic clouds with bases warmer than 10°C and tops warmer than 0°C	Mar-Oct 240 days	Evaluation based on crop damage data EIS-Yes C/B-Yes
UKRAINE											
UK-1	Op. PE (R) Ext.	5,000 km^2 target 11,000 km^2 control	Precipitation Enhancement for Agricultural Production	Dnepropetrovsk District 48°N 33°E	1990 Every year Yes	Agr. Res. (G)	In-cloud seeding with pyrotechnic flares and dry ice from 2 A/C	AgI Total consumption 1,057 flares. Dry ice. Total consumption 750 kg during the year	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C Seeding criteria: presence of droplets in clouds with depth > 250 m and temp. < -4°C for dry ice and < -7°C for AgI	Mar, May-June 8 days	Estimation based on historical records Report available EIS-Yes B/C-Yes
UK-2	Op. Hail	5,000 km^2 target	Hail Suppression	Crimea Peninsular	1968 Every year Yes	Agr. (G)	In-cloud seeding with pyrotechnical flares on rockets	AgI Total consumption 9.86 kg	Convective clouds with bases colder than 10°C and tops warmer than -20°C. Seeding criteria: presence of liquid phase in clouds with depth > 400 m, temp. < -7°C	May-Sept 19 days	Estimation based on comparison with historical records, crop damage data and comparison with control area EIS-Yes C/B-Yes
UK-3	Op. Hail	4,000 km^2	Hail Suppression	Odessa District (46°N, 30°E)	1980 Every year Yes	Agr. (G)	As UK-2	AgI Total consumption 542 kg	As UK-2	May-Sept 12 days	Evaluation based on historical records EIS-Yes B/C-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UNITED STATES OF AMERICA											
US-1	Fog	162 km²	Fairchild Cold Fog Dispersal System NOAA 92-771 93-815	Fairchild AFB, Washington	-	Def. (G)	Cold fog seeding with G/B propane dispensers	Propane Total consumption 27,320 l	-	Jan-Apr, Nov-Dec 31 days	EIS-Yes
US-2	PE	2,916 km²	Nevada Ruby Mountains Project NOAA 92-774 93-816	Western Ruby Mountains Watershed	-	Res. (G)	6 G/B acetone burners	AgI Total consumption 14,072 g	-	Jan-Feb Nov-Dec 31 days	EIS-No
US-3	PE	9,720 km²	Nevada Carson-Walker Project NOAA 92-775 93-817	Walker and Carson Watershed, Nevada	-	Res. (G)	A/C with pyrotechnic flares and wing tip burners	AgI G/B 6 g/hour per generator, airborne 200 g/hour per generator Total consumption 24,194 g	-	Jan-Mar Nov-Dec 51 days	EIS-No
US-4	PE	5,410 km²	Nevada Truckee-Tahoe Project NOAA 92-776 93-818	Truckee River Watershed, Nevada	-	Res (G)	7 G/B acetone burners and 1 A/C with pyrotechnic flares or burners	AgI Total consumption 29,665 g	-	Jan-Apr Oct-Dec 26 days	EIS-No
US-5	PE	765 km² target 3,240 km² control	NOAA 92-814	American River Watershed, California	-	Muni. (G)	8 G/B acetone burners	AgI 20 g/hour per burner. Total consumption 313 g	-	Oct-Dec 1 days	EIS-Yes
US-6	Snowpack augmenta-tion	1,620 km² target, 16,000 km² control	NOAA 92-793 93-829	Box Elder, Cache and Rich Counties, Utah	-	Water resources (P)	30 G/B acetone burners	AgI 8 g/hours per burner. Total consumption 19,598 g	-	Jan-Mar Nov-Dec 21 days	EIS-No
US-7	Mountain snowpack augmenta-tion	36,930 km² target, 24,300 km² control	Central and Southern Utah Cloud Seeding NOAA 92-782 93-825	Central and Southern Utah	-	Water resources (P)	80 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 52,968 g	-	Jan-Dec 33 days	EIS-No

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-8	Mountain snowpack increase water supply increase	810 km^2	Mokelumne NOAA 92-779 93-820	Central Sierra Nevada Mountains, California	-	Enr. (P)	6 G/B acetone burners	AgI 25 g/hour per burner. Total consumption 39,937 g	-	Jan-Dec 46 days	Evaluation is planned based on target/control ratio EIS-No
US-9	Mountain snowpack increase, water supply increase	1,620 km^2 target, 454 km^2 control	Lake Almanor NOAA 93-821	Northern Sierra Nevada mountains California	-	Enr. (P)	9 G/B acetone burners	AgI 25 g/hour per burner. Total consumption 11,100 g	-	Nov-Dec 10 days	As US-8
US-10	Mountain snowpack augmenta-tion	650 km^2 target, 490 km^2 control	WASATCH Front (mountains) NOAA 92-783	Utah	-	Muni. (G)	14 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 11,506 g	-	Jan-Feb 16 days	EIS-No
US-11	PE	11,340 km^2	Santa Barbara NOAA 92-795	Santa Barbara, California	-	Muni. (G)	6 G/B generators and A/C with wing-tip generators	AgI 12 g/hour per G/B generator and 180 g/hour per airborne generator Total consumption 14,994 g	-	Jan-Mar 15 days	EIS-Yes
US-12	PE	632 km^2 target, 1944 km^2 control	Santa Clara Project NOAA 93-798	Santa Clara County, California	-	Muni. (G)	Seeding from 1 A/C with pyrotechnics and liquid fuel generator	AgI Total consumption 400 g	-	Jan-Apr 2 days	EIS-Yes
US-13	Mountain snowpack augmenta-tion	32,400 km^2 target, 16,200 km^2 control	West Uintas NOAA 93-829	Northern Utah	-	Water Resources (P)	15 G/B acetone burners	AgI, 8 g/hour per generator Total consumption 2,338 g	-	Nov-Dec 4 days	EIS-No
US-14	Winter snowpack augmenta-tion PE	325 km^2 target, 2,590 km^2 control	Central Colorado Program (Vail) NOAA 92-787 93-822	Vail and Beaver Creek areas, Colorado	-	Water Resources (P,G)	10 G/B acetone burners	AgI 5 g/hour to 20 g/hour per burner. Total consumption 13,684 g	-	Jan-Dec 46 days	EIS-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-15	Fog	3.5 km^2 target, 16.2 km^2 control	Fog Dispersal NOAA 92-781 93-824	Salt Lake City International Airport	-	Trans. (P)	G/B dry ice dispersal	Dry ice. Total consumption 3,640 kg	-	Jan-Feb, Nov-Dec 11 days	EIS-Yes
US-16	PE	765 km^2	American River NOAA 93-814	California	-	Muni.	-	AgI. Total consumption 313 g	-	Oct-Dec 1 day	-
US-17	PE	7,210 km^2	Kings River NOAA 92-794 93-830	Kings River Basin, California	-	Muni. (G)	10 G/B generators, 1 A/C with 2 wing tip generators	AgI 6 to 9 g/hour per G/B generator and 120 to 180 g/hour by A/C generator Total consumption 2,062 g	-	Jan-May Dec 42 days	EIS-Yes
US-18	Fog	32.5 km^2	NOAA 93-828	Medford airport, Oregon	-	Trans (P)	A/C	Dry ice Total consumption 1,534 kg	-	Nov-Dec 4 days	EIS-No
US-19	Snowpack augmenta-tion	1,300 km^2	Ogden River NOAA 92-789	Upper Ogden River and Lost Creek Drainages	-	Water Resources (P)	6 G/B acetone burners	AgI 8 g/hour per burner Total consumption 5,942 g	-	Jan-Feb 16 days	EIS-No
US-20	PE	3,888 km^2 target, 6,480 km^2 control	San Joaquin River Project NOAA 93-806	San Joaquin River, California	-	Water Resources (P)	19 G/B generators and pyrotechnics on 1 A/C	AgI Total consumption 18,193 g	-	Jan-Dec 55 days	EIS-No
US-21	Winter snowpack augmenta-tion, PE	325 km^2 target, 2,590 km^2 control	Aspen Colorado Program NOAA 92-786 93-823	Aspen, Colorado	-	(P)	10 G/B acetone burners	AgI Total consumption 9,213 g	-	Jan-Feb, Nov-Dec 39 days	EIS-No
US-22	Snowpack augmenta-tion	583 km^2 target	Big Sandy River NOAA 93-819	Wyoming	-	Muni.	-	AgI Total consumption 138 g	-	Nov-Dec 2 days	-
US-23	PE	1,620 km^2 target, 1,620 km^2 control	Solano County NOAA 93-799	Solano County, California	-	Muni. (G)	1 A/C seeding clouds with pyrotechnic devices at temp. 0°C to -10°C	AgI 2-200 g/min Total consumption 3,900 g	-	Feb-Mar 13 days	EIS-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-24	PE	4,536 km²	Southeast Idaho NOAA 93-796	Southeast Idaho	-	Muni.	-	AgI Total consumption 13,228 g	-	Jan-Apr 14 days	-
US-25	PE	3,900 km² target, 7,780 km² control	Tuolumne River Project NOAA 93-800	Tuolumne County, California	-	(G) Local	In-cloud and cloud top 1 A/C seeding with pyrotechnic devices and liquid spray	AgI Total consumption 7,498 g	-	Jan-Apr 31 days	EIS-Yes
US-26	PE	1,500 km² target, 3,240 km² control	Eastern Sierra Program NOAA 93-801	Eastern Sierra, California	-	(G) Local	Cloud top seeding with pyrotechnics from 1 A/C	AgI 60 to 6,000 g/hour Total consumption 3,060 g	-	Jan 7 days	EIS-Yes
US-27	PE	2,592 km² target, 3,900 km² control	Monterey Project NOAA 93-804	Monterey County, California	-	(G) Local	In-cloud and cloud-top seeding with pyrotechnics and liquid fuel generators, all from 1 A/C	AgI 60 to 10,000 g/hour Total consumption 5,706 g	-	Jan-Mar 17 days	EIS-Yes
US-28	PE	1,620 km² target, 3,240 km² control	Kaweah River Project NOAA 93-802	Kaweah River, California	-	(G) Local	In-cloud and cloud top seeding with 6 G/B generators and pyrotechnics and liquid fuel generator on 1 A/C	AgI Total consumption 9,548 g	-	Jan-Apr, Dec 32 days	EIS-Yes
US-29	PE	3,800 km² target, 16,200 km² control	Kern River Project NOAA 93-803	Kern River basin, California	-	(G) Local	As US-26	AgI Total consumption 9,080 g	-	Jan-May 23 days	EIS-Yes
US-30	PE	1,620 km² target, 3,240 km² control	San Luis Obispo NOAA 93-805	California	-	(G) Local	As US-26 but 7 G/B generators used	AgI Total consumption 11,794 g	-	Jan-Feb 25 days	EIS-Yes

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-31	PE	11,340 km^2	Boise Program NOAA 92-791 93-826	Boise River basin, Idaho	-	(G) Local	15 G/B AgI generators	AgI 8 g/hour per generator Total consumption 27,344 g	-	Jan-Apr Nov-Dec 40 days	EIS-No
US-32	PE	7,452 km^2	Eastern Idaho NOAA 93-797	Eastern Idaho	-	Muni.	-	AgI Total consumption 25,092 g	-	Jan-Apr 23 days	-
US-33	PE	7,209 km^2	Kings River, California NOAA 92-794 93-830	California	-	(G) Local	12 G/B generators and 1 A/C with 2 wing tip generators	AgI 8 g/hour per G/B generator, 120 g/hour per airborne generator Total consumption 20,062 g	-	Jan-May Dec 42 days	EIS-Yes
US-34	PE Hail	7,740 km^2	North Dakota Weather Modification Program District I NOAA 93-812	Western North Dakota	-	(G) Local	Cloud base and in-cloud seeding with acetone burners and pyrotechnics from 2 A/C at temp -2°C to -12°C	AgI Total consumption 30,420 g Dry ice Total consumption 387 kg	-	June-Aug 30 days	EIS-No
US-35	PE Hail	22,080 km^2	North Dakota Weather Modification Program District II NOAA 93-813	North Dakota	-	(G) Local	as US-34	AgI and dry ice Total consumption 80,740 g and 1,113 kg respectively	-	June-Sept 37 days	EIS-No
US-36	PE	17,820 km^2	Colorado River Municipal Water District NOAA 93-808	Colorado River basin, Texas	-	(G) Local Hyd.	Cloud-base seeding from 1 A/C	AgI Total consumption 2,080 g	-	July-Sept 14 days	EIS-No
US-37	PE Hail	40,800 km^2	Western Kansas Weather Modification NOAA 93-807	West Central and Southwest Kansas	-	(G) Local	Cloud base and top seeding with 4 A/C	AgI and dry ice. Total consumption 55,845 g and 3,159 kg respectively	-	Jan-Apr May-Sept 67 days	-
US-38	Res.	39,300 km^2	Tracer Experiment NOAA 93-811	North Dakota	-	Res. (G)	-	AgI Total consumption 29 g	-	June-July 2 days	-

IV. REGISTER OF 1993 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-39	Mountain snowpack enhance-ment for water supply	840 km² target, 3.2 km² control	Feather River NOAA 92-831	Middle Fork Feather River California	-	(G) Local Hyd.	10 G/B liquid propane dispensers	Propane 12 l/hour Total consumption 6,606 l	-	Nov-Dec 4 days	EIS-Yes
UZBEKISTAN											
UZ-1	Op. Hail	800 km²	Samarkand Project	Zarafshan Valley, Samarkand District	1983 Every year Yes	Agr. (G)	Cloud-base and in-cloud seeding with rockets and shells with pyrotechnics at temp. -6° to -10°C	AgI	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion based on radar data	Apr-Aug 22 days	Evaluation based on historical records and crop damage data EIS-Yes C/B-Yes
UZ-2	Op. Hail	1900 km²	Shahrisyabz Project	Kashkadarya River, Kashkadarya District	1979 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
UZ-3	Op. Hail	3,130 km²	Namangan Project	Fergana Valley, Namangan District	1969 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
UZ-4	Op. Hail	800 km²	Andijan Project	Eastern Fergana Valley, Andijan District	1981 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
YUGOSLAVIA											
YU-1	Op. Hail	66,000 km²	Hail Suppression in Serbia	Republic of Serbia	1967 Every year Yes	Agr. (G)	In-cloud seeding with pyrotechnics on rockets at temp. -4° to -12°C	AgI Total consumption 607 kg	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: maximum reflectivity region above 0°C level, cloud top colder than -28°C	Apr-Oct 39 days	Evaluation based on comparison with historical records and crop damage data EIS-No C/B Yes

V. MEMBER COUNTRIES REPORTING 1994 PROJECTS

[3]Project in Argentina reported by the Russian Federation whose experts performed the project.

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ARGENTINA[4]											
ARG-1[4]	Op. Hail	1,950 km^2	Hail Suppression	Northern Province of Mendoza	1985 Every year (?)	Agr. (G)	In-cloud seeding at temp. levels -3° - -9°C with pyrotechnic flares on rockets	AgI Total consumption 78.6 kg	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: radar reflectivity between 35 and 55 DBZ and extention of 45 DBZ region above 0°C level exceeding 2 km or radar reflectivity > 55 DBZ and said extention > 2.5 km	Nov-Dec	Evaluation based on crop damage data. Report available EIS-Yes C/B-Yes
ARMENIA											
AR-1	Op. Hail	4,170 km^2 target 4,000 km^2 control	Modification of hydrometeological processes	Yerevan area (40°10' N 44°30' E)	1964 Every year Yes	Agr. (G)	-	-	-	-	-

[4]Information submitted by the Russian Federation whose experts performed the project.

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AUSTRALIA											
AU-1	Res. PE Inc.	3,000 km² target. 40,000 km² control	Tasmanian Dry-Ice Cloud Seeding Experiment (DICSE), Stage III	Central Plateau, Tasmania	1992 Every year No	Enr. (G)	A/C dispersing dry ice in clouds and cloud tops at -10°C level where supercooled LWC > 0.1 g/m³	Dry ice, 40 kg/hour Total consumption 600 kg during the year	Stratiform clouds with bases colder than 10°C and top temp. between -3°C and -25°C Seeding criteria: cloud depth greater than half the height of cloud base, average supercooled liquid water in cloud exceeds 0.1g/m³ in St and 0.5g/m³ in Cu	May-Oct 14 days	Evaluation based on randomization, report available. EIS-No C/B-Yes
AU-2	Op. PE (E)	13,000 km² target	The New South Wales Drought Relief Cloud Seeding Operation	North West of New South Wales	1994 (?)	Hyd. (G)	One A/C Seeding in-clouds, cloud tops and bases with acetone burners and by solid dispersal	AgI. 0.5 kg/hour and dry ice 40 kg/hour. Total consumption: 30 kg of AgI and 100 kg of dry ice	Stratiform clouds with bases warmer than 10°C and cloud top temp. between -5 and -25°C. Seeding criteria: as AU-1	Nov-Dec	Evaluation based on comparison with historical records EIS-No C/B-Yes
AUSTRIA											
AUS-1	Op. Hail	1,800 km²	Hail Test Program	Weiz district 46°50' N 15°45' E	1985 Every year Yes	Agr. (P)	3 A/C with acetone burners for seeding cloud bases	17 l/hour of AgI Total consumption 205 kg for year	Convective clouds, bases colder than 10°C and tops colder than -20°C. Seeding criteria: regional forecasts and radar data (C-Band)	May-Sept 28 days	Evaluation based on historical records, crop damage and hail pad data, report planned after 1999 EIS-No C/B-No

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AUS-2	Op. Hail	500 km^2	Lower Austria - Hail Test Program	Krems district 48°20' N 15°31' E	1981 Every year Yes	Agr. (P)	2 A/C with acetone burners for seeding cloud base	12 l/hour of AgI Total consumption 42 kg per year	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: as AUS-1	May-Sept 24 days	As AUS-1
BULGARIA											
BG-1	Op. Res Hail	15,000 km^2	Bulgarian Hail Suppression Project (B-1)	42°45' N 23°45' E	1969 Every year Yes	Agr., Wea. Ser. Insurance (G)	Rockets with pyrotechnic flares, in-cloud seeding at temp. between -5° and -10°C	AgI, 41 g per rocket. Total consumption 147 kg per year	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criteria based on radar echo top height, hail cell top, reflectivity	Apr-Oct 43 days	Evaluation based on historical records, report planned. EIS-No C/B-Yes
BG-2	Res. Dev. PE, PR	2,000 km^2	B-2	42° N 24°E (Southern Bulgaria)	1990 Every year (?)	Res., Wea. Ser. (G)	As BG-1, but seeding temp. are -3° to -10°C	AgI, 41 g per rocket. Total consumption 3.5 kg per year	Convective clouds with bases warmer than 10°C. Seeding criteria: cloud top temp. between -10° and -30°C, radar reflectivity ≥35 DBZ	Apr-Sept 13 days seeded and 12 days with no seeding	Evaluation based on randomization EIS-No C/B-No

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CHINA											
CN-1	Op. PE (E) Hail	12,800 km^2	Precipitation Enhancement and Hail Suppression	30°N, 102°E Sichuan Province	1958 Every year Yes	Agr., Wea. Ser.	In-cloud seeding at -5°C level with pyrotechnical flares on rockets and shells and one A/C. Liquid spray also used	AgI. Total consumption 37.8 kg. Liquid nitrogen 575 kg	Convective orographic and stratiform clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: top temp. about -10°C and supercooled region > 1 km (for PE); radar echo ≥ 34 DBZ, tops higher than 8 km (for hail suppression)	Apr-Sept 80 days	Evaluation based on historical records and crop damage data EIS-No B/C-Yes
CN-2	Res. Op. PE Hail (R)	60,000 km^2 target 30,000 km^2 control	Precipitation Enhancement. Hail Suppression	Heilongjiang Province	1975 Every year Yes	Agr. (G) Wea. Ser.	One A/C with acetone burner and artillery shells at temp. below -10°C, in-cloud seeding	AgI. Total consumption 28.5 kg/year	Convective and stratiform clouds with tops colder than -20°C or between 0 and -20°C	May-Sept 144 days	Evaluation based on historical records and crop damage data, report planned EIS-No C/B-Yes
CN-3	Res. Op. PE, Hail (R)	15,000 km^2	As CN-2	40°40' N 116°30' E (near Beijing)	1990 Every year Yes	Agr. (G) Hyd.	In-cloud seeding with artillery shells and one A/C. 20 G/B generators and liquid spray used at temp. below 0°C	Liquid nitrogen, 4 kg/min. Total consumption 2000 kg during the year	Convective and stratiform clouds, with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criterion: cloud depth more than 1 km	Jan-Sept, Dec 290 days	Estimation based on historical records, crop damage and hail pad data EIS-Yes C/B Yes

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-4	Res. Op. PE, (E), (R) Inc., Hail	50,000 km^2 target, 10,000 km^2 control	Precipitation Enhancement and Hail Suppression	41°N 122°E Liaoning Province	1992 Every year Yes	Agr. (G) Res.	In-cloud seeding at temp. -5°C with acetone burners and solid dispersal from 2 A/C, and explosives on shells	50 kg/hour of dry ice and 300 g/hr of AgI. Total consumption 1500 kg of dry ice and 20 kg of AgI	Convective and stratiform clouds with bases warmer than 10°C and top temp. between 0° and -20°C	Apr-Sept 26 days	Evaluation based on historical records EIS-Yes C/B-Yes
CN-5	Op. PE, Hail	40,000 km^2	Precipitation Enhancement and Hail Suppression	Ningxia Province	1988 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. < -4°C with acetone burner from A/C. Artillery shells for hail suppression	AgI, total yearly consumption 10 kg	Convective and stratiform clouds with top temp. between 0 and -20°C. Seeding criterion: radar echo > 10-15 DBZ in stratiform clouds	May-Sept 150 days	Estimation not planned EIS-No C/B-Yes
CN-6	Op. PE (E)	920 km^2	Precipitation Enhancement	Southwest of Hainan Island	1977 Interrupted Yes	Agr. (G)	In-cloud seeding at temp. between 0° and -4°C with artillery shells	AgI, yearly total consumption 15.6 kg	Convective clouds with bases warmer than 10°C and top temp. between 0° and -20°C	May 31 days	EIS-No C/B-No
CN-7	Res. Op. PE Hail	36,500 km^2 target 39,800 km^2 control	-	Hebei province	1990 Every year Yes	Agr. (G) Res.	In-cloud seeding at temp. -4 - -20°C with acetone burner from 1 A/C and pyrotechnic flares in rockets and artillery shells	-	Convective and stratiform clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: cloud base lower than 2 km, cloud depth > 2 km, LWC > 0.1 g/m^3	Apr-July 118 days	Evaluation based on control modelling. Report planned EIS-Yes C/B-Yes

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-8	Op. PE, Hail (E), Inc	20,000 km^2 target 10,000 km^2 control	Precipitation Enhancement and Hail Suppression	Shanxi Province	1958 Interrupted Yes	Agr. (G) Wea.	In-cloud seeding at temp. -4 - -10°C with acetone burner from one A/C. Rockets and shells also used	500 g/hour of AgI. Total consumption 35 kg/year	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C. Seeding criteria: cloud top temps. between -5 and -20°C, cloud depth more than 3 km	Mar-Oct	EIS-No C/B-Yes
CN-9	Res. Op. PE Hail	12,795 km^2	As CN-8	Guizhou Province 27°N, 106°E	1958 Interrupted Yes	Agr. (G) For. Hyd. Wea. Ser.	In-cloud.seeding with rockets and artillery shells	AgI	Convective and orographic clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion: radar reflectivity	Mar-Oct 214 days	Evaluation based on historical records crop damage and hail pad data EIS-Yes C/B-Yes
CN-10	Op. Res. Dev PE (R) Inc.	20,000 km^2 target 15,000 km^2 control	Snowfall Enhancement	Xinjiang Province, 40°N, 87°E	1978 Every year Yes	Agr. (G) Wea. Ser.	6 G/B generators and 2 A/C with acetone burners for in-cloud seeding at temp. -6° - -15°C	AgI. Total consumption 10 kg	All types of clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria for convective clouds: radar reflectivity > 40 DBZ	Jan, Nov-Dec 220 days	Evaluation based on comparison with historical records and crop damage data EIS-No C/B-Yes
CN-11	Op. PE (R)	2,300 km^2 target 3,300 km^2 control	Precipitation Enhancement	Jiangxi Province	1979 Interrupted Yes	Agr. (G)	In-cloud seeding with artillery shells	AgI. Total consumption: 8 kg	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: cloud depth 6-10 km	July-Sept	Evaluation based on comparison with historical records EIS-No C/B-Yes

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-12	Op. PE	14,000 km^2	Precipitation Enhancement by Aircraft	Anhui Province	1988 Interrupted Yes	Agr. (G) Wea. Ser.	In-cloud seeding with acetone burner from one A/C at temp. below 0°C	AgI, 175 g/hour. Total consumption: 3 kg	Convective and stratiform clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: in-cloud temp. < 0°C, radar reflectivity 10-30 DBZ	July-Sept 63 days	Evaluation based on historical records EIS-No C/B-No
COSTA RICA											
COR-1	Op. PE	600 km^2	Programa de Siembra de Nubes sobre Embalse Arenal	10°30' N 84°50' W Laguna Arenal	1994 (?)	Enr. (G)	In-cloud airborne seeding with pyrotechnical flares at temp. below -5°C	AgI. Total consumption 21.5 kg	Convective clouds with bases warmer than 10°C and top temp. between 0° and -20°C	July-Nov 120 days	Evaluation based on comparison with historical records EIS-No C/B-Yes
CROATIA											
CR-1	Op. Hail	11,000 km^2	Hail Suppression	Between Sava and Drava rivers, 46°N, 17°E	1971 Every year Yes	(G)	In-cloud seeding with rockets at temp. -8° to -12°C and 341 G/B acetone burners	AgI. Total consumption 230 kg during the year	Convective and orographic clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criteria: cloud top temp. below -28°C, 45 DBZ echo top higher than 0°C level plus 1.4 km	July, Oct 45 days	Estimation based on comparison with historical records and crop damage. Report is planned. EIS-Yes C/B-No
CR-2	Res. Dev. Op. Hail	11,000 km^2	As CR-1	Northern Croatia	1970 Every year Yes	Agr (G) Wea. Ser.	In-cloud seeding with rockets at temp. 0° - -10°C and 341 G/B acetone burners	Total yearly consumption rockets 120, with 0.4 kg of pyrotechnics each. Acetone solution of AgI, total 19,158 l	As CR-1	July-Oct 102 days	As CR-1 except C/B-Yes

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FRANCE											
FR-1	Res. Op. Hail	80,000 km^2 target 420,000 km^2 control	ANELFA	Southwestern France	1952 Every year Yes	Agr. (P)	Ground-based seeding with 545 acetone burners	AgI 8 g/hour per generator. Total yearly consumption 784 kg	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criterion: hailstones with diameter exceeding 15 mm being forecasted	Apr-Oct 38 days	Evaluation based on crop damage and hail pad data. Report is available EIS-Yes C/B-Yes
GERMANY											
GE-1	Op. Hail	2,500 km^2 target 7,500 km^2 control	Hail Suppression-Stuttgart Area	49°N 10°E (SW Germany)	1980 Every year Yes	Agr. (G, P) Insurance	Cloud base seeding with acetone burners from 2 A/C	AgI Total consumption 120 kg per year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: based on degree of convective instability, radar data	Apr-Oct	Estimation based on comparison with historical records and hail pad data. Report available EIS-Yes C/B-Yes
ISRAEL											
IS-1	Res. Op. PE (R)	Operational: 4,200 km^2 target 100 km^2 control Experimental: 6,800 km^2 target 150 km^2 control	EMS-Rain Enhancement	Operational: Northern Israel Experimental: Central and Southern Israel	Experimental 1960 Operational 1975 Every year Yes	Agr. (G) Hyd	60 G/B acetone burners and 3 A/C with acetone burners seeding at cloud base level	AgI. Total consumption: A/C 200 kg G/B 200 kg	Convective clouds with bases colder than 10°C and tops warmer than -20°C (usually) or colder (sometimes). Seeding criteria: cloud top colder than -8°C; wind direction	Jan-Apr, Nov-Dec 100 days	Estimation based on randomization (experiment) and comparison with historical records (operational). Report available EIS-No C/B-Yes

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ITALY											
IT-1	Res. PE, Inc.	3,000 km^2 target, 1,500 km control	Rain Project	Southern Italy 16°N, 41°E	1988 Every year No	Agr. (G)	Cloud base seeding with acetone burner from one A/C	AgI	Convective clouds seeding criteria: bases below 2,400 m and tops colder than -8°C	Jan-May 36 seeded units	Estimation based on randomized experiment EIS-Yes C/B-No
LIBYAN ARAB JAMAHIRIYA											
LI-1	Op., PE, Inc	25,000 km^2 target, 40,000 km^2 control	Libyan Cloud Seeding Project	Tafara Plain, west coast of Libya	1980 Every year Yes	Wea. Ser.	Cloud top and in-cloud seeding from 3 A/C	AgI at a rate of 150 g/h. Total yearly consumption 6 kg	Convective and orographic clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criterion: cloud temp. between -5° and -20°C	Oct-Dec	Evaluation based on comparison with historical records, report planned EIS-No B/C-No
MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF											
MAC-1	Op. Hail	25,000 km^2	Hail Suppression	Republic of Macedonia	1971 Every year Yes	Wea. Ser.	In-cloud seeding with rockets at -6° - -12°C temp. levels	AgI	Convective clouds top temp. Seeding criteria: -28°C or lower, logorithm of maximum reflectivity exceeding 3.5 and maximum reflectivity region above 0°C level	Apr-Oct 29 days	Evaluation based on comparison with historical records

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
MALAYSIA											
MAL-1	Op. PE (R) PR	1,136 km^2	Pedu Muda Cloud Seeding Operation	Northern part of Peninsular Malaysia	1977 Interrupted Yes	Wea. Ser. (G)	In-cloud seeding with liquid spray from 1 A/C	NaCl Total consumption 11,100 kg during the year	Convective clouds with bases warmer than 10°C and top temp. close to 0°C Seeding criterion: cloud tops between 4.5 and 6 km	Oct-Dec 58 days	Evaluation is not planned EIS-No C/B-No
MONGOLIA											
MON-1	Op. Res. Dev. Hail	500 m^2	Hail-94	48°N 103°E	1991 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding with shells at temp. between -10° and -20°C	AgI. Total consumption 10 kg	Convective and orographic clouds with top temp. below -20°C	June-Sept 100 days	Evaluation based on comparison with historical records. Report available EIS-No C/B-Yes
MOROCCO											
MO-1	Res. PE (E) (R) Inc	16,400 km^2 target 6,000 km^2 control	Programme AL CHAIT	Atlas Mountains, Central Basin	1984 Every year Yes	Wea. Ser. (G)	G/B seeding with 15 acetone burners and propane dispensers. Seeding cloud tops, bases and in-cloud with acetone burners, solid dispersal and pyrotechnics from 2 A/C	G/B seeding: AgI 20 g/hour Total consumption 32.65 kg during the year. Propane 2 kg/hour Airborne seeding: PbI_2 375 g/hour NaI 115 g/h	Convective orographic and stratiform clouds with bases colder than 10°C and top temps. warmer than -20°C Seeding criteria: cloud top temp. between -5° and -20°C, cloud depth ≥ 1 km	Jan-Apr 31 days	Estimation based on comparison with historical records. Report available EIS-No C/B-Yes
NORWAY											
NO-1	Op. Fog	Airport runway area	-	Oslo Airports: Fornebu and Gardermoen	- Every year Yes	Trans. (G)	1 A/C dispersing dry ice at fog top level	Dry ice	Fog at temp. colder than 0° but warmer than -20°C	Jan-Feb Nov-Dec	-

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RUSSIAN FEDERATION											
RF-1	Op. Hail	771 km^2	Hail suppression	Krasnodar district	1967 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. between -5° and -10°C with rockets and artillery shells	AgI	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: probability of hail Pr ≥ 0.4, ratio of radar reflectivities at 3.2 and 10 cm wave lengths < 1	May-Sept 12 days	Estimation based on historical data. Report available EIS-Yes C/B-Yes
RF-2	Op. Hail	1,006 km^2	Hail suppression	Northern Caucasas	1967 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. -3° to -15°C with pyrotechnical flares on rockets	AgI	Convective clouds with bases colder than 10°C and tops between 0° and -20°C Seeding criteria: as RF-1	Apr-Sept 22 days	Estimation based on comparison with historical records EIS-Yes C/B-Yes
RF-3	Op. PE (E)	40,000 km^2	Cloud seeding for precipitation enhancement in large areas	Stavropol District (Northern Caucasas)	1986 Every year Yes	Agr. Wea. Ser. (G)	Cloud top and in-cloud seeding with pyrotechnical flares from 2 A/C	AgI, dry ice Total consumption 6.8 kg and 150 kg, respectively	Convective and stratiform clouds with base temp. colder than 10°C. Seeding criterion: cloud top above -0°C level (from radar data)	May-July 28 days	Estimation based on comparison with historical data Report available EIS-No C/B-Yes

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SLOVENIA											
SLO-1	Op. Hail	9,700 km^2	Hail Suppression Project of Slovenia	Eastern Slovenia	1971 Every year Yes	Agr. Wea. Ser. (G)	In-cloud seeding at temp. -5 to -15°C with pyrotechnic flares on rockets	AgI 8 g/km^3 of cloud Total consumption 50 kg during the year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criterion: radar reflectivity ≥ 40 DBZ at height exceeding 0°C level by 1.5 km	June-Aug 11 days	Estimation based on historical records and crop damage data. EIS-No C/B-Yes
SOUTH AFRICA											
SA-1	Res. PE	Two target areas, 30,000 km^2 each	National Precipitation Research Program	Bethlehem and Carouna, South African Highlands	1990 Every year Yes	-	A/C seeding of cloud bases with pyrotechnical flares	NaCl, KCl, MgO	Convective clouds with bases colder than 10°C and tops colder than -20°C Seeding criteria: radar reflectivity ≥ 30 DBZ, well defined updraft area	Jan-Mar, Oct-Dec	Estimation based on randomized experiment and data of microphysical measurements EIS-No C/B-Yes
SPAIN											
SP-1	Op. Hail	10,000 km^2	Servicio Interprovincial de Defensa Antigranizo de Alava, la Rioja y Navarra	Northern Spain	1969 Every day	Agr. (G)	G/B seeding with acetone generators	AgI. Total consumption 325 kg	As SP-1	May-Sept 153 days	Evaluation based on hail pads and hailstone composition analysis
THAILAND											
TH-1	Op. PE (E) (R) PR	-	Cloud Seeding Operational Program	Thailand	1972 Every year Yes	Agr. (G)	Cloud top and base seeding by solid dispersal from 3 A/C	NaCl plus exo- and endothermic chemicals at a rate of 2 tons within 20-30 km tracks	Convective and orographic clouds with bases warmer than 10°C and tops warmer than 0°C	Mar-Oct	Evaluation based on crop damage data EIS-Yes C/B-Yes

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UKRAINE											
UK-1	Op. PE (R) Ext.	5,000 km² target 11,000 km² control	Precipitation Enhancement for Agricultural Production	Dnepropetrovsk District 48°N 33°E	1990 Every year Yes	Agr. Res. (G)	In-cloud seeding with pyrotechnic flares and dry ice from 2 A/C	AgI Total consumption 1,000 flares. Dry ice. Total consumption 650 kg during the year	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C (stratiform clouds) or colder (convective clouds). Seeding criteria: presence of droplets in clouds with depth > 250 m and temp. < -4°C for dry ice and < -7°C for AgI	Mar, May-June 7 days	Estimation based on historical records Report available EIS-Yes B/C-Yes
UK-2	Op. Hail	5,000 km² target	Hail Suppression	Crimea Peninsular	1968 Every year Yes	Agr. (G)	In-cloud seeding with pyrotechnical flares on rockets	AgI Total consumption 5.99 kg	Convective clouds with bases colder than 10°C and tops warmer than -20°C. Seeding criteria: presence of liquid phase in clouds with depth > 400 m, temp. < -7°C	May-Sept 14 days	Estimation based on comparison with historical records, crop damage data and comparison with control area EIS-Yes C/B-Yes
UK-3	Op. Hail	4,000 km²	Hail Suppression	Odessa District (46°N, 30°E)	1980 Every year Yes	Agr. (G)	As UK-2	AgI Total consumption 199 kg	As UK-2	May-Sept 9 days	Evaluation based on historical records EIS-Yes B/C-Yes
UNITED STATES OF AMERICA											
US-1	Fog	162 km²	Fairchild Cold Fog Dispersal System NOAA 93-815	Fairchild AFB, Washington	-	Def. (G)	Cold fog seeding with G/B propane dispensers	Propane Total consumption 13,036 l	-	Jan-Mar 25 days	EIS-Yes

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US-2	PE Snowpack augmenta-tion	10,336 km^2	Ruby Mountains Project NOAA 93-816 94-852	Western Ruby Mountains Watershed, Nevada	-	Res. (G)	6 G/B acetone burners	AgI Total consumption 14,223 g	-	Jan-Feb Nov-Dec 25 days	EIS-No
US-3	PE	10,423 km^2	Nevada Carson-Walker Project NOAA 93-817	Walker and Carson Watershed, Nevada	-	Res. (G)	A/C with pyrotechnic flares and wing tip burners	AgI G/B 6 g/hour per generator, airborne 200 g/hour per generator Total consumption 8,821 g	-	Jan-Apr 16 days	EIS-No
US-4	PE	3,532 km^2	Truckee-Tahoe Project NOAA 93-818 94-854	Truckee River Watershed, Nevada	-	Res (G)	7 G/B acetone burners and 1 A/C with pyrotechnic flares or burners	AgI Total consumption 55,017 g	-	Jan-Apr Nov-Dec 39 days	EIS-No
US-5	PE	765 km^2 target 3,240 km^2 control	NOAA 93-814 91-848	American River Watershed, California	-	Muni. (G)	8 G/B acetone burners	AgI 20 g/hour per burner. Total consumption 18,240 g	-	Jan-Mar Nov-Dec 31 days	EIS-Yes
US-6	Snowpack augmenta-tion	810 km^2 target	NOAA 93-829 94-862	Box Elder, Cache and Rich Counties, Utah	-	Water resources (P)	30 G/B acetone burners	AgI 8 g/hours per burner. Total consumption 29,729 g	-	Jan-Mar Dec 25 days	EIS-No
US-7	Mountain snowpack augmenta-tion	32,400 km^2 target, 24,300 km^2 control	Central and Southern Utah Cloud Seeding NOAA 93-825 94-866	Central and Southern Utah	-	Water resources (P)	80 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 58,642 g	-	Jan-Apr Nov-Dec 34 days	EIS-No
US-8	Mountain snowpack increase water supply increase	810 km^2	Mokelumne NOAA 93-820 94-856	Central Sierra Nevada Mountains, California	-	Enr. (P)	6 G/B acetone burners	AgI 25 g/hour per burner. Total consumption 56,706 g	-	Jan-May Nov-Dec 51 days	Evaluation is planned based on target/control ratio EIS-No

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US-9	Mountain snowpack increase, water supply increase	1,620 km^2 target, 454 km^2 control	Lake Almanor NOAA 94-857	Northern Sierra Nevada mountains California	-	Enr. (P)	9 G/B acetone burners	AgI 25 g/hour per burner. Total consumption 28,000 g	-	Nov-Dec 22 days	As US-8
US-10	Mountain snowpack augmenta-tion	356 km^2 target	WASATCH Front (mountains) NOAA 93-832 94-864	Utah	-	Muni. (G)	14 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 9,420 g	-	Jan-Feb Nov-Dec 22 days	EIS-No
US-11	PE	12,960 km^2	Santa Barbara /Obispo NOAA 93-827 94-865	Santa Barbara, California	-	Muni. (G)	6 G/B generators and A/C with wing-tip generators	AgI 12 g/hour per G/B generator and 180 g/hour per airborne generator Total consumption 15,476 g	-	Jan-Mar Dec 13 days	EIS-Yes
US-12	PE	632 km^2 target, 1944 km^2 control	Santa Clara Project NOAA 94-851	Santa Clara County, California	-	Muni. (G)	Seeding from 1 A/C with pyrotechnics and liquid fuel generator	AgI Total consumption 4,200 g	-	Dec 4 days	EIS-Yes
US-13	Mountain snowpack augmenta-tion	800 km^2 target	Northern Utah NOAA 93-829 91-862	Northern Utah	-	Water Resources (P)	15 G/B acetone burners	AgI, 8 g/hour per generator Total consumption 29,726 g	-	Jan-Mar Dec 25 days	EIS-No
US-14	Winter snowpack augmenta-tion PE	325 km^2 target, 2,590 km^2 control	Central Colorado Program (Vail) NOAA 93-822 94-859	Vail and Beaver Creek areas, Colorado	-	Water Resources (P,G)	10 G/B acetone burners	AgI 5 g/hour to 20 g/hour per burner. Total consumption 12,982 g	-	Jan-Feb Nov-Dec 43 days	EIS-Yes
US-15	Fog	3.5 km^2 target, 16.2 km^2 control	Fog Dispersal NOAA 93-824	Atlanta International Airport	-	Trans. (P)	G/B dry ice dispersal	Dry ice. Total consumption 100 kg	-	Jan 1 day	EIS-Yes
US-16	PE	765 km^2	American River NOAA 93-848	California	-	Muni.	-	AgI. Total consumption 18,240 g	-	Jan-Mar Nov-Dec 31 days	-

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US-17	PE	5,184 km²	Kings River NOAA 94-837	Kings River Basin, California	-	Muni. (G)	10 G/B generators, 1 A/C with 2 wing tip generators	AgI 6 to 9 g/hour per G/B generator and 120 to 180 g/hour by A/C generator Total consumption 39,608 g	-	Jan-Dec 36 days	EIS-Yes
US-18	Fog	32.5 km²	NOAA 93-828 94-850	Medford airport, Oregon	-	Trans (P)	A/C	Dry ice Total consumption 1,024 kg	-	Jan-Dec 5 days	EIS-No
US-19	PE	1,134 km²	Calaveras River NOAA 94-868	California	-	Hyd. Muni.	-	AgI. Total consumption 170 g	-	Dec 2 days	-
US-20	PE	3,888 km² target, 6,480 km² control	San Joaquin River Project NOAA 94-836	San Joaquin River, California	-	Water Resources (P)	19 G/B generators and pyrotechnics on 1 A/C	AgI Total consumption 56,292 g	-	Jan-Dec 42 days	EIS-No
US-21	Winter snowpack augmenta-tion, PE	325 km² target, 2,590 km² control	Aspen Colorado Program NOAA 93-823	Aspen, Colorado	-	(P)	10 G/B acetone burners	AgI Total consumption 5,201 g	-	Jan-Feb 24 days	EIS-No
US-22	Snowpack augmenta-tion	583 km²	Big Sandy River NOAA 93-819 94-849	Wyoming	-	Muni.	-	AgI	-	Feb Aug-Sept	-
US-23	PE	1,620 km² target, 1,620 km² control	Solano County NOAA 94-833	Solano County, California	-	Muni. (G)	1 A/C seeding clouds with pyrotechnic devices at temp. 0°C to -10°C	AgI 2-200 g/min Total consumption 12,300 g	-	Jan-Feb 8 days	EIS-Yes
US-24	Snowpack augmenta-tion	842km²	Lake Orovilla NOAA 93-831	California	-	Hyd. Muni.	G/B seeding with propane dispensers	Propane. Total consumption 2,808 l	-	Jan 2 days	-

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US-25	PE	3,900 km² target, 7,780 km² control	Tuolumne River Project NOAA 94-834	Tuolumne County, California	-	(G) Local	In-cloud and cloud top 1 A/C seeding with pyrotechnic devices and liquid spray	AgI Total consumption 17,100 g	-	Jan-Dec 23 days	EIS-Yes
US-26	PE	1,460 km² target, 3,240 km² control	Eastern Sierra Program NOAA 93-801 94-835	Eastern Sierra, California	-	(G) Local	Cloud top seeding with pyrotechnics from 1 A/C	AgI 60 to 6,000 g/hour Total consumption 11,840 g	-	Jan-Dec 19 days	EIS-Yes
US-27	PE	2,592 km² target, 3,900 km² control	Monterey Project NOAA 94-840	Monterey County, California	-	(G) Local	In-cloud and cloud-top seeding with pyrotechnics and liquid fuel generators, all from 1 A/C	AgI 60 to 10,000 g/hour Total consumption 10,400 g	-	Jan-Dec 10 days	EIS-Yes
US-28	PE	1,620 km² target, 3,240 km² control	Kaweah River Project NOAA 94-838	Kaweah River, California	-	(G) Local	In-cloud and cloud top seeding with 6 G/B generators and pyrotechnics and liquid fuel generator on 1 A/C	AgI Total consumption 26,723 g	-	Jan-Dec 42 days	EIS-Yes
US-29	PE	3,800 km² target, 16,200 km² control	Kern River Project NOAA 93-803	Kern River basin, California	-	(G) Local	As US-26	AgI Total consumption 9,080 g	-	Jan-May 23 days	EIS-Yes
US-30	Snowpack augmenta-tion	550 km²	Grand Mesa NOAA 94-842	Colorado	-	Hyd. Muni.	-	AgI. Total consumption 6,070 g	-	Mar-Dec 3 days	-
US-31	PE	11,340 km²	Boise Program NOAA 93-826 94-860	Boise River basin, Idaho	-	(G) Local	15 G/B AgI generators	AgI 8 g/hour per generator Total consumption 34,462 g	-	Jan-Apr Nov-Dec 41 days	EIS-No

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US-32	Snowpack augmenta-tion	3,240 km^2	Eastern Idaho NOAA 94-863	Eastern Idaho	-	Muni.	-	AgI Total consumption 25,092 g	-	Dec 9 days	-
US-33	PE	5,184 km^2	Kings River, California NOAA 93-830 94-837	California	-	(G) Local	12 G/B generators and 1 A/C with 2 wing tip generators	AgI 8 g/hour per G/B generator, 120 g/hour per airborne generator Total consumption 39,608 g	-	Jan-Dec 36 days	EIS-Yes
US-34	PE Hail	7,737km^2	Atmospheric Modification Program NOAA 94-844	North Dakota	-	Res.	-	AgI, dry ice. Total consumption 37,170 g and 469 kg, respectively	-	June-Aug 14 days	-
US-35	PE Hail	22,080 km^2	Atmospheric Modification Program NOAA 94-845	North Dakota	-	Res.	-	AgI. Total consumption 129,900 g and 1176 kg, respectively	-	Jan-Aug 27 days	-
US-36	PE	17,820 km^2	Big Spring NOAA 94-846	Colorado River basin, Texas	-	(G) Local Hyd.	Cloud-base seeding from 1 A/C	AgI Total consumption 2,360 g	-	Apr-Oct 14 days	EIS-No
US-37	PE Hail	38,880 km^2	Western Kansas Weather Modification NOAA 93-807	West Central and Southwest Kansas	-	(G) Local	Cloud base and top seeding with 4 A/C	AgI and dry ice. Total consumption 73,084 g and 2,308 kg respectively	-	May-Sept 50 days	-
US-38	Snowpack augmenta-tion	583 km^2	Wind River NOAA 93-819 94-849	Wyoming	-	Hyd. Muni.	-	AgI	-	Aug-Sept	-
US-39	Snowpack augmenta-tion		North Colorado NOAA 93-818 94-841	Colorado	-	Hyd. Muni.	-	AgI. Total consumption 5,644 g	-	Nov-Dec 16 days	-
US-40	PE	650 km^2	Oneida County NOAA 94-843	Indiana	-	Muni.	-	Ag. Total consumption 15,472 g	-	Dec 5 days	-

VI. REGISTER OF 1994 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UZBEKISTAN											
UZ-1	Op. Hail	800 km^2	Samarkand Project	Zarafshan Valley, Samarkand District	1983 Every year Yes	Agr. (G)	In-cloud seeding with rockets and shells with pyrotechnics at temp. -6° to -10°C	AgI. Total consumption in UZ-1 - UZ-4 projects 10.1 kg	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion based on radar data	Apr-Aug 22 days	Evaluation based on historical records and crop damage data EIS-Yes C/B-Yes
UZ-2	Op. Hail	1,900 km^2	Shahrisyabz Project	Kashkadarya River, Kashkadarya District	1979 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
UZ-3	Op. Hail	3,130 km^2	Namangan Project	Fergana Valley, Namangan District	1969 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
UZ-4	Op. Hail	800 km^2	Andijan Project	Eastern Fergana Valley, Andijan District	1981 Every year Yes	Agr. (G)	As UZ-1	AgI	As UZ-1	As UZ-1	As UZ-1
YUGOSLAVIA											
YU-1[5]	Op. Hail	66,000 km^2	Hail Suppression in Serbia	Republic of Serbia	1967 Every year Yes	Agr. (G)	In-cloud seeding with pyrotechnics on rockets at temp. -4° to -12°C	AgI	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: maximum reflectivity region above 0°C level, cloud top colder than -28°C	Apr-Oct	Evaluation based on comparison with historical records and crop damage data EIS-No C/B Yes

[5]A continuation of activities on YU-1 project in 1993.

VII. ADDRESSES OF REPORTING AGENCIES

ARMENIA	Special State Interprize on Modification of Hydrometeorological Processes 54, Leo St. YEREVAN 375 002 Armenia
AUSTRALIA	Hydro-Electric Commission Cloud Seeding Department GPO Box 355D, Hobart TASMANIA 7001 Australia
AUSTRIA	Department of Climatology Central Institute of Meteorology and Geodynamics Hohe Warte 38 A-1190 VIENNA Austria
BULGARIA	National Institute of Meteorology and Hydrology 66, blvd. Tsarigradsko chaussee 1784 SOFIA Bulgaria
CHINA	State Meteorological Administration Weather Modification Program Office 46 Baishiqiao Road BEIJING 100081 China
COSTA RICA	Instituto Costarricense de Electricidad Apdo. 10032-1000, Sabana Norte SAN JOSE Costa Rica
CROATIA	Meteorological and Hydrological Service of Croatia Gric 3 ZAGREB 10000 Croatia
FRANCE	Association Nationale d'Etude et de Lutte Contre les Fleaux Atmospheriques 52, rue Alfred Duméril 31400 TOULOUSE France
GEORGIA	Institute of Hydrometeorology Georgian Academy of Sciences 150A, Av. Agmashenebeli 380012 TBILISI Georgia
GERMANY	University of Hohenheim D-70593 STUTTGART Germany

GREECE	Hellenic Agricultural Insurance Organization 45 Mesogion St. P.O. Box 14103 11510 ATHENS Greece
ITALY	Ufficia Centrale di Ecolosta Agraria Via del Caravita, 7/A 00186 ROMA Italy
ISRAEL	Israel Meteorological Service P.O. Box 25 BET-DAGAN 50250 Israel
JAPAN	Meteorological Research Institute Japan Meteorological Agency 1-1 Nagamine TSUKUBA, Ibaraki 305 Japan
JORDAN	Jordan Meteorological Department Marka-P.O. Box 341011 AMMAN Jordan
LIBYAN ARAB REPUBLIC	Meteorological Department Administration of Research and Cloud Seeding P.O. Box 5069 TRIPOLI Libyan Arab Republic
MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF	Republic Hydrometeorological Institute Skupi bb 91000 SKOPJE The Former Yugoslav Republic of Macedonia
MALAYSIA	Malaysian Meteorological Service Ibu Pejabat Kajicuaca Jalan Sultan 46667 PETALING JAYA Malaysia
MONGOLIA	Ministry of Nature and Environment Office of Hydrometeorology and Monitoring Hudaldaany gudang 5 ULAANBAATAR-11 Mongolia
MOROCCO	Direction de la Météorologie Nationale Service de Recherche Atmospheriques/CNCRM Aéroport CASA/ANFA CASABLANCA Morocco
NORWAY	Civil Aviation Authority P.O. Box 8124 Dep 0032 OSLO Norway

PERU	Servicio National de Meteorologia e Hidrologia Jr. Cahuide 805 OF. 406 CP 1308 LIMA 11 Peru
RUSSIAN FEDERATION	Federal Service for Hydrometeorology and Monitoring of Environment Administration for Weather Modification 12 Novovagankovskay str. 123342 MOSCOW Russian Federation
SLOVENIA	Hydrometeorological Institute Vojkova 1/B LJUBLJANA 61000 Slovenia
SOUTH AFRICA	S.A. Weather Bureau Private Bag X15 BETHLEHEM 9700 South Africa
SPAIN	Gobierno de Aragon Centro de Proteccion Vegetal Apartado 727 ZARAGOZA 50080 Spain
	Servicio Interprovincial de Defensa Antigranizo de Alava, la Rioja y Navarra 4 Milicias 4-1º- 26003 LOGRONO Spain
	Universidad de Leon Dep. de Fisica 24071 LEON Spain
SYRIAN ARAB REPUBLIC	Syrian Ministry of Agriculture and Agrarian Reform Rain Enhancement Project DAMASCUS Syrian Arab Republic
THAILAND	Bureau of the Royal Rainmaking and Agricultural Aviation Kasetsart University Phahalyokin Rd., Chatuchak BANGKOK 109000 Thailand
UKRAINE	Ukraine Research Institute for Hydrometeorology 37, Prospekt Nauki 252650 GSP KIEV, 28 Ukraine

UNITED STATES OF AMERICA	NOAA National Weather Service SILVER SPRINGS, MD 20910 USA
UZBEKISTAN	Main Administration of Hydrometeorology Uzbek Service for Weather Modification 72, Observatorskay St. 700052 TASHKENT Uzbekistan
YUGOSLAVIA	Federal Hydrometeorological Institute Bircaninova 6 11001 BEOGRAD Yugoslavia

VIII. MEMBER COUNTRIES REPORTING ON COMPLETED PROJECTS

Page

[6]Information on a completed project which took place in Armenia was submitted by Georgian experts who participated in the project.

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
ARMENIA[7]				
Mountainous terrain in the Lake Sevan area Target: 5,000 km^2 Fixed	Precipitation enhancement from convective and stratiform clouds 1978-1990 Apr-Oct Nov-Mar	Agent: AgI Winter time: ground-based seeding with 25-30 generators at a rate of 0.8-1.0 kg/hour Summer time: A/C seeding at altitude 5-7 km with pyrotechnic flares at a rate of 5-10 flares per cloud top. Seeding criteria based on radar data on cloud depth (1-2 km in winter), size and reflectivity Experimental unit: 24 hours in winter and 12 hours in summer. Seeded/unseeded units: 92/100 in winter and 72/69 in summer. Restricted randomization, provided that seeding criteria are met. Basis for evaluation: 100 rain gauges and 10 rain recorders. Evaluation method: comparison of seeded/unseeded units using Student and selected sum tests. Results: 20% and 30% increase in precipitation amounts in summer and winter, respectively, at 0.05-0.10 statistical signficance levels	1. Svanidze G.G. et. al, "On physical and economical efficiency of precipitation enhancement activities in Transcaucasus" Proc. of High Mountain Geophysical Institute, 1992, ISS 85, pp 80-90 2. Begalishvili N.A., Methods for planning and evaluation of efficiency of precipitation enhancement in mountaineous regions (as revealed in Transcaucasus) - Announcement on theses for doctor's degree in physics and mathematics - Tbilisi, 1995	Institute of Hydrometeorology Georgian Academy of Sciences 150 A, Av. Agmaskenebeli 380012 TBILISI Georgia

[7]Information submitted by Georgian experts

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
CHINA				
Mountainous terrain in Baiyang River basin Target: 2,100 km² Control: 1,600 km² Both fixed, 20 km apart	Rain and snow enhancement from orographic clouds 1983-1994 Jan-Nov	Agent: AgI. Cloud seeding at a rate of 0.125 kg/hour with 6 G/B generators and A/C at altitudes 3-4 km. Standard seeding period: 2 hours. Seeding criterion: presence of supercooled water in clouds (as revealed by A/C measurements). Bases for evaluation: data from 10 recording precipitation gauges in target and 5 gauges in control areas. Evaluation method: target-control regression analysis. Result: 22.6% precipitation amount increase at statistical significance level 0.0035	G. Ziyi et. al, 1989 "The orographic cloud seeding over the Baiyang River basin Klamayi, Xinjing, China" - The 5th WMO Scientific Conf. on Weath. Mod. and Appl. Cloud Physics, Beijing, pp. 539-542	Weather Modification Program Office 46 Baishiqiao Rd. BEIJING 100081 China
Flat terrain in Hebei Province Target: 36,500 km² Control: 39,800 km² Variable, about 200 km apart	Rainfall enhancement from stratiform clouds 1990-1994 Mar-July	Agent: AgI. Airborne seeding at a rate of 0.2 kg/hour at altitudes 4-5.5 km. Seeding criteria based on type of weather system, cloud type and cloud macro- and microphysical structures. Standard seeding periods: 1.5 - 2 hours. Seeded days: 77 with unrestricted randomization. Basis for evaluation: 43 and 41 recording precipitation gauges in target and control areas, respectively; data from radar (5 cm wave length), PMS (airborne) and microwave (in 13.5 and 8 mm bands) radiometer. Result based on early experiments (1980-1990) and airborne measurement data: precipitation increase by 17.7% at 0.05 signficance level	WMO/TD-No. 537, pp. 235-240 WMO/TD-No. 596, pp. 549-552, 383-386, 409-410, 627-630 Jingyan Y. et. al, "The study on cloud and precipitation physics and rainfall enhancement technology" - Meteorological Press, China (year unknown)	Weather Modification Program Office 46 Baishiqiao Rd. BEIJING 100081 China
COSTA RICA				
Hilly terrain near Laguna Arenal (10°30'N, 84°50'W) Fixed target: 600 m²	Precipitation enhancement from convective clouds July-Nov 1994	Agent: AgI. In-cloud airborne seeding at temp. -5°C. Seeded: 120 days	-	Instituto Costarricense de Electricidad Apdo. 10032-1000 Sabana Norte SAN JOSE Costa Rica

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
CROATIA				
Mountainous, hilly and flat terrain in Northern Croatia Fixed Target: 11,000 km^2	Hail suppression from convective clouds 25 years July-Oct	Agent: AgI G/B seeding with 341 generators. Seeding criteria based on radar reflectivity and cloud top temperature. Seeded: 102 days. Result: less frequency of hail occurrence as compared to historical records	-	Meteorological and Hydrological Service Gric 3 10000 ZAGREB Croatia
FRANCE				
Hilly and flat terrain in southwestern France Target: 80,000 km^2 Control: 420,000 km^2 Both areas fixed	Suppression of hail from convective and frontal clouds 43 years Apr-Oct	Agent: AgI from 545 ground-based generators. Control is based on hail pad data and crop damage data. Seeding criterion: hail with diameter $\geq$ 15 mm predicted. Seeding unit: 1 day with 8 hours of seeding. Evaluation method: bivariable test with logorithmic transformation. Result: 42% decrease in hail mass at 0.01 statistical significance level. See also 1992 Register	Dessens, J., 1986, "Hail in southwestern France II: Results of a 30 year Hail Prevention Project with AgI seeding from the ground" - J. Appl. Meteor. and Climate, 25, pp. 48-58	ANELFA 52, rue Alfred Dumeril 31400 TOULOUSE France

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
GEORGIA				
Hilly and flat area in Eastern Georgia Two targets: 7,500 km^2, 4,500 km^2	Suppression of hail and lightning from convective and frontal clouds. Hail suppression: 1961-1990 Apr-Oct Lightning suppression: 1978-1983 May-Sept	Hail suppression agents: AgI, PbI_2 (in 1964-1984). Seeding criterion based on radar data. Experimental unit: 24 hours. Seeding objects: developing and mature Cb (cells). Seeding with rockets and shells at altitudes 3-8 km at a rate of 15-20 rockets or 10-15 shells per cell. Seeded units: 1420 days. Evaluation bases: crop damage and radar data on seeded/unseeded cell size and lifetime. Results: 1) by 30-80% less crop damage from hail in the target areas 2) smaller size, radar reflectivity and lifetime of seeded cells (as compared to unseeded) Lightning suppression agent: PbI_2 from rockets at a rate of 2 rockets/min during 13-15 min if cloud top is at 8-10 km or 4 rockets/min during 20 min if cloud top at 10-12 km Experimental unit: a convective cell Randomization of seeded/unseeded units: 4/3. Seeded/unseeded units: 88/22. Evaluation bases: radar and lightning recorder data. Tested hypothesis: lessening of cloud lifetime and lightning activity. Results: positive and negative effect found in 53.4% and 21.6% cases, respectively with 25.0% cases indicating no definite effect	1. Kartsevadze A.I. et. al, 1975, "Certain aspects of hail processes modification using antihail Alazan system" - Proc. Geoph. Inst. of Georgian Academy of Sciences v. 36, pp. 13-27 2. Bartishivili I.T., et. al, 1978, "Towards physical bases of a method for hail suppression" - Proc. of Transcaucasus Research Hydrometeorological Institute (TRHI), ISS.67(73) pp. 73-82 3. Abshaev M.T., Burtsev I.I., Fedchenko L.M., 1990, "Antihail protection in USSR" - Proc. All-Union Conference on Weather Modification, Leningrad, pp. 101-108.	Institute of Hydrometeorology Georgian Academy of Sciences 150 A, Av. Agmaskenebeli 380012 TBILISI Georgia

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
Yory Project Mountainous terrain in Yory River and Paravany Lake Basins Two targets: 1,000 km^2 (Yory River Basin) 2,200 km^2 (Paravany Lake Basin) Control: 3,000 km^2 Distance between areas: 20-30 km	Precipitation enhancement from convective clouds 1978-1990 Apr-Oct	Seeding clouds at 3-8 km with AgI from rockets and shells at a rate of 2-3 rockets or shells per a convective cell. Seeding criteria: based on radar data on cell size and reflectivity. Experimental unit: 12 hours or an individual convective cell. Seeding period: developing Cb. Randomization: seeded/control cells 3/2. Seeded cells: 196. Control cells: 92. Evaluation bases: 40 rain gauges in target area, radar observations. Evaluation method: comparison of rainfall amount from seeded and unseeded cells. Results: 60-80% increase in rainfall at statistical significance level 0.10. Yory River run-off increase by 40% on seeded days as compared to unseeded. Extended area effect: two-fold increase in precipitation amount from an individual cell at a distance of 110-120 km downwind of target area (statistical significance level 0.20)	1) Svanidze G.G. et. al, "Towards an assessment of feasibility of cloud modification effect determination from rain gauge data in the warm period of the year", 1981 - Proc. of TRHI, Iss.73(79) pp. 3-18 2) Svanidze G.G. et. al, 1986 - "Guidelines for precipitation enhancement from convective clouds with antihail hardward", Moscow, Hydrometeorol. Publishers	Georgian Main Administration for Hydrometeorology Department for Monitoring and Protection from Dangerous Hydrometeorological Phenomena TBILISI Georgia
GERMANY				
Hilly terrain in Stuttgart area Target: 2,500 km^2 Control: 7,500 km^2 Both areas are fixed and adjacent	Suppression of hail from convective and frontal clouds 15 years Apr-Oct	Airborne seeding with AgI at cloud base level at a rate of 2 kg/hour. For more information see WMO Register for 1992	-	University of Hobenheim STUTTGART Germany
GREECE				
Hilly and mountainous terrain in Northern Greece Target: 1000 km^2 Control: 1000 km^2 Both fixed	Suppression of hail from convective clouds 1984-1988 Apr-Sept	Airborne seeding with AgI at -10°C level at a rate of 0.4 kg/hour. Experimental unit: 24 hours. Seeded 37 units. Seeding criterion: 35 DBZ echo above -5°C level. Evaluation methods: 130 hail pads in target and the same number in control areas. Mann-Whitney U test applied. Result: 70% reduction of hail mass at 0.05 statistical signficance level. See also WMO Register for 1992	-	ELGA 45 Mesogion St. P.O. Box 14103 11510 ATHENS Greece

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
ITALY				
Rain Project. Flat terrain in Southern Italy, Puglia region Target: 3,000 km^2 Control: 1,500 km^2 Cross-over design with a buffer zone	Rainfall enhancement from convective and frontal clouds 6 years Feb-May	Airborne seeding at 600 m level with AgI. Experimental unit: 1 day. Randomizatioin unrestricted. Seeded: 151 units. Unseeded: 151 units. Evaluation based on data from 22 rain gauges in target area and 15 rain gauges in control area. Evaluation procedures: single ratio, double ratio, root double ratio, WHW, Kolmogorov-Smirnov, Kruskal-Wallis Tests. Result: seed/no seed ratio of rainfall is 0.161, but small amount of data makes this result statistically insignificant	Bauistini et. al, 1993 "Il controllo diefficacia della sperimentazione di incremento artificiale della ploggia net Sud dell' Italia: stima di durata dell' esperimento in Puglia" - Bolleuino Geofisiko, Anno XVI, N 2-3	Via Del Caravita, 7/A 00186 ROMA Italy
JORDAN				
Mountains and hilly area covering major part of Jordan Fixed target: 14,500 km^2	Rainfall augmentation from orographic clouds 1986-1995 Oct-May	Agents: AgI and $(NH_4)_2\ CO_3$ (for warm clouds). Seeding at a rate of 0.4 kg/hour with 20 G/B generators and A/C operating at 3,000 m. Seeding unit: 1 day. Number of seeded/unseeded units: 65/650. Basis for evaluation: data from 12 recording precipitation gauges in target area. Methods for evaluation: comparison with historical records and precipitation efficiency maps. Result: rainfall increase by 15-19% at 0.05 significance level	Tahboub M.I.K, "Status of precipitation enhancement program in Jordan" - Submitted to publication in WMO Technical Document series	Meteorological Department Precipitation Enhancement Program in Jordan P.O. Box 341011 Marka AMMAN Jordan
MALAYSIA				
Mountainous terrain in Northern Malaysia, Peda Muda Catchmeut Target: 1,136 km Fixed	Rainfall augmentation from convective clouds 1993-1994 Aug-Nov	Airborne seeding with NaCl at 1.5-2.1 km. Result: more precipitation presumed. No evaluation made because of mountainous terrain in the target area	-	Malaysian Meteorological Service Jalan Sultan 46667 Petaling Jaya SELANGOR Malaysia

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
MONGOLIA				
Hilly and mountainous terrain, 48°N 103°E Fixed target: 500 km^2	Orographic and convective clouds 1991-1995 June-Aug	Agent: AgI in-cloud seeding at altitude 6-7 km with pyrotechnics on rockets. Seeding criteria based on radar data. Seeded: 100 days. Result: less hail mass	-	Ministry of Nature and Environment Office of Hydrometeorology and Monitoring Khudaldaany Gudamj 5 ULAANBAATAR-11 Mongolia
MOROCCO				
Atlas Mountains. Mountainous terrain Target: 16,400 km^2 Control: 6,000 km^2 Both fixed, 80-100 km apart	Rainfall augmentation from all types of clouds 10 years Nov-Apr	Ground-based and airborne seeding with AgI and NaI at temp. less than -5°C. Seeding rate: 0.375 kg/hour. Evaluation basis: data from 20 and 10 rain gauges in target and control areas. Statistical method: linier regression. Result: 14-17% increase in rainfall	"An Evaluation Trial of the Morocco's ALGHAIT Weather Modification Project"- 6th WMO Conf. on Wea. Mod., Italy, 1994	Direction de la Météorologie Nationale Service de recherches atmospheriques/CNCRM Aéroport CASA/ANFA CASABLANCA Morocco
SPAIN				
Mountainous, hilly and flat terrain in Navarra, Alava and La Rioja Fixed target: 10,000 km^2	Suppression of hail from convective clouds 1969-1995 May-Sept	G/B seeding of AgI with 115 generators. Standard seeding period: from 13 till 1930 hours local time. Number of seeded/unseeded days: 1993 - 53/86, 1994 - 46/107	-	Servicio Antigranizo 4 Milicias 4 - 1° 26003 LOGRONO Spain
SYRIAN ARAB REPUBLIC				
Mountainous, hilly and flat terrain Target: 170,000 km^2 Control: 15,000 km^2 Location of target and control areas are variable, depending on clouds and wind direction	Precipitation enhancement from convective and frontal clouds 1991-1995 Nov-May	Agent: AgI. Airborne seeding at 5.5 km altitude. Total seeding duration: 1009 hours. Basis for evaluation: 125 precipitation gauges (including 37 recording) in target area and 14 gauges (including 8 recording) in control area. Result: precipitation increase by 13%	WMO Report No. 22, WMO TD/No. 596, Vol. 1, pp. 325, 341, 221	Syrian Ministry of Agriculture and Agrarian Reform Rain Enhancement Project DAMASCUS Syrian Arab Republic

IX. REPORTS ON COMPLETED PROJECTS 1993-1994

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
THAILAND				
Mountainous terrain. Floating target: 49,060 km^2	Rainfall augmentation from orographic and convective clouds 1987-1994 Apr-Oct	Agent: AgI. Airborne cloud top seeding at altitude about 7 km with pyrotechnic flares (1-10 flares per cloud top). Seeding criteria: LWC > 1.0 g/m^3, updraft velocity ≥ 5 m/s. Experimental unit: convective cell. Number of seeded/unseeded units: 87/64. Basis for evaluation: rain gauge data and radar estimated rainfall data. Results: 69% increase of rain cell volume, high cloud top, longer duration, larger area of rainfall from seeded cells. More samples required	"Thailand Applied Atmospheric Resources Research Program (Phase 1)", Vol. 1, 2, 3, BRRAA Technical Documents	Bureau of Royal Rainmaking and Agricultural Aviation (BRRAA) Kasetsart Univ. Phanonyotin Rd. Chatuchak BANGKOK 10900 Thailand

X. MEMBER COUNTRIES REPORTING *NO* WEATHER MODIFICATION PROJECTS IN 1993

Afghanistan
Angola
Azerbaijan
Bahamas
Belize
Canada
Costa Rica
Czech Republic
Djibouti
Ecuador
Egypt
Ethiopia
Georgia
Ghana
Hong Kong
Hungary
Iceland
India
Ireland
Kazakstan
Kenya
Korea, Republic of
Lebanon
Lithuania
Madagascar
Mauritius
Myanmar
Namibia
Netherlands
New Zealand
Niger
Oman
Poland
Qatar
Saint Lucia
Saudi Arabia
Seychelles
Sierra Leone
Singapore
Sri Lanka
Sudan
Sweden
Switzerland
Togo
Trinidad and Tobago
Tunisia
Turkmenistan
United Kingdom
Uruguay
Vanuatu
Venezuela
Viet Nam, Socialist Republic of
Zambia

XI. MEMBER COUNTRIES REPORTING *NO* WEATHER MODIFICATION PROJECTS IN 1994

Afghanistan
Azerbaijan
Bahamas
Belize
Brunei
Canada
Czech Republic
Djibouti
Ecuador
Egypt
Ethiopia
Georgia
Ghana
Greece
Hong Kong
Hungary
Iceland
India
Ireland
Kazakstan
Kenya
Korea, Republic of
Lebanon
Lithuania
Madagascar
Mauritius
Myanmar
Namibia
Netherlands
New Zealand
Niger
Oman
Poland
Qatar
Saint Lucia
Saudi Arabia
Seychelles
Sierra Leone
Singapore
Sri Lanka
Sudan
Sweden
Switzerland
Togo
Trinidad and Tobago
Turkmenistan
United Kingdom
Uruguay
Vanuatu
Venezuela
Viet Nam, Socialist Republic of
Zambia

QUESTIONNAIRE CIRCULATED TO GATHER DATA FOR THE REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS

W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

R/CLA/4, ANNEX A
FORM (1 JANUARY 1993)

CLOUD PHYSICS AND WEATHER MODIFICATION RESEARCH PROGRAMME

QUESTIONNAIRE
TO GATHER DATA FOR THE 1993 REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS

PLEASE MARK APPROPRIATE BOXES

MEMBER OF WMO .....

No weather modification activities in 1993 /__/

(Please return this form even if no weather modification activities have taken place this year).

1. TYPE (PURPOSE) OF WEATHER MODIFICATION ACTIVITY OR PROJECT:

(a) Precipitation enhancement ..... /__/

Activity is response to emergency (e.g., droughts) ..... /__/

Activity is for routine water supply augmentation ..... /__/

Goal is to extend wet period ..... /__/

Goal is to increase precipitation during wet period ..... /__/

(b) Precipitation redistribution ..... /__/

(c) Hail suppression ..... /__/

(d) Fog dispersal ..... /__/

(e) Other (please specify): .....

2. THIS IS PRIMARILY A (Research ..... /__/ / Development ... /__/ / Operational ... /__/) ACTIVITY

3. PROJECT AREA

(a) Approximate size of the project target area (km^2): .....

(b) Approximate size of the control area (if used) (km^2): .....

(POOLE 5229)

4. NAME AND/OR REFERENCE OF PROJECT: .....

.....

5. LOCATION OF AREA IN WHICH PROJECT IS CARRIED OUT:

.....

6. PROJECT HISTORY

(a) Year project started: .....

(b) Has project been implemented each year since it was started?

Yes /__/ No /__/ Not known /__/

(c) Is it expected to continue during the coming year?

Yes /__/ No /__/ Not known /__/

7. NATURE OF ORGANIZATION SPONSORING PROJECT
(Please place X in appropriate box)

ACTIVITY OF ORGANIZATION	GOVERNMENT	PRIVATE
Agriculture		
Energy		
Forestry		
Hydrology		
Research Foundation		
Transportation		
Weather Service		
Other (please specify)		

8. PROJECT ACTIVITY THIS YEAR

(a) During the current reporting year, what months did seeding or other weather modification activity take place?

.....

(Note: if reporting period extends over two years, as it might if a project spanning December and January is being reported, please indicate the years being reported, one example might be: December 1992, January-February 1993; another might be: January-February 1993, December 1993).

(b) On how many days did this activity take place? .....

9. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENT AND THEIR DISPERSAL RATES, TECHNIQUES EMPLOYED, ETC. (see instructions)

(a) Seeding delivery system:

Ground /__/ ..... How many generators? /__/

Aircraft /__/ ..... How many aircrafts? /__/

Rockets /__/ Artillery shells /__/

Other (please specify): .....

(b) Type of Generator:

Acetone burner /__/ Pyrotechnic flare /__/

Explosive /__/ Liquid spray /__/

Solid dispersal /__/ Other : .....

(c) Location of release of seeding material:

Ground /__/ Cloud base /__/

Cloud top /__/ In-cloud /__/

If release is in-cloud, at what temperature or other criterion?

.....

.....

Seeding Material	Rate of Consumption (give units)	Total Consumption during this year (kg)
AgI	.....	.....
PbI_2	.....	.....
Dry Ice	.....	.....
NaCl	.....	.....
Propane	.....	.....
.....		
.....		
.....		

10. CHARACTERISTICS OF CLOUDS TREATED:

(a) Convective (cumulus) /__/ Orographic /__/ Layer (stratiform) /__/

(b) Generally, the cloud base temperatures (°C) are:

Warmer than +10°C /__/ Colder than +10°C /__/

(c) Generally, the cloud top temperatures are:

Warmer than 0°C /__/

Colder than 0°C but warmer than -20°C /__/

Colder than -20°C /__/

(d) Criteria used to select days or clouds for treatment:

.....

.....

.....

11. PROVISIONS FOR EVALUATION

(a) None /__/

(b) Randomized experiment /__/

(c) Comparison with historical records /__/

(d) Crop damage /__/ Hail pads /__/

(e) Other: .....

(f) Is a document on the evaluation available or planned? YES /__/ NO /__/

(g) If so, is it available to WMO? YES /__/ NO /__/

12. MISCELLANEOUS

(a) Was an environmental impact study prepared for this project? YES /__/ NO /__/

(b) Has an analysis been made of the expected (or actual) costs and benefits? YES /__/ NO /__/

13. ORGANIZATION IN CHARGE OF PROJECT:

(a) Name of key technical person: .....

(b) Organization: .....

(c) Postal address: .....

.....

.....

14. OPTIONAL REMARKS:

.....

.....

.....

.....

15. REPORTING AGENCY:

(a) Name of reporting agency: .....

(b) Official title of responsible office: .....

.....

(c) Postal address: .....

.....

.....

.....

.....

....
(Signature) (Date)

Please complete and return this questionnaire as soon as possible, and in any case not later than 30 November 1995.

The Secretary-General
World Meteorological Organization
41, Avenue Giuseppe-Motta
Case postale 2300
1211 GENEVA 2
Switzerland

NOTES FOR COMPLETING REPORT ON WEATHER MODIFICATION ACTIVITIES

Weather modification activities which should be included in the Register

The seeding or dispersing into clouds or fog of any substance with the object of altering drop-size distribution, producing ice crystals or the coagulation of droplets, altering the development of hail or lightning, or influencing in any way the natural development cycle of clouds or their environment.

Any other activity performed with the intention of producing artificial changes in the composition, behaviour or dynamics of the atmosphere.

For example :

(a) The use of fires or heat sources to influence convective circulation or to evaporate fog;

(b) The modification of the solar radiation exchange of the earth or clouds, through the release of gases, dusts, liquids or aerosols into the atmosphere;

(c) The modification of the characteristics of land or water surfaces by dusting or treating with powders, liquid sprays, dyes, or other materials;

(d) The releasing of electrically charged or radioactive particles, or ions, into the atmosphere;

(e) The application of shock waves, sonic energy sources, or other explosive or acoustic sources to the atmosphere;

(f) The use of aircraft and helicopters to produce downwash for fog dispersal as well as the use of jet engines and other sources of artificial wind generation;

(g) The use of lasers or other sources of electromagnetic radiation.

Weather modification activities which need not be included in the Register

Activities of a purely local nature, such as the use of lightning deflection or static discharge devices in aircraft, boats, or buildings, or the use of small heat sources, fans, fogging devices, aircraft downwash, or sprays to prevent the occurrence of frost in tracts or fields planted with crops susceptible to frost or freeze damage.

Note: One completed copy of this form is requested for each weather modification activity (hereafter referred to as the project).

ADDITIONAL EXPLANATION
OF QUESTIONS FOR THE
REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS

ITEM 1 - Mark (X) in the box that corresponds to purpose of activity. By project is meant a related series of weather modification activities having a common objective and conducted at a particular location.

ITEM 2 - Mark (X) in the box corresponding to goal of the activity:

- Research - investigating scientific questions;
- Development - field work to optimize procedures;
- Operational - field work intended directly for economic benefits.

ITEM 3 - The Target Area is the area over which an effect is sought. The Control Area (or Areas) are areas that are chosen so as to be unaffected by the seeding material and used to evaluate results within the Target Area.

ITEM 4 - Enter the name and/or reference of projects used by operator. If the project was reported in the previous Register, please quote the WMO Register number which appears in column 1.

ITEM 5 - Indicate the location of the weather modification project by geographical co-ordinates and name of the region.

ITEM 6 - (a) Enter the year in which the first activities under the present project took place;

(b) Indicate if there were breaks in activities or if activities took place each year since it was started;

(c) Indicate whether the project is expected to continue by marking (X) in the appropriate box.

ITEM 7 - Indicate the principal interests of the organization that funds the project by marking (X) in the appropriate box (use multiple marks if appropriate).

ITEM 8 - During what months did the project operate in the field and on how many days did operations take place? Any other information related to the scope of the activity would be helpful. In some cases projects span two years. It is desirable that the portion conducted only within the reporting year be included in the Register for a particular year. If this is not practical, please indicate the years in which the activities took place, for example, December 1990, January-February 1991.

ITEM 9 - By weather modification apparatus is meant any apparatus used with the intention of producing artificial changes in the composition, behaviour or dynamics of the atmosphere. For example: AgI smoke generators, propane devices, flares, rockets, artillery projectiles, jet engines, etc.

(a) Seeding delivery system. Indicate, by marking (X) in the appropriate box, the nature of the delivery system, ground based, airborne, etc.;

(b) Indicate the way the seeding material is prepared for dispersal (e.g., by burning an acetone solution of silver iodide complex). Solid dispersal refers to the release of pellets (e.g., dry ice), powder (e.g., NaCl), etc.;

(c) Indicate the location at which seeding material is dispersed;

(d) Indicate what seeding material is used and the rate of dissemination (mass per unit of time, mass per cloud, etc.). Indicate total amount of material dispensed during the reporting period in kilograms.

ITEM 10 - (a) Indicate, by marking (X) in the box, the general characteristics of the clouds that are selected for treatment;

(b) Indicate the predominate range of cloud base temperatures;

(c) Indicate the predominate range of cloud top temperatures;

(d) What are the characteristics that distinguish days or clouds that are treated from those that are not treated?

ITEM 11 - This question relates to the evaluation of the effectiveness of the project. More information on the means used to judge the merit of the project are welcomed and can be described under Item 14 or on a separate page.

ITEM 12 - This question relates to any analysis that has been made to predict and/or measure the total change in the environment that is affected by the activity and, separately, the economic benefits expected or achieved.

ITEM 13 - Please supply the name and address of agency to which any request for further information should be directed.

ITEM 14 - This item is to permit the reporting person to include any information not covered by items 1 through 13 but which he feels is significant or of interest such as references to published reports describing results of the weather modification operation or experiment. Any information not previously reported, definite plans for a new project, information that is sought, etc., may be outlined under Item 14.

ITEM 15 - Please supply the name and address of the agency that is transmitting this information to WMO.

(POOLE 5229)

ORGANISATION METEOROLOGIQUE MONDIALE

R/CLA/4, ANNEXE A
FORMULAIRE (1er janvier 1993)

PROGRAMME DE RECHERCHE SUR LA PHYSIQUE DES NUAGES ET LA MODIFICATION ARTIFICIELLE DU TEMPS

QUESTIONNAIRE A REMPLIR
AFIN DE FOURNIR DES DONNEES POUR
L'INVENTAIRE 1993 DES PROJETS NATIONAUX DE MODIFICATION ARTIFICIELLE DU TEMPS

COCHER LA CASE CORRESPONDANTE

MEMBRE DE L'OMM .....

Le Membre n'a pas déployé d'activité de modification artificielle du temps en 1993 ..... /__/

(Veuillez renvoyer la première page de ce formulaire, même si aucune activité de modification artificielle du temps n'a eu lieu cette année)

1. TYPE (OBJECTIF) D'ACTIVITE OU DE PROJET DE MODIFICATION ARTIFICIELLE DU TEMPS :

a) Augmentation des précipitations ..... /__/

Activité déployée à la suite d'une situation d'exception (par exemple, sécheresse) ..... /__/

Activité déployée en prévision d'une augmentation régulière de l'approvisionnement en eau ..... /__/

Il s'agit de prolonger la période humide ..... /__/

Il s'agit d'augmenter les précipitations pendant la période humide ..... /__/

b) Redistribution des précipitations ..... /__/

c) Suppression de la grêle ..... /__/

d) Dispersion du brouillard ..... /__/

e) Divers (veuillez préciser) .....

2. IL S'AGIT PRINCIPALEMENT D'UNE ACTIVITE

(de recherche ..... /__/
(de développement .. /__/
(d'exploitation .... /__/

3. ZONE COUVERTE PAR LE PROJET

a) Superficie approximative de la zone cible du projet (km^2) : ....

b) Superficie approximative de la zone témoin (le cas échéant) (km^2) : .....

4. TITRE ET/OU NUMERO DE REFERENCE DU PROJET : .....

.....

5. REPERAGE DE LA ZONE DANS LAQUELLE LE PROJET EST EXECUTE : .....

.....

6. HISTORIQUE DU PROJET

a) Année durant laquelle le projet a été entrepris : .....

b) Les activités d'exécution du projet ont-elles eu lieu chaque année depuis le début des travaux ?

Oui /__/ Non /__/ Indéterminé /__/

c) Est-il prévu de poursuivre le projet au cours de l'année prochaine ?

Oui /__/ Non /__/ Indéterminé /__/

7. CARACTERE DE L'ORGANISME QUI PATRONNE LE PROJET (veuillez cocher la case appropriée) :

ACTIVITE DE L'ORGANISME	ORGANISME GOUVERNEMENTAL	ORGANISME PRIVE
Agriculture		
Energie		
Sylviculture		
Hydrologie		
Fondation de recherche		
Transports		
Service météorologique		
Divers (veuillez préciser)		

8. ACTIVITES RELATIVES AU PROJET EN 1993

a) Quels sont les mois de l'année considérée pendant lesquels ont eu lieu des opérations d'ensemencement ou d'autres activités de modification artificielle du temps ?

.....

.....

(Note : Si la période considérée porte sur deux ans, comme ce pourrait être le cas pour un projet s'étendant sur les mois de décembre et de janvier, veuillez indiquer les années faisant l'objet du rapport; exemples possibles : décembre 1992, janvier-février 1993, ou janvier-février 1993 décembre 1993).

b) Nombre de jours de l'année durant lesquels ont eu lieu ces activités ?

.....

9. DESCRIPTION DES APPAREILS UTILISES POUR LA MODIFICATION DU TEMPS, DES AGENTS DE MODIFICATION ET DE LEUR VITESSE DE DISPERSION, DES METHODES EMPLOYEES, ETC. (voir les instructions)

a) Système de dispersion de la substance d'ensemencement :

Au sol	/__/	Nombre de générateurs	/__/
Aéronef	/__/	Nombre d'appareils	/__/
Fusées	/__/	Projectiles d'artillerie	/__/

Divers (veuillez préciser) .....

b) Type de générateur :

Brûleur à acétone	/__/	Fusée pyrotechnique	/__/
Explosif	/__/	Vaporisation de liquide	/__/
Dispersion de solide	/__/	Divers	

c) Lieu de dispersion de la substance d'ensemencement :

Au sol	/__/	A la base du nuage	/__/
Au sommet du nuage	/__/	Dans le nuage	/__/

Si la dispersion est effectuée dans le nuage, à quelle température ou en fonction de quel autre critère ?

.....

.....

SUBSTANCE D'ENSEMENCEMENT	VITESSE DE CONSOMMATION (indiquer les unités)	CONSOMMATION TOTALE DURANT L'ANNEE (kg)
AgI	.....	.....
PbI_2	.....	.....
Neige carbonique	.....	.....
NaCl	.....	.....
Propane	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

10. CARACTERISTIQUES DES NUAGES ENSEMENCES :

a) Convectifs (cumulus) /__/ Orographiques /__/ Couche (stratiforme) /__/

b) En règle générale, les températures à la base des nuages (°C) sont :

supérieures à +10°C /__/ inférieures à +10°C /__/

c) En règle générale, les températures au sommet des nuages sont :

supérieures à 0°C /__/

inférieures à 0°C mais supérieures à -20°C /__/

inférieures à -20°C /__/

d) Critères de sélection des jours d'ensemencement ou des nuages ensemencés :

.....

.....

.....

11. DISPOSITIONS PRISES EN VUE D'UNE EVALUATION

a) Aucune /__/

b) Expérience aléatoire /__/

c) Comparaison avec des relevés anciens /__/

d) Dégâts aux récoltes /__/ Coussins à grêle /__/

e) Divers : .....

f) Existe-t-il ou est-il prévu d'élaborer un document sur l'évaluation de l'activité ? Oui /__/ Non /__/

g) Le cas échéant, est-il possible de le mettre à la disposition de l'OMM ? Oui /__/ Non /__/

12. DIVERS

a) Une étude concernant les effets de ce projet sur l'environnement a-t-elle été préparée ? Oui /__/ Non /__/

b) Les coûts et les avantages escomptés (ou réels) ont-ils été analysés ? Oui /__/ Non /__/

13. ORGANISME RESPONSABLE DU PROJET :

a) Nom du responsable technique : .....

b) Organisme : .....

c) Adresse : .....

.....

.....

14. REMARQUES FACULTATIVES :

.....

.....

.....

15. ORGANISME QUI FOURNIT LES RENSEIGNEMENTS

a) Nom de l'organisme : .....

b) Titre officiel du bureau responsable : .....

.....

c) Adresse : .....

.....

.....

....
(Signature) (Date)

Veuillez remplir ce questionnaire et le renvoyer dès que possible, et dans tous les cas avant le 30 novembre 1995 à l'adresse suivante :

Monsieur le Secrétaire général
Organisation météorologique mondiale
41, Avenue Giuseppe-Motta
Case postale 2300
1211 GENEVE 2
Suisse

NOTES EXPLICATIVES POUR REMPLIR LE QUESTIONNAIRE SUR LES ACTIVITES DE MODIFICATION ARTIFICIELLE DU TEMPS

Activités de modification artificielle du temps qui devraient figurer dans l'inventaire

L'ensemencement ou la dispersion dans les nuages ou dans le brouillard de toute substance visant à modifier la distribution de la dimension des gouttes, à produire des cristaux de glace ou à coaguler les gouttelettes, à modifier l'évolution de la grêle ou de la foudre ou à influencer d'une manière ou d'une autre le cycle naturel de l'évolution des nuages ou leur environnement.

Toute autre activité déployée dans l'intention de produire des modifications artificielles de la composition, du comportement ou de la dynamique de l'atmosphère.

Par exemple :

a) L'utilisation de feux ou de sources de chaleur pour influencer la circulation convective ou pour évaporer le brouillard.

b) La modification du bilan du rayonnement solaire de la Terre et des nuages par la libération, dans l'atmosphère, de gaz, de poussières, de liquides ou d'aérosols.

c) La modification des caractéristiques des surfaces terrestres ou aquatiques par poudrage ou par des traitements ayant recours à des poudres, des arrosages, des colorants ou d'autres substances.

d) La libération dans l'atmosphère de particules radioactives ou électriquement chargées ou bien d'ions.

e) L'application à l'atmosphère d'ondes de choc, de sources d'énergie acoustique ou d'autres sources explosives ou acoustiques.

f) L'utilisation du souffle des aéronefs et des hélicoptères pour dissiper le brouillard, ainsi que l'utilisation de réacteurs et d'autres sources de vent artificiel.

g) L'utilisation de laser ou d'autres sources de rayonnement électromagnétique.

Activités de modification artificielle du temps qu'il n'est pas nécessaire d'inclure dans l'inventaire

Activités de caractère purement local, par exemple, l'utilisation de parafoudres et de dispositifs de décharge statique sur des aéronefs, des bateaux ou des bâtiments, ou bien l'utilisation de petites sources de chaleur, de ventilateurs, de dispositifs fumigènes, de souffles d'aéronefs ou d'arrosages pour éviter les gelées dans les régions ou les champs plantés de cultures que le gel risque d'endommager.

Note : Il convient de fournir un exemplaire dûment rempli de de formulaire pour chaque activité de modification artificielle du temps (dénommée ci-après le projet)

EXPLICATIONS COMPLEMENTAIRES
CONCERNANT LE QUESTIONNAIRE A REMPLIR POUR
L'INVENTAIRE DES PROJETS NATIONAUX DE MODIFICATION ARTIFICIELLE DU TEMPS

QUESTION 1 - Marquer d'une croix (x) la case qui correspond à l'objectif de l'activité. Par projet on entend une suite d'activités de modification du temps ayant un objectif commun et se déroulant à un endroit donné.

QUESTION 2 - Marquer d'une croix (x) la case correspondant au but de l'activité :

- o recherche - portant sur des questions scientifiques;
- o développement - activités pratiques déployées à des fins d'optimisation des procédures;
- o exploitation - activités pratiques directement axées sur des avantages économiques.

QUESTION 3 - La zone cible est la zone dans laquelle on cherche à obtenir une réaction. La ou les zones témoins sont choisies de manière à ne pas être touchées par la substance d'ensemencement et utilisées pour évaluer les résultats obtenus dans la zone cible.

QUESTION 4 - Inscrire le titre et/ou le numéro de référence du projet utilisé par l'exécutant. Si le projet a été mentionné dans l'inventaire précédent, veuillez indiquer le numéro d'inventaire de l'OMM qui figure dans la colonne 1.

QUESTION 5 - Repérer l'emplacement où est exécuté le projet de modification du temps en indiquant les coordonnées géographiques et le nom de la région.

QUESTION 6 - a) Indiquer l'année au cours de laquelle ont été déployées les premières activités du projet;

b) Indiquer si les activités ont subi des interruptions ou si elles ont eu lieu chaque année depuis le début du projet;

c) Indiquer s'il est prévu de poursuivre le projet en marquant une croix (x) dans la case appropriée.

QUESTION 7 - Indiquer les principales activités de l'organisme qui finance le projet en marquant une croix (x) dans la case appropriée (marquer plusieurs croix, le cas échéant).

QUESTION 8 - Indiquer les mois de l'année pendant lesquels les activités ont été déployées sur le terrain dans le cadre du projet et le nombre de jours d'activité. Tout autre renseignement sur le champ d'application de l'activité serait utile. Dans certains cas, le projet peut s'étendre sur deux ans. Il est souhaitable que seule la partie du projet exécutée pendant l'année considérée figure dans l'inventaire pour l'année en question. Si cela n'était pas possible, veuillez préciser les années pendant lesquelles les activités ont été déployées (par exemple, décembre 1991 janvier-février 1992).

QUESTION 9 - L'expression "appareil utilisé pour la modification artificielle du temps" désigne ici tout appareil utilisé dans l'intention de produire des modifications artificielles de la composition du comportement ou de la dynamique de l'atmosphère. Par exemple, générateurs de fumées d'AgI, dispositifs à propane, torches, fusées, projectiles d'artillerie, moteurs à réaction, etc.

a) Système de dispersion de la substance d'ensemencement. Indiquer en marquant une croix (x) dans la case appropriée, la nature du système de dispersion au sol ou aéroporté, etc.

b) Indiquer comment la substance d'ensemencement est préparée en vue de sa dispersion (par exemple, par combustion d'une solution d'iodure d'argent dans l'acétone). Par dispersion solide, on entend le dégagement de granulés (par exemple de neige carbonique), de poudre (par exemple de NaCl), etc.

c) Indiquer le lieu de dispersion de la substance d'ensemencement.

d) Indiquer la substance d'ensemencement qui est utilisée et la vitesse de dispersion (masse par unité de temps, masse par nuage, etc.). Indiquer, en kilogrammes, la quantité totale de substance dispersée durant toute la période à l'étude.

QUESTION 10 - a) Indiquer, en marquant une croix (x) dans la case appropriée les caractéristiques générales des nuages qui ont été choisis pour traitement.

b) Indiquer l'intervalle prédominant de températures à la base des nuages.

c) Indiquer l'intervalle prédominant de températures au sommet des nuages.

d) Quelles sont les caractéristiques qui permettent de distinguer les jours d'ensemencement ou les nuages ensemencés des autres ?

QUESTION 11 - Cette question se rapporte à l'évaluation de l'efficacité du projet. Il sera fait grand cas de tous les renseignements portant sur les moyens utilisés pour juger les avantages et les inconvénients du projet qui pourraient être donnés en liaison avec la question 14 ou sur une feuille distincte.

QUESTION 12 - Cette question se rapporte à toute analyse effectuée pour prévoir et/ou mesurer l'ensemble des modifications subies par l'environnement du fait de cette activité, ainsi que toute analyse distincte concernant les avantages économiques escomptés ou obtenus.

QUESTION 13 - Veuillez indiquer le nom et l'adresse de l'organisme auquel il faut adresser toute demande de renseignements complémentaires.

QUESTION 14 - Cette question doit permettre à la personne qui remplit le questionnaire de fournir tous les renseignements qui ne sont pas couverts par les questions 1 à 13 comprise et qu'elle juge significatifs ou intéressants, notamment les références à des publications sur les résultats de l'opération ou de l'expérience de modification artificielle du temps. Tout renseignement qui ne figure pas dans les questions qui précèdent, plans définitifs concernant un nouveau projet, renseignement recherché, etc. peut être exposé en liaison avec la question 14.

QUESTION 15 - Veuillez indiquer le nom et l'adresse de l'organisme qui fournit ces renseignements à l'OMM.

ORGANIZACIÓN METEOROLÓGICA MUNDIAL

R/CLA/4, ANEXO A
FORMULARIO (1 DE ENERO DE 1993)

PROGRAMA DE INVESTIGACIÓN SOBRE LA FÍSICA DE NUBES
Y LA MODIFICACIÓN ARTIFICIAL DEL TIEMPO

CUESTIONARIO
PARA RECOPILAR DATOS DESTINADOS AL INVENTARIO DE 1993 DE PROYECTOS NACIONALES DE MODIFICACIÓN ARTIFICIAL DEL TIEMPO

SEÑALAR EN LA CASILLA CORRESPONDIENTE

MIEMBRO DE LA OMM .....

El Miembro no ha llevado a cabo actividades de modificación en 1993 /__/

(Sírvase devolver este formulario aunque no se haya llevado a cabo ninguna actividad de modificación artificial del tiempo este año.)

1. TIPO (FINALIDAD) DE LA ACTIVIDAD O DEL PROYECTO DE MODIFICACIÓN ARTIFICIAL DEL TIEMPO:

a) Intensificación de la precipitación ..... /__/

Esta actividad es la respuesta a una situación de urgencia (por ejemplo sequías) ..... /__/

Esta actividad tiene por objeto lograr un aumento del abastecimiento normal de agua ..... /__/

Se trata de prolongar el período húmedo ..... /__/

Se trata de aumentar la precipitación durante el período húmedo ..... /__/

b) Redistribución de la precipitación ..... /__/

c) Supresión del granizo ..... /__/

d) Dispersión de la niebla ..... /__/

e) Otros (especifíquense): .....

2. SE TRATA PRINCIPALMENTE DE UNA ACTIVIDAD

(de investigación .... /__/
(de desarrollo ..... /__/
(operativa ..... /__/

3. ZONA QUE CUBRE EL PROYECTO

a) Superficie aproximada de la zona del blanco (km^2): .....

b) Superficie aproximada de la zona de control (si procede) (km^2): .....

4. NOMBRE Y/O REFERENCIA DEL PROYECTO: .....

.....

5. SITUACIÓN DE LA ZONA EN LA QUE SE EJECUTA EL PROYECTO:

.....

6. HISTORIAL DEL PROYECTO

a) Año del comienzo del proyecto: .....

b) Indique si el proyecto se ha realizado cada año desde el principio de los trabajos

Sí /__/ No /__/ No se sabe /__/

c) ¿Se ha previsto que continúe el proyecto durante el año próximo?

Sí /__/ No /__/ No se sabe /__/

7. NATURALEZA DE LA ORGANIZACIÓN QUE PATROCINA EL PROYECTO (colóquese una X en la casilla que corresponda)

ACTIVIDAD DE LA ORGANIZACIÓN	GUBERNAMENTAL	PRIVADA
Agricultura		
Energía		
Silvicultura		
Hidrología		
Fundación de investigación		
Transporte		
Servicio Meteorológico		
Otras actividades (especifíquense)		

8. ACTIVIDADES RELATIVAS AL PROYECTO EN 1993

a) ¿Cuáles son los meses del año durante los cuales se han realizado operaciones de siembra u otras actividades de modificación artificial del tiempo?

.....

(Nota: Si el período abarca más de dos años, como podría ocurrir si un proyecto se realiza durante los meses de diciembre y enero, sírvase indicar los años de que trata el informe; ejemplos posibles: diciembre de 1992, enero-febrero de 1993 o enero-febrero de 1993, diciembre de 1993).

b) Número de días durante los cuales se han llevado a cabo estas actividades .....

9. DESCRIPCIÓN DE LOS APARATOS DE MODIFICACIÓN ARTIFICIAL DEL TIEMPO, E INDICACIÓN DE LOS AGENTES DE MODIFICACIÓN Y SUS ÍNDICES DE DISPERSIÓN, TÉCNICAS EMPLEADAS, ETC. (véanse instrucciones)

a) Procedimiento de siembra:

Desde tierra	/__/	..... ¿Cuántos generadores?		/__/
Desde aeronaves	/__/	..... ¿Cuántas aeronaves?		/__/
Mediante cohetes	/__/		Proyectiles de artillería	/__/

Otros (especifíquense): .....

b) Tipo de generador:

Quemador de acetona	/__/	Fulguración pirotécnica	/__/
Explosivo	/__/	Neutralizador líquido	/__/
Dispersión de sustancias sólidas	/__/	Otros:	

c) Lugar de lanzamiento del material de siembra:

En tierra	/__/	Base de las nubes	/__/
Cima de las nubes	/__/	Interior de las nubes	/__/

Si el lanzamiento se hace en el interior de una nube, ¿a que temperatura o cuál criterio?

.....

.....

Material de siembra	Cantidad de material consumido (dar unidades)	Consumo total durante este año (kg)
AgI	.....	.....
PbI_2	.....	.....
Hielo Seco	.....	.....
NaCl	.....	.....
Propano	.....	.....
.....		
.....		
.....		

10. CARACTERÍSTICAS DE LAS NUBES TRATADAS:

a) Convectivas (cúmulos) /__/ Orográficas /__/ Capa de nubes (estratiforme) /__/

b) En general las temperaturas de la base de las nubes (°C) son:

Superiores a +10°C /__/ Inferiores a +10°C /__/

c) En general, las temperaturas en la cima de las nubes son:

Superiores a 0°C /__/

Inferiores a 0°C, pero superiores a -20°C /__/

Inferiores a -20°C /__/

d) Criterios de selección de los días de siembra o de las nubes sembradas:

.....

.....

.....

11. DISPOSICIONES QUE SE HAN TOMADO PARA REALIZAR LA EVALUACIÓN

a) Ninguna /__/

b) Experimento aleatorio /__/

c) Comparación con registros históricos /__/

d) Daños causados a las cosechas /__/ Paquetes de granizo /__/

e) Otras: .....

f) Indíque si existe o si se ha previsto preparar un documento sobre la evaluación de la actividad Sí /__/ No /__/

g) Si procede indíque si es posible facilitarlo a la OMM Sí /__/ No /__/

12. DIVERSOS

a) Indique si se ha preparado un estudio sobre los efectos de este proyecto para el medio ambiente Sí /__/ No /__/

b) Indique si se han analizado los costos y las ventajas previstos Sí /__/ No /__/

13. ORGANIZACIÓN ENCARGADA DEL PROYECTO

a) Nombre de la persona encargada de los aspectos técnicos .....

.....

b) organización .....

c) dirección .....

.....

.....

14. OTRAS OBSERVACIONES:

.....

.....

.....

.....

15. ORGANISMO QUE PRESENTA LA INFORMACIÓN:

a) Nombre del organismo:.....

b) Título oficial de la dependencia responsable: .....

.....

c) Dirección: .....

.....

.....

.....

.....

....
(Firmado) (Fecha)

Sírvase rellenar el presente cuestionario y devolverlo lo antes posible, y en todo caso antes del 30 de noviembre de 1995 a la dirección siguiente:

Señor Secretario General
Organización Meteorológica Mundial
41, Avenue Giuseppe-Motta
Case postale 2300
1211 GINEBRA 2
Suiza

NOTAS ACLARATORIAS PARA RELLENAR EL INFORME SOBRE ACTIVIDADES DE MODIFICACIÓN ARTIFICIAL DEL TIEMPO

Actividades de modificación artificial del tiempo que deberán consignarse en el inventario

La siembra o dispersión, en las nubes o en la niebla, de cualquier sustancia inyectada con objeto de alterar la distribución de las dimensiones de las gotas, que produzcan cristales de hielo o la coagulación de gotas minúsculas, que altere el proceso de formación de granizo o de descargas eléctricas, o que incluya de un modo u otro en el desarrollo natural del ciclo de formación de nubes o en el medio que las rodea.

Cualquier otra actividad, realizada con intención de producir por medios artificiales cambios en la composición, el comportamiento o la dinámica de la atmósfera.

Por ejemplo:

a) la utilización de fuegos o de focos de calor con miras a influir en la circulación convectiva o a provocar la evaporación de la niebla;

b) la modificación del intercambio de la radiación solar de la tierra o de las nubes, mediante la emisión de gases, polvos, líquidos o aerosoles en la atmósfera;

c) la modificación de las características de las superficies terrestres o líquidas espolvoreándolas o tratándolas con sustancias pulverizadas, o con líquidos nebulizados, materias colorantes u otros materiales;

d) la emisión en la atmósfera de partículas cargadas eléctricamente o de partículas radiativas, o bien de iones;

e) la aplicación a la atmósfera de ondas de choque, fuentes de energía sónica u otras fuentes explosivas o acústicas;

f) la utilización de aviones y helicópteros para la dispersión de la niebla mediante la corriente de aire provocada por las palas o hélices de los mismos, así como la utilización de reactores y de otros generadores artificiales de viento;

g) la utilización de lasers u otras fuentes de radiación electromagnética.

Actividades de modificación artificial del tiempo que no deberán consignarse en el inventario

Actividades de índole puramente local, tales como la utilización de pararrayos o dispositivos de descargas estáticas a bordo de los aviones, buques o edificios; o la utilización de pequeños focos caloríferos, de ventiladores, de generadores de humo; o el empleo de aeronaves con miras a aprovechar la corriente de aire provocada por las palas de los rotores o las hélices, o de riesgos para evitar la formación de hielo en zonas o terrenos en los que los cultivos son susceptibles de sufrir daños por causa de las heladas.

Nota: Se solicita el envío de un ejemplar rellenado de este formulario para cada actividad de modificación artificial de tiempo (en adelante denominado proyecto).

EXPLICACIÓN ADICIONAL DE LAS PREGUNTAS QUE FIGURAN EN EL FORMULARIO PARA EL INVENTARIO DE PROYECTOS NACIONALES DE MODIFICACIÓN ARTIFICIAL DEL TIEMPO

PREGUNTA 1 - Escríbase una (X) en la casilla que corresponda a la finalidad de la actividad. Se entiende por proyecto una serie relacionada de actividades de modificación artificial del tiempo que tiene un objetivo común y que se realiza en un lugar determinado.

PREGUNTA 2 - Escríbase una (X) en la casilla correspondiente a la finalidad de la actividad:

- investigación	- investigación de cuestiones científicas;
- desarrollo	- trabajos sobre el terreno para optimizar los procedimientos
- operativa	- trabajos sobre el terreno con la intención directa de obtener beneficios económicos.

PREGUNTA 3 - La zona del blanco es aquella en la que se trata de obtener un efecto. La zona (o zonas) de control es aquella que se escoge para que no sea afectada por el material de siembra y se utiliza para evaluar los resultados dentro de la zona del blanco.

PREGUNTA 4 - Consígnese el nombre y/o referencia de los proyectos que ejecuta el realizador. Si el proyecto fue comunicado ya en el inventario anterior, rogamos cite el número de inventario de la OMM que aparece en la columna 1.

PREGUNTA 5 - Indíquese el lugar donde se ejecuta el proyecto de modificación artificial del tiempo mediante coordenadas geográficas y el nombre de la región.

PREGUNTA 6 - a) Consígnese el año en que tuvieron lugar las primeras actividades en el marco del presente proyecto;

b) indíquese si se han interrumpido las actividades o si se han realizado cada año desde el principio del proyecto;

c) indíquese si está previsto que el proyecto continúe, señalando con una (X) la casilla adecuada.

PREGUNTA 7 - Indíquense los principales intereses de la organización que financia el proyecto, señalando con una (X) la casilla apropiada (utilícense varias señales si es necesario).

PREGUNTA 8 - Indíquense los meses del año durante los cuales se han realizado actividades sobre el terreno en el marco del proyecto y el número de días de actividad. Cualquier otra información sobre el campo de apliación de la actividad. Convendría que sólo se mencione en el inventario la parte del proyecto realizada durante el año de que se trata. Si esto no es posible, sírvase especificar los años durante los cuales se han realizado las actividades (por ejemplo: diciembre de 1990, enero-febrero de 1991).

PREGUNTA 9 - Se entiende por aparato para la modificación artificial del tiempo cualquier apartato utilizado con la intención de producir cambios artificiales en la composición, comportamiento o dinámica de la atmósfera. Por ejemplo, generadores de humo de AgI, dispositivos de propano, fulguraciones, cohetes, proyectiles de artillería, reactores, etc.

a) procedimiento de siembra, indíquese, señalando con una (X) la casilla adecuada, el carácter del sistema de emisión, con base en tierra, aerotransportado, etc.;

b) indíquese el modo en que se prepara el material de siembra para su dispersión (por ejemplo, quemando una solución de yoduro de plata en acetona). La dispersión de sustancias sólidas se refiere al lanzamiento de gránulos (por ejemplo, hielo seco), polvo (por ejemplo, NaCL), etc.;

c) indíquese el lugar en el que se dispersa el material de siembra;

d) indíquese qué material de siembra se utiliza y su índice de dispersión (masa por unidad de tiempo, masa por nube, etc.) Indíquese la cantidad total de material empleado durante el período de este informe en kilos.

PREGUNTA 10 - a) Indíquese, señalando con una (X) la casilla adecuada, las caraterísticas generales de las nubes que se seleccionan para el tratamiento;

b) indíquese el intervalo predominante de las temperaturas en la base de las nubes;

c) indíquese el intervalo predominante de las temperaturas en la cima de las nubes;

d) ¿Cuáles son las características distintivas de las nubes en los días en que se han sometido a tratamiento y de las nubes no tratadas?

PREGUNTA 11 - Esta pregunta se refiere a la evaluación de la eficacia del proyecto. Se acogerá con satisfacción mayor información sobre los medios utilizados para juzgar los méritos del proyecto, y ello puede describirse bajo el punto 14 o en una página aparte.

PREGUNTA 12 - Esta pregunta se refiere a cualquier análisis realizado para prever y/o medir el conjunto de las modificaciones del medio ambiente como consecuencia de esta actividad así como a cualquier análisis sobre las ventajas económicas previstas o alcanzadas.

PREGUNTA 13 - Rogamos proporcione el nombre y dirección del organismo al que ha de dirigirse toda petición de mayor información.

PREGUNTA 14 - Esta pregunta tiene por finalidad permitir que la persona que presenta el informe incluya toda información no tratada por las preguntas 1 a 13 pero que estime importante o de interés, como pueden ser las referencias a informes publicados en los que se describen los resultados de la operación o experimento de modificación artificial del tiempo. Toda información no consignada anteriormente, planes concretos para un nuevo proyecto, información que se solicita, etc. puede exponerse en la pregunta 14.

PREGUNTA 15 - Rogamos proporcione el nombre y dirección del organismo que transmite esta información a la OMM.

ВСЕМИРНАЯ МЕТЕОРОЛОГИЧЕСКАЯ ОРГАНИЗАЦИЯ

R/CLA/4, ПРИЛОЖЕНИЕ A
ФОРМА (1 ЯНВАРЯ 1993 г.)

ПРОГРАММА НАУЧНЫХ ИССЛЕДОВАНИЙ ПО ФИЗИКЕ ОБЛАКОВ И АКТИВНЫМ ВОЗДЕЙСТВИЯМ НА ПОГОДУ

ВОПРОСНИК ПО СБОРУ ДАННЫХ ДЛЯ РЕЕСТРА НАЦИОНАЛЬНЫХ ПРОЕКТОВ ПО АКТИВНЫМ ВОЗДЕЙСТВИЯМ НА ПОГОДУ ЗА 1993 г.

ПРОСЬБА ПОМЕТИТЬ СООТВЕТСТВУЮЩИЕ КВАДРАТЫ

ЧЛЕН ВМО .....

Деятельность по активным воздействиям на погоду в 1993 г. не проводилась ☐

(Просьба прислать эту форму, даже если деятельность по активным воздействиям на погоду в этом году не проводилась).

1. ВИД (ЦЕЛЬ) ДЕЯТЕЛЬНОСТИ ИЛИ ПРОЕКТА ПО АКТИВНЫМ ВОЗДЕЙСТВИЯМ НА ПОГОДУ:

a) Увеличение осадков ..... ☐

Деятельность вызвана чрезвычайными обстоятельствами (например, засухи) ..... ☐

Деятельность осуществляется в целях увеличения обычного водоснабжения ..... ☐

С целью продления влажного периода ..... ☐

С целью увеличения осадков в течение влажного периода .. ☐

b) Перераспределение осадков ..... ☐

c) Подавление града ..... ☐

d) Рассеивание тумана ..... ☐

e) Другие виды (просьба указать) ..... ☐

2. ЭТА ДЕЯТЕЛЬНОСТЬ НОСИТ ПРЕЖДЕ ВСЕГО ХАРАКТЕР

(исследований ..... ☐)
(разработок ..... ☐)
(оперативных применений ..... ☐)

3. РАЙОН, ОХВАТЫВАЕМЫЙ ПРОЕКТОМ

a) Приблизительный размер целевого района, где осуществляются воздействия, предусмотренные проектом ($км^2$): .....

b) Приблизительный размер контрольного района (если используется) ($км^2$): .....

4. НАЗВАНИЕ И/ИЛИ ОБОЗНАЧЕНИЕ ПРОЕКТА: .....

.....

5. МЕСТОНАХОЖДЕНИЕ РАЙОНА, ГДЕ ОСУЩЕСТВЛЯЕТСЯ ПРОЕКТ:

.....

6. ИСТОРИЯ ПРОЕКТА

a) Год начала проекта: .....

b) Осуществлялся ли проект каждый год после его начала?

Да ☐ Нет ☐ Неизвестно ☐

c) Предполагается ли продолжение проекта в течение следующего года?

Да ☐ Нет ☐ Неизвестно ☐

7. ХАРАКТЕР ОРГАНИЗАЦИИ-СПОНСОРА ПРОЕКТА
(просьба поставить X в соответствующем месте)

ОБЛАСТЬ ДЕЯТЕЛЬНОСТИ ОРГАНИЗАЦИИ	ПРАВИТЕЛЬСТВЕННАЯ	ЧАСТНАЯ
Сельское хозяйство		
Энергетика		
Лесное хозяйство		
Гидрология		
Фонд для научных исследований		
Транспорт		
Метеорологическая служба		
Прочие (просьба указать)		

8. ДЕЯТЕЛЬНОСТЬ ПО ПРОЕКТУ В ЭТОМ ГОДУ

a) В какие месяцы текущего отчетного года производился засев или проводилась другая деятельность по активному воздействию на погоду?

. . . . . .

(Примечание: Если отчетный период охватывает два года, например при сообщении информации о проекте, осуществляемом в течение декабря и января, то просьба указать годы. Пример: декабрь 1992 г., январь-февраль 1993 г.; другой пример: январь-февраль 1993 г., декабрь 1993 г.).

b) Сколько дней проводилась эта деятельность? . . . . . .

9. ОПИСАНИЕ ОБОРУДОВАНИЯ ДЛЯ АКТИВНОГО ВОЗДЕЙСТВИЯ НА ПОГОДУ, РЕАГЕНТОВ АКТИВНОГО ВОЗДЕЙСТВИЯ И СКОРОСТИ ИХ РАСПЫЛЕНИЯ, ИСПОЛЬЗУЕМЫХ МЕТОДОВ И Т.Д. (см. указания)

a) *Система доставки засеивающих веществ:*

Наземная ☐ . . . . . Сколько генераторов? ☐

Самолет ☐ . . . . . Сколько самолетов? ☐

Ракеты ☐ . . . . . Артиллерийские снаряды ☐

Другие (просьба указать): . . . . . .

b) *Тип генератора:*

Ацетоновая горелка ☐ Пиротехническая ракета ☐

Взрывчатое вещество ☐ Разбрызгиватель жидкости ☐

Распылитель твердых частиц ☐ Другие: .....

c) *Расположение выпуска засеивающего вещества:*

Наземное ☐ Нижняя граница облаков ☐

Верхняя граница облаков ☐ В облаках ☐

Если выпуск осуществляется в облаке, то при какой температуре или по каким другим критериям?

.....

.....

Реагент засева	Расход (указать единицы измерения)	Общий расход в течение года (в кг)
AgI	.....	.....
PbI_2	.....	.....
Сухой лед	.....	.....
NaCl	.....	.....
Пропан	.....	.....
.....		
.....		
.....		

10. ХАРАКТЕРИСТИКИ ОБРАБАТЫВАЕМЫХ ОБЛАКОВ

a) Конвективные (кучевые) ☐ Орографические ☐ Слой (слоистообразные) ☐

b) Преобладающая температура в основании облака (°C):

Выше 10°C ☐ Ниже 10°C ☐

c) Преобладающая температура в вершине облака:

Выше 0°C ☐

Ниже 0°C, но выше -20°C ☐

Ниже -20°C ☐

d) Критерии, используемые при выборе дней или облаков для их обработки:

. . . . . .

. . . . . .

. . . . . .

11. ОБОСНОВАНИЯ ДЛЯ ОЦЕНКИ

a) Не имеются ☐

b) Рандомизированный эксперимент ☐

c) Сравнение с историческими данными ☐

d) Ущерб урожаю ☐ Градомеры ☐

e) Прочие: . . . . . .

f) Имеется ли документ по оценке или планируется таковой? ДА ☐ НЕТ ☐

g) Если да, то можно ли его направить в ВМО? ДА ☐ НЕТ ☐

12. РАЗНОЕ

a) Была ли подготовлена для этого проекта оценка влияния на окружающую среду? ДА ☐ НЕТ ☐

b) Проведен ли анализ предполагаемых (или фактических) затрат и выгод? ДА ☐ НЕТ ☐

13. НАЗВАНИЕ ОРГАНИЗАЦИИ, ОТВЕТСТВЕННОЙ ЗА ПРОЕКТ

a) Фамилия главного технического лица: . . . . . .

b) Организация: . . . . . .

c) Почтовый адрес: . . . . . .

. . . . . .

. . . . . .

14. ЛЮБЫЕ ЗАМЕЧАНИЯ

....

....

....

....

15. ОРГАНИЗАЦИЯ, НАПРАВЛЯЮЩАЯ ОТЧЕТ

a) Название организации, направляющей отчет: ....

b) Официальное название ответственного подразделения: ....

....

c) Почтовый адрес: ....

....

....

....

....

.... (Подпись)   .... (Дата)

Просьба заполнить и вернуть этот вопросник по возможности скорее и в любом случае не позднее 30 ноября 1995 г. по адресу:

The Secretary-General
World Meteorological Organization
41, Avenue Giuseppe-Motta
Case postale 2300
1211 GENEVA 2
Switzerland

ПРИМЕЧАНИЯ ПО СОСТАВЛЕНИЮ ОТЧЕТА О ДЕЯТЕЛЬНОСТИ ПО АКТИВНЫМ ВОЗДЕЙСТВИЯМ НА ПОГОДУ

Деятельность по активным воздействиям на погоду, которую следует включить в Реестр

Засеивание или распространение в облачности или тумане какого-либо вещества с целью изменения распределения размера капель, образования кристаллов льда или коагуляции капелек, изменение развития града или молний или осуществление какого-либо воздействия на естественное развитие цикла облаков или их окружение.

Любая другая деятельность, осуществляемая с целью вызывания искусственных изменений в составе, поведении или динамике атмосферы.

Например:

a) использование огня или источников тепла для оказания влияния на конвективную циркуляцию или для испарения тумана;

b) активное воздействие на обмен солнечной радиации земли или облаков посредством выделения в атмосферу газов, пыли, жидкостей или аэрозолей;

c) активное воздействие на характеристики поверхностей земли или воды при помощи опыления или обработки порошками, жидкими распылителями, красителями или другими веществами;

d) выделение в атмосферу электрически заряженных или радиоактивных частиц, или ионов;

e) применение в атмосфере ударных волн, источников звуковой энергии или других взрывных или акустических источников;

f) использование самолетов и вертолетов для создания нисходящих потоков в целях рассеивания тумана, а также использование реактивных двигателей и других источников создания искусственного ветра;

g) использование лазеров или других источников электромагнитной радиации.

Деятельность по активным воздействиям на погоду, которую не следует включать в Реестр

Деятельность, носящую чисто локальный характер, такую как использование отражателей молний или статистических разрядников на самолетах, судах или зданиях или использование небольших источников тепла, вентиляторов, противотуманных устройств, создание нисходящего воздушного потока воздушными судами или распылителями для предотвращения заморозков на участках или полях с посевом культур, которым наносят ущерб заморозки или морозы.

Примечание: Просьба заполнить один экземпляр этой формы для каждого вида деятельности по активным воздействиям на погоду (в дальнейшем именуемого как проект).

ДОПОЛНИТЕЛЬНЫЕ ПОЯСНЕНИЯ К ВОПРОСАМ ДЛЯ РЕЕСТРА НАЦИОНАЛЬНЫХ ПРОЕКТОВ ПО АКТИВНЫМ ВОЗДЕЙСТВИЯМ НА ПОГОДУ

ПУНКТ 1 - Укажите значком (X) квадрат, который соответствует целям деятельности. Под проектом подразумевается связанная серия действий по активным воздействиям на погоду, имеющих общую цель и проводимых в конкретном месте.

ПУНКТ 2 - Укажите значком (X) квадрат, соответствующий цели деятельности:

- исследования	- вопросы научных исследований;
- разработки	- полевая работа по оптимизации процедур;
- оперативные применения	- полевая работа, направленная непосредственно на достижение экономических выгод.

ПУНКТ 3 - Под целевым районом осуществления воздействий подразумевается район, в пределах которого предполагается обнаружить последствия деятельности по активному воздействию на погоду. Под контрольным районом (или районами) понимается территория, которая выбрана так, чтобы она не подвергалась воздействиям засевающих веществ; она используется для оценки результатов в пределах целевого района.

ПУНКТ 4 - Впишите название и/или обозначение проектов, используемых оператором. Если проект был зарегистрирован в предыдущем Реестре, просьба указать номер по Реестру ВМО, который стоит в колонке 1.

ПУНКТ 5 - С помощью географических координат и названия районов укажите место осуществления проекта по активным воздействиям на погоду.

ПУНКТ 6 - a) Укажите год осуществления первоначальной деятельности по настоящему проекту;

b) Укажите, были ли перерывы в деятельности, или же она проводилась каждый год со времени начала;

c) Укажите, предполагается ли продолжить проект в будущем, поставив значок (X) в соответствующем квадрате.

ПУНКТ 7 - Укажите основную область деятельности организации, которая финансирует проект, обозначив значком (X) соответствующий квадрат (при необходимости используйте несколько значков).

ПУНКТ 8 - В какие месяцы и сколько дней осуществлялась оперативная полевая фаза проекта? Была бы полезна любая информация, касающаяся целей деятельности. В некоторых случаях проекты охватывают два года. Желательно включить в Реестр за конкретный год только ту часть, которая проводилась в отчетный период. Если это невозможно, просьба указать годы, в которые проводилась деятельность, например декабрь 1990 г., январь-февраль 1991 г.

ПУНКТ 9 - Под оборудованием для активного воздействия на погоду подразумеваются любые устройства, используемые с целью намеренного вызывания искусственных изменений в составе, поведении или динамике атмосферы. Например: генераторы засеивания йодистым серебром, пропановые устройства, пиротехнические устройства, ракеты, артиллерийские снаряды, реактивные двигатели и т.д.

a) Система доставки засеивающих веществ. Укажите, обозначив значком (X) соответствующий квадрат, характер системы доставки - наземная, воздушная и т.д.;

b) Укажите способ подготовки засеивающего вещества для распыления (например, путем сжигания ацетонового раствора соединения йодистого серебра). Распыление твердых частиц относится к рассеиванию ледяных крупинок (например, сухой лед), порошка (например, NaCl) и т.д.;

c) Укажите, обозначив значком (X), соответствующий квадрат, место рассеивания реагента;

d) Укажите, какие засеивающие реагенты используются и какова скорость рассеивания (масса на единицу времени, масса на облако и т.д.). Укажите, в килограммах, общее количество реагента, рассеянного в течение отчетного периода.

ПУНКТ 10 - a) Укажите, обозначив значком (X) квадрат, общую характеристику облаков, которые выбраны для обработки;

b) Укажите преобладающий диапазон температур на нижней границе облаков;

c) Укажите преобладающий диапазон температур на верхней границе облаков;

d) По каким характеристикам отличают дни или облака, подвергнутые воздействию, от тех, которые не были подвергнуты воздействию.

ПУНКТ 11 - Этот вопрос относится к оценке эффективности проекта. Предоставление большего объема информации о средствах, используемых для оценки положительных сторон проекта, только приветствуется, и эта информация может быть представлена под пунктом 14 или на отдельной странице.

ПУНКТ 12 - Этот вопрос относится к любому анализу, проведенному с целью расчета и/или измерения общего изменения окружающей среды, подвергнутой воздействию, и отдельный вопрос касается предполагаемых или полученных экономических выгод.

ПУНКТ 13 - Сообщите название и адрес организации, в которую можно направлять запросы о дополнительной информации.

ПУНКТ 14 - Этот пункт предназначен для того, чтобы позволить лицу, представляющему отчет, включить любую информацию, которая не

вошла в пункты с 1 по 13, но которую он считает важной или представляющей интерес, такую, например, как ссылка на опубликованные отчеты, представляющие результаты осуществления активного воздействия на погоду или эксперимента. Любая не сообщавшаяся ранее информация, определенные планы на новый проект, поиск информации и т.д. могут быть отражены под пунктом 14.

ПУНКТ 15 - Просьба сообщить название и адрес учреждения, которое передает эту информацию ВМО.

FORM USED FOR REPORTING ON COMPLETED WEATHER MODIFICATION PROJECTS

W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

R/CLA/4, ANNEX B

REPORT ON COMPLETED WEATHER MODIFICATION PROJECT

(Please mark X in box or boxes which apply)

MEMBER OF WMO: .....

1. DESCRIPTION OF PROJECT

1.1 Project identification (name/location/organization): .....

.....

.....

.....

.....

.....

.....

1.2 Purpose(s) of project

Precipitation augmentation - rainfall /__/ snow /__/

Hail suppression /__/

Lightning suppression /__/

Other (please specify): .....

.....

1.3 Major cloud type involved:

Orographic /__/ Cumulus /__/ Stratiform /__/ Frontal /__/

2. DURATION OF PROJECT

2.1 Project duration in years: .....

2.2 Operational period within each year:

From: ..... To: ..... inclusive.

3. SEEDING OPERATION

3.1 Seeding agent: AgI /__/ CO_2 /__/ NaCl /__/

Other (please specify): .....

3.2 Generator(s): On ground /__/ Airborne /__/

If on ground, please give number of generators: .....

3.3 Procedure for airborne seeding:

Altitude of seeding (m): .....

Length of seeding track (m or km): .....

Seeding rate (Kg h^{-1}): .....

4. PROJECT DESIGN

4.1 Basic design:

Target only /__/ Target + control /__/ Cross-over /__/

4.2 Distance between areas (km): .....

4.3 Area definition:

Fixed /__/ Variable /__/

If variable, give basis for definition: .....

4.4 Area subdivisions, if any (give number and nature): .....

.....

5. PROJECT SITE

5.1 Project terrain:

Mountainous /__/ Hilly /__/ Flat /__/

5.2 Size of target area (km^2): .....

5.3 Size of control area (km^2): .....

5.4 Number of precipitation gauges:

5.4.1 All types of precipitation gauges in target area: .....

All types of precipitation gauges in control area: .....

5.4.2 Recording precipitation gauges in target area: .....

Recording precipitation gauges in control area: .....

5.5 Other verification quantities (e.g., radar reflectivity, aircraft cloud measurements, hailpads, etc.): .....

.....

6. EXPERIMENTAL UNIT

6.1 Duration of unit in hours or days: .....

6.2 Conditions determining whether unit is seedable or not: .....

.....

6.3 Total number of units seeded and not seeded (in case of cross-over design this applies to each area):

.....

6.4 Randomization of experimental units:

Unrestricted /__/ Restricted /__/

If restricted, give nature of restriction: .....

.....

6.5 Standard seeding period (hours): .....

7. OVERALL PROJECT RESULTS (no stratification or partitioning)

7.1 Name of statistical test(s) and/or analysis (analyses):

.....

7.2 Transformation(s) for each test: .....

7.3 Results for each test and/or analysis: .....

7.3.1 Qualitative:

No Difference	/__/	More Precipitation	/__/	Less Precipitation	/__/	Less Hail Mass	/__/

Other qualitative results: .....

.....

7.3.2 Quantitative:

Seed/no-seed ratio: ..... Statistical significance: .....

8. BASIS FOR ASSESSMENT OF RESULTS

8.1 Analytical specifications fixed BEFORE the project began

8.1.1 Nature of stratification(s), if any: .....

8.1.2 Sample size for each stratification (No. of seed/no-seed units):

Seed: ..... No seed: .....

8.1.3 Test(s) and/or analysis (analyses) for each stratification:

.....

8.1.4 Transformation(s) for each stratification and each test:

.....

8.1.5 Results for each stratification, test and transformation:

Qualitative: .....

Quantitative: .....

8.2 Analytical specifications chosen AFTER the project began

8.2.1 Nature of partitioning(s): .....

8.2.2 Sample size for each partition (No. of seed/no-seed units):

Seed: ..... No seed: .....

8.2.3 Test(s) and/or analysis (analyses) for each partition:

.....

8.2.4 Transformation(s) for each partition and each test:

.....

8.2.5 Results for each partition, test and transformation:

Qualitative: .....

Quantitative: .....

9. EXTENDED AREA EFFECTS (i.e., outside the target area)

9.1 Sign of effect: .....

9.2 Maximum distance observed: .....

9.3 Statistical significance (size of area and probability):

.....

10. COMMENTS

.....

.....

.....

.....

.....

11. PRINCIPAL REFERENCES TO PUBLISHED RESULTS (where details of above may be found):

.....

.....

.....

.....

.....

RAPPORT SUR UN PROJET DE MODIFICATION ARTIFICIELLE DU TEMPS DEJA REALISE

[veuillez cocher (x) dans la ou les cases appropriées]

MEMBRE DE L'OMM : .....

1. DESCRIPTION DU PROJET

1.1 Identification du projet (titre/zone d'exécution/organisation)

.....

.....

.....

.....

.....

.....

1.2 But(s) du projet

Augmentation des précipitations Pluie /__/ Neige /__/

Suppression de la grêle /__/

Suppression de la foudre /__/

Autres modifications (veuillez préciser) : .....

.....

1.3 Principaux types de nuages traités :

Orographiques /__/ Cumulus /__/ Stratiformes /__/ Système frontal/__/

2. DUREE DU PROJET

2.1 Durée du projet, en années : .....

2.2 Période opérationnelle au cours de chaque année :

du ..... au ..... (inclusivement)

3. OPERATIONS D'ENSEMENCEMENT

3.1 Agents d'ensemencement : AgI /__/ CO_2 /__/ NaCl /__/

Autres (veuillez préciser) : .....

3.2 Générateur(s) : Au sol /__/ Aéroporté(s) /__/

Dans le cas de générateurs au sol, veuillez indiquer le nombre de générateurs utilisés :

.....

3.3 Méthode d'ensemencement par appareil aéroporté

Altitude de l'ensemencement (m) .....

Longueur de la trajectoire suivie pour l'ensemencement (m ou km) .....

Taux d'ensemencement (Kg h^{-1}) .....

4. CONCEPTION DU PROJET

4.1 Conception de base :

Zone cible seulement /__/ Zone cible et zone témoin /__/ Zone cible et/ou zone témoin sans distinction /__/

4.2 Distance entre les zones (km) : .....

4.3 Définition d'une zone :

Fixe /__/ Variable /__/

Si elle est variable, veuillez indiquer les critères de définition :

.....

.....

4.4 Subdivisions des zones, le cas échéant (indiquer le nombre et la nature)

.....

.....

5. SITE DU PROJET

5.1 Terrain

Montagneux /__/ Accidenté /__/ Plat /__/

5.2 Superficie de la zone cible (km^2) : .....

5.3 Superficie de la zone témoin (km^2) : .....

5.4 Nombre de pluviomètres :

5.4.1 Tous types de pluviomètres dans la zone cible : .....

Tous types de pluviomètres dans la zone témoin : .....

5.4.2 Pluviographes dans la zone cible : .....

Pluviographes dans la zone témoin : .....

5.5 Autres mesures de vérification (par exemple, réflectivité radar, mesure des nuages par aéronefs, coussins à grêle, etc.) :

.....

.....

6. UNITE EXPERIMENTALE

6.1 Durée de l'unité en heures ou en jours : .....

6.2 Conditions permettant de déterminer si une unité est ensemençable ou pas :

.....

6.3 Nombre total d'unités ensemencées et non ensemencées (dans le cas de la conception avec zone cible et/ou zone témoin, sans distinction, ceci s'applique à chaque zone) :

.....

.....

6.4 Répartition aléatoire des unités expérimentales :

Illimitée /__/ Limitée /__/

Dans ce dernier cas, indiquer la nature des limites fixées :

.....

6.5 Période standard d'ensemencement (heures) : .....

7. RESULTATS D'ENSEMBLE DU PROJET (pas de stratification ni de division)

7.1 Test(s) statistique(s) et/ou analyse(s) :

.....

7.2 Transformation(s) pour chaque test : .....

7.3 Résultats de chaque test et/ou analyse : .....

7.3.1 Qualitatifs :

Pas de différence /__/ Augmentation des précipitations /__/ Diminution des précipitations /__/ Diminution de la masse de grêle /__/

Autres résultats qualitatifs : .....

.....

7.3.2 Quantitatifs :

Rapport ensemencement/pas d'ensemencement : .....

Signification statistique : .....

8. CRITERES CHOISIS POUR L'EVALUATION DES RESULTATS

8.1 Spécifications analytiques fixées AVANT le projet

8.1.1 Nature de la (des) stratification(s), le cas échéant :

.....

8.1.2 Dimension de l'échantillon pour chaque stratification (nombre d'unités ensemencement/pas d'ensemencement) :

Ensemencement : ..... Pas d'ensemencement : .....

8.1.3 Test(s) et/ou analyse(s) pour chaque stratification :

.....

8.1.4 Transformation(s) pour chaque stratification et pour chaque test :

.....

8.1.5 Résultats pour chaque stratification, test et transformation :

Qualitatifs : .....

Quantitatifs : .....

8.2 Spécifications analytiques choisies APRES le projet

8.2.1 Nature de la (des) subdivision(s) :

.....

8.2.2 Dimension de l'échantillon pour chaque subdivision (nombre d'unité ensemencement/pas d'ensemencement) :

Ensemencement : ..... Pas d'ensemencement : .....

8.2.3 Test(s) et/ou analyse(s) pour chaque subdivision :

.....

8.2.4 Transformation(s) pour chaque subdivision et chaque test :

.....

8.2.5 Résultats pour chaque subdivision, test et transformation :

Qualitatifs : .....

Quantitatifs : .....

9. EFFETS OBSERVES (c'est-à-dire à l'extérieur de la zone cible)

9.1 Indice de l'effet : .....

9.2 Distance maximale observée : .....

9.3 Signification statistique (superficie de la zone et probabilité) :

.....

10. COMMENTAIRES

.....

.....

.....

.....

.....

11. PRINCIPALES REFERENCES A DES RESULTATS PUBLIES (dans lesquels sont indiqués les détails des procédures ci-dessus) :

.....

.....

.....

.....

.....

ORGANIZACIÓN METEOROLÓGICA MUNDIAL

R/CLA/4, ANEXO B

INFORME SOBRE PROYECTOS TERMINADOS DE MODIFICACIÓN ARTIFICIAL DEL CLIMA

(Colóquese una X en la casilla o casillas que corresponde)

MIEMBRO DE LA OMM: .....

1. DESCRIPCIÓN DEL PROYECTO

1.1 Identificación del proyecto (nombre/lugar/organización) .....

.....

.....

.....

.....

.....

.....

1.2 Finalidad(es) del proyecto

Aumento de las precipitaciones - lluvia /__/ nieve /__/

Supresión del granizo /__/

Supresión de los relámpagos /__/

Otros (sírvase especificar) : .....

.....

1.3 Principales tipos de nubes de que se trata:

Orográfica /__/ Cumulus /__/ Estratiforme /__/ Frontal /__/

2. DURACIÓN DEL PROYECTO

2.1 Duración del proyecto en años: .....

2.2 Período en que se han llevado a cabo las operaciones durante cada año:

del: ..... al: ..... inclusive.

3. OPERACIONES DE SIEMBRA

3.1 Reactivo químico de siembra: AgI /__/ CO_2 /__/ NaCl /__/

Otros (sírvase especificar) : .....

3.2 Generador(es): Terrestre /__/ Aerotransportado /__/

Si es terrestre, sírvase dar el número de generadores: .....

3.3 Procedimiento de siembra mediante aeronaves:

Altitud de la siembra (m) .....

Longitud de la trayectoria de siembra (m o km) .....

Indice de la siembra (Kg h^{-1}) .....

4. CONCEPCIÓN DEL PROYECTO

4.1 Concepción básica:

Sólo en la zona del blanco /__/

En la zona del blanco y zona de control /__/

En la zona del blanco y/o zona de control /__/

4.2 Distancia entre las zonas (km): .....

4.3 Determinación de la zona:

Fija /__/ Variable /__/

Si es variable, sírvase dar la base para la definición: .....

4.4 Subdivisiones de la zona, en caso de que hubieran (sírvase dar el número y la naturaleza) .....

.....

5. UBICACIÓN DEL PROYECTO

5.1 Terreno donde se lleva a cabo el proyecto:

Montañoso /__/ Accidentado /__/ Llano /__/

5.2 Tamaño de la zona del blanco (km^2) .....

5.3 Tamaño de la zona de control (km^2) .....

5.4 Número de pluviómetros

5.4.1 Todos los tipos de pluviómetros en la zona del blanco: .....

Todos los tipos de pluviómetros en la zona de control: .....

5.4.2 Registro de los pluviómetros en la zona del blanco: .....

Registro de los pluviómetros en la zona de control:.....

5.5 Otra serie de verificaciones (por ejemplo reflectividad del radar, medida de las nubes mediante una aeronave, paquetes de granizo, etc.):

.....

.....

6. UNIDAD EXPERIMENTAL

6.1 Duración de la unidad en horas o días: .....

6.2 Condiciones que determinan si una unidad puede ser sembrada o no: ....

.....

6.3 Número total de unidades sembradas y no sembradas (en el caso de que el diseño sea de una zona del blanco y/o de control indistintamente esto se aplica a cada zona):

.....

6.4 Selección aleatoria de las unidades experimentales:

No limitada / / Limitada / /

Si es limitada, sírvase dar el carácter de la limitación: .....

.....

6.5 Período de siembra normalizado (horas): .....

7. RESULTADOS DE LOS PROYECTOS GENERALES (no estratificación o partición)

7.1 Nombre de la(s) prueba(s) estadística(s) y/o análisis: .....

.....

7.2 Transformación(es) para cada prueba: .....

7.3 Resultados de cada prueba y/o análisis: .....

7.3.1 Cualitativo:

No hay diferencia	___ /__/	Más precipitación	___ /__/	Menos precipitación	___ /__/	Menos masa de granizo	___ /__/

Otros resultados cualitativos: .....

.....

7.3.2 Cuantitativo:

Relación de la siembra/no siembra: .....

Significado estadístico: .....

8. BASE PARA LA EVALUACIÓN DE LOS RESULTADOS

8.1 Especificaciones analíticas fijadas ANTES de que se haya llevado a cabo el proyecto

8.1.1 Carácter de la estratificación(es), en caso de que hubiere: .....

8.1.2 Tamaño de muestra para cada estratificación (número de unidades de siembra/o sin siembra):

Siembra: ..... Sin siembra: .....

8.1.3 Prueba(s) y/o análisis para cada estratificación:

.....

8.1.4 Transformación(es) para cada estratificación y cada prueba:

.....

8.1.5 Resultados para cada estratificación, prueba y transformación:

Cualitativo : .....

Cuantitativo : .....

8.2 Especificaciones analíticas seleccionadas DESPUÉS de revisarse el proyecto:

8.2.1 Carácter de la partición(es): .....

8.2.2 Tamaño de muestra para cada partición (número de unidades de siembra/ sin siembra):

Siembra: ..... Sin siembra: .....

8.2.3 Prueba(s) y/o análisis para cada partición:

.....

8.2.4 Transformación(es) para cada partición y cada prueba:

.....

8.2.5 Resultados para cada partición, prueba y tranformación:

Cualitativa: .....

Cuantitativa: .....

9. EFECTOS QUE TIENE FUERA DE LA ZONA (por ejemplo fuera de la zona del blanco)

9.1 Indicio del efecto: .....

9.2 Distancia máxima observada: .....

9.3 Significado estadístico (tamaño de la zona y probabilidad):

.....

10. COMENTARIOS

.....

.....

.....

.....

.....

11. PRINCIPALES REFERENCIAS PARA QUE SE PUBLIQUEN LOS RESULTADOS (lugar en el que se pueden encontrar los detalles antes mencionados):

.....

.....

.....

.....

.....

ВСЕМИРНАЯ МЕТЕОРОЛОГИЧЕСКАЯ ОРГАНИЗАЦИЯ

R/CLA/4, ПРИЛОЖЕНИЕ B

ОТЧЕТ О ЗАВЕРШЕННОМ ПРОЕКТЕ ПО АКТИВНОМУ ВОЗДЕЙСТВИЮ НА ПОГОДУ

(Просьба поставить X в соответствующем квадрате)

ЧЛЕН ВМО: .....

1. ОПИСАНИЕ ПРОЕКТА

1.1 Обозначение проекта (название/местонахождение/организация) .....

.....

.....

.....

.....

.....

.....

1.2 Цель(и) проекта:

Увеличение осадков - дождя ☐ снега ☐

Подавление града ☐

Предотвращение молний ☐

Другие (просьба указать): .....

.....

1.3 Основной тип облаков:

Орографические ☐ Кучевые ☐ Слоистообразные ☐ Фронтальные ☐

2. ПРОДОЛЖИТЕЛЬНОСТЬ ПРОЕКТА

2.1 Продолжительность проекта, в годах: .....

2.2 Оперативный период в каждом году:

С: ..... До: ..... включительно.

3. ЗАСЕВ

3.1 Реагент, используемый для засева: AgI ☐ CO_2 ☐ NaCl ☐

Другие (просьба указать): .....

3.2 Генератор(ы): Наземные ☐ Воздушные ☐

Если генератор наземный, то просьба указать количество: .....

3.3 Процедура засева с воздуха:

Высота засева (м): .....

Длина трассы засева (м или км): .....

Норма засева (кг/час.): .....

4. СХЕМА ПРОЕКТА

4.1 Основная схема:

Целевые ☐ Целевые + контрольные ☐ Перекрестные ☐

4.2 Расстояние между районами (км): .....

4.3 Определение района:

Постоянный ☐ Переменный ☐

Если переменный, указать основу определения: .....

4.4 Подразделение района, если имеется (указать число и характер): .....

.....

5. ПЛОЩАДКА

5.1 Местность:

Горная ☐ Холмистая ☐ Ровная ☐

5.2 Размер целевого района ($км^2$): .....

5.3 Размер контрольного района ($км^2$): .....

5.4 Количество осадкомеров:

5.4.1 *Все виды осадкомеров в целевом районе:* .....

Все виды осадкомеров в контрольном районе: .....

5.4.2 *Осадкомеры-самописцы в целевом районе:* .....

Осадкомеры-самописцы в контрольном районе: .....

5.5 Другие средства проверки (например, отражательная способность радиолокаторов, измерения облаков с самолетов, градомеры и т.д.):

.....

6. ЭКСПЕРИМЕНТАЛЬНАЯ ЕДИНИЦА

6.1 Продолжительность единицы, в часах или днях: .....

6.2 Условия для определения, подлежит ли единица засеву или нет: .....

.....

6.3 Общее количество засеянных и незасеянных единиц (при перекрестном построении это относится к каждому району):

.....

6.4 Рандомизация экспериментальных единиц:

Неограниченная ☐ Ограниченная ☐

Если ограниченная, то дать характер ограничения: .....

.....

6.5 Стандартный период засева: .....

7. ОБЩИЕ РЕЗУЛЬТАТЫ ПРОЕКТА (без стратификации или деления)

7.1 Название статистического испытания(ий) и/или анализа(ов):

.....

7.2 Трансформация(ии) для каждого испытания: .....

7.3 Результаты каждого испытания и/или анализа: .....

7.3.1 *Качественные:*

Различий нет ☐ Больше осадков ☐ Меньше осадков ☐ Меньше града по массе ☐

Другие качественные результаты: .....

.....

7.3.2 *Количественные:*

Соотношение засев/нет засева: ..... Статистическая значимость: .....

8. ОБОСНОВАНИЕ ДЛЯ ОЦЕНКИ РЕЗУЛЬТАТОВ

8.1 Аналитические спецификации, установленные ДО проекта

8.1.1 Характер стратификации(ий), если имеется: .....

8.1.2 Объем выборки для каждой стратификации (число единиц засев/нет засева):

Засев: ..... Нет засева: .....

8.1.3 Испытание(я) и/или анализ(ы) для каждой стратификации:

.....

8.1.4 Трансформация(ии) для каждой стратификации и каждого испытания:

.....

8.1.5 Результаты для каждой стратификации, испытания или трансформации:

Качественные: .....

Количественные: .....

8.2 Аналитические спецификации, выбранные ПОСЛЕ проекта

8.2.1 Характер деления(ий): .....

8.2.2 Объем выборки для каждого деления (число единиц засев/нет засева):

Засев: ..... Нет засева: .....

8.2.3 Испытание(я) и/или анализ(ы) для каждого деления:

.....

8.2.4 Трансформация(ии) для каждого деления и каждого испытания:

.....

8.2.5 Результаты для каждого деления, испытания или трансформации:

Качественные: .....

Количественные: .....

9. ВОЗДЕЙСТВИЕ НА ДРУГИЕ РАЙОНЫ (т.е. за пределами целевого района)

9.1 Признак воздействия: .....

9.2 Максимальное расстояние: .....

9.3 Статистическая значимость (размер района и вероятность):

. . . . . .

10. ЗАМЕЧАНИЯ

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

11. ССЫЛКИ НА ОПУБЛИКОВАННЫЕ РЕЗУЛЬТАТЫ (в которых можно найти более детальную информацию):

. . . . . .

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WEATHER MODIFICATION PROGRAMME REPORTS

WMP-No. 1	Review of Warm Cloud Modification by Bh. V. Ramana Murty (September 1984)	WMO/TD-No. 5
WMP-No. 2	Papers Presented at the Fourth WMO Scientific Conference on Weather Modification (Honolulu, Hawaii, 12-14 August 1985	WMO/TD-No. 53
WMP-No. 3	Notes for the International Cloud Modelling Workshop/Conference (Irsee, Federal Republic of Germany, 15-19 July 1985) (Out-of-print)	WMO/TD-No. 57
WMP-No. 4	Register of National Weather Modification Projects 1983 (November 1985)	WMO/TD-No. 78
WMP-No. 5	The Evaluation of Hail Suppression Experiments - Report of Meeting of Experts (March 1986)	WMO/TD-No. 97
WMP-No. 6	Information Concerning Weather Modification Directed to Government Decision-Makers (June 1986)	WMO/TD-No. 123
WMP-No. 7	Trends in Weather Modification - 1975-1983 (L.R. Koenig, Geneva, November 1986)	-
WMP-No. 8	Report of the International Cloud Modelling Workshop (Irsee, Federal Republic of Germany, 15-19 July 1985)	WMO/TD-No. 139
WMP-No. 9	Register of National Weather Modification Projects - 1984 and 1985 (Geneva, July 1987)	WMO/TD-No. 182
WMP-No. 10	Register of National Weather Modification Projects - 1986 (Geneva, December 1988)	WMO/TD-No. 208
WMP-No. 11	Report of the Second International Cloud Modelling Workshop (Toulouse, 8-12 August 1988)	WMO/TD-No. 268
WMP-No. 12	Papers Submitted to the Fifth WMO Scientific Conference on Weather Modification and Applied Cloud Physics (Beijing, China, 8-12 May 1989)	WMO/TD-No. 269
WMP-No. 13	Register of National Weather Modification Projects - 1987-1988	WMO/TD-No. 330
WMP-No. 14	Register of National Weather Modification Projects - 1989 (Geneva, May 1991)	WMO/TD-No. 417
WMP-No. 15	Report of a Meeting of Experts to Review Findings and Make Recommendations on the Saudi Arabia Cloud Physics Experiment (SACPEX) (Geneva, 14-16 November 1990)	-
WMP-No. 16	Report of the Seventeenth Session of the Executive Council Panel of Experts/CAS Working Group on Physics and Chemistry of Clouds and Weather Modification Research (Geneva, 19-23 November 1990)	-
WMP-No. 17	WMO Meeting of Experts on the Role of Clouds in the Chemistry, Transport, Transformation and Deposition of Pollutants (Obninsk, 30 September-4 October 1991)	WMO/TD-No. 448
WMP-No. 18	Register of National Weather Modification Projects 1990	WMO/TD-No. 449

WMP-No. 19	Proceedings - WMO Workshop on Cloud Microphysics and Applications to Global Change (Toronto, Canada, 10-14 August 1992)	WMO/TD-No. 537
WMP-No. 20	Report of the Third International Cloud Modelling Workshop (Toronto, Canada, 10-14 August 1992	WMO/TD-No. 565
WMP-No. 21	Register of National Weather Modification Projects 1991	WMO/TD-No. 575
WMP-No. 22	Sixth WMO Scientific Conference on Weather Modification Volumes I and II (Paestum, Italy, 30 May - 4 June 1994)	WMO/TD-No. 596
WMP-No. 23	Register of National Weather Modification Projects 1992	WMO/TD-No. 686
WMP-No. 24	Eighteenth Session of the Executive Council Panel of Experts/CAS Working Group on Physics and Chemistry of Clouds and Weather Modification Research (Geneva, Switzerland, 30 January - 3 February 1995)	WMO/TD-No. 687
WMP-No. 25	Register of National Weather Modification Projects 1993 and 1994	WMO/TD-No. 745