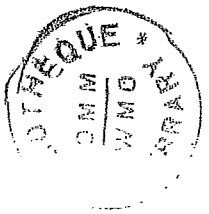
WORLD METEOROLOGICAL ORGANIZATION

PROGRAMME ON PHYSICS AND CHEMISTRY OF CLOUDS AND WEATHER MODIFICATION RESEARCH

WMP REPORT No. 28



REGISTER

OF

NATIONAL WEATHER MODIFICATION PROJECTS

1995

NOTE

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WMO/TD-No. 851

TABLE OF CONTENTS

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 nineteenth 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 1995

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 May 1996. 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 1995 projects. Annex B refers to completed projects or those where physical and/or statistical evaluation have been carried out that are reported in Section VII.

The names of Member countries who provided the information reported in this Register are listed in Sections III. Section VII provides summaries of completed projects and Section VIII indicates which countries reported that no weather modification activities had taken place in 1995.

Requests for further information concerning the projects reported may be addressed to the reporting agency for each country which is indicated in Section V. 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 1995 PROJECTS

Page

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ARGENTINA											
ARG-1	Op. Hail	1,950 km^2 target. 2,500 km^2 control	Hail Suppression	Northern Province of Mendoza (33°00' N 68°30' W)	1985 Every year except 1992/1993 season Yes	Agr. (G)	In-cloud seeding at temp. levels -3° - -9°C with pyrotechnic flares on rockets	AgI 12.4g/rocket Total consumption 79.9 kg/year	Convective clouds with base temperatures 3-15°C and tops colder than -20°C Seeding criteria: radar reflectivity > 45 DBZ and extention of 45 DBZ region above 0°C level exceeding 2.5 km	Oct-Apr 32 days seeded	Evaluation based on historic records. Report available EIS-Yes C/B-Yes
AUSTRALIA											
AU-1	PE (E) Op	6,000 km^2 target	Midlands/East Coast Drought Relief Projects	Midlands/East Coast Agricultural Region, Tasmania	1973 Interrupted No	Agr. (G)	In-cloud and cloud-base seeding with acetone burner from one A/C. Temp. at seeding level between -5°C and -10°C	AgI 480g/hr Total consumption 5 kg/year	Convective clouds with base temperature < 10°C and top warmer than -20°C. Seeding criteria: cloud top colder than -5°C and LWC at -5°C level in excess of 0.5g/m^3	Sept-Oct 42 days	No evaluation planned EIS-No C/B-Expected
AUSTRIA											
AUS-1	Op. Hail	1,800 km^2	Hail Test Program - STYRIA (HTP-S)	Weiz district (46°50' N 15°45' E)	1985 Every year Yes (provided funds are available)	Agr. (P)	3 A/C with acetone burners and pyrotechnic flares for seeding cloud bases	AgI Total consumption 119.6 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-Aug	Evaluation based on historical records, crop damage and hail pad data, report planned after 1999 EIS-No C/B-No

IV. REGISTER OF 1995 REPORTED 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 (HTP-N)	Krems district (48°20' N 15°35' E)	1981 Every year Yes (provided funds are available)	Agr. (P)	3 A/C with acetone burners and pyrotechnic flares for seeding cloud bases	AgI Total consumption 29.7 kg per year	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: as AUS-1	May-Sept 13 days	Evaluation, based as in AUS-1, planned for 1997
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., Trans. (G)	Rockets with pyrotechnic flares, in-cloud seeding at temp. between -5° and -10°C	AgI, 41 g per rocket. Total consumption 127 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	June-Sept 29 days	Evaluation based on historical records, and crop damage data. Report planned. EIS-No C/B-No
CHINA											
CN-1	Op. PE (R) Hail	200,000 km^2	Precipitation Enhancement and Hail Suppression	Jilin Province	1958 Every year Yes	Agr. (G) For. Hyd. Wea. Ser.	Cloud top and in-cloud seeding with dry ice at temp. about -10°C. Explosives on rockets and shells are also used	Dry ice. Total consumption: 2,000 kg during the year	Convective and stratiform clouds with bases colder than 10°C and top temp. between 0°C and -20°C	Apr-July 36 days	Evaluation based on historical records and hail pad data EIS-No C/B-Yes
CN-2	Res. Op. PE Hail (R)	26,000 km^2 target 30,000 km^2 control	Precipitation Enhancement and Hail Suppression	Heilongjiang Province (41°N, 128°E)	1985 Every year Yes	Agr. (G) Wea. Ser.	One A/C with acetone burner, pyrotechnic flares and artillery shells at temp. between -4°C and -10°C, in-cloud seeding	AgI. Total consumption 50 kg/year	Convective, orographic and stratiform clouds with bases colder than 10°C and top temp. between 0 and -20°C	May-June 42 days	Evaluation based on historical records and crop damage data, report planned EIS-No C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-3	Res. Op. PE, Hail (R)	15,000 km^2	Precipitation Enhancement in Beijing	40°40' N 116°30' E (near Beijing)	1990 Interrupted Yes	Agr. (G) Wea. Ser.	In-cloud seeding with artillery shells and one A/C. 20 G/B generators and liquid spray used at temp. below 0°C	AgI and liquid nitrogen (80 kg/hour) Total consumption 4 kg and 600 kg during the year, respectively	Convective and stratiform clouds, with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criterion: radar echo intensity	July	Estimation based on historical records, EIS-No C/B Yes
CN-4	Res. Op. PE, (E), Hail	100,000 km^2 target, 10,000 km^2 control	Precipitation Enhancement and Hail Suppression	Liaoning Province	1992 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. -5°C to -15°C with acetone burners from 2 A/C, and explosives on shells	300 g/hr of AgI. Total consumption 25 kg of AgI	Orographic and stratiform clouds with bases warmer than 10°C and top temp. between 0° and -20°C	Apr-Aug	Evaluation based on historical records EIS-Yes C/B-Yes
CN-5	Op. PE, Hail, (E), (R)	153,000 km^2	Precipitation Enhancement during spring	Shandong Province	1989 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding with acetone burner from 1 A/C at temp. below -5°C. Explosives on shells also used	AgI, 400g/hour. Total yearly consumption: 14 kg	Convective and stratiform clouds with bases colder than 10°C and top temp. between 0°C and -20°C. Seeding criteria: cloud top temp. between -3 and -18°C, cloud depth > 2500 m	Mar-June 36 days	Evaluation based on historical records and crop damage data EIS-Yes C/B-Yes
CN-6	Op. PE (E)	160,000 km^2	Artifical Influence on Weather	Henan Province	1988 Interrupted Yes	Agr. (G) Wea. Ser.	Cloud top seeding with acetone burner and pyrotechnic flares and 1 A/C and artillery shells	AgI at a rate of 320 g/hour. Total: 20 kg	Convective clouds with bases warmer than 10°C and top temp. between 0° and -20°C	Mar-June Sept-Nov 50 days	EIS-No C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-7	Res. Op. PE Hail	30,000 km^2 target 30,000 km^2 control	Artificial Precipitation Enhancement	Hebei province	1990 Every year Yes	Agr. (G) Wea. Ser.	Cloud top and in-cloud seeding at temp. -4 - -20°C with acetone burner from 1 A/C and pyrotechnic flares on rockets and artillery shells	AgI, 360g/hour. Total consumption: 50 kg per year	Convective orographic and stratiform clouds with bases colder than 10°C and top temp. between 0 and -20°C. Seeding criteria: westerly trough and cold front	Apr-July 31 days	Evaluation based on historical records and crop damage data. Report planned EIS-Yes C/B-Yes
CN-8	Op. PE, Hail (E)	150,000 km^2	Precipitation Enhancement and Hail Suppression	Shanxi Province	1989 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	AgI. Total consumption 25 kg/year	Stratiform clouds with bases warmer than 10°C and tops warmer than -20°C	Mar-Oct 29 days	No evaluation planned EIS-No C/B-Yes
CN-9	Res. Op. PE Hail	12,795 km^2	As CN-8	Guizhou Province	1974 Every year Yes	Agr. (G)	In-cloud seeding with rockets and artillery shells at temp. -20° to 0°C	AgI. Total consumption: 32,223 kg during the year	Convective stratiform and orographic clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion: radar reflectivity	Mar-Sept 200 days	Evaluation based on historical records, crop damage and hail pad data EIS-No C/B-Yes
CN-10	Op. Res. PE (E)	25,000 km^2 target	Snowfall Enhancement and Hail Suppression	Xinjiang Province north of Jianshan mountains	1978 Every year Yes	Agr. (G) Wea. Ser..	1 A/C with acetone burner for in-cloud seeding at temp. -5°C - -20°C. Artillery shells and rockets also used	AgI. Total consumption 253 kg during the year	Convective and stratiform clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: radar reflectivity > 15 DBZ	Jan, May-Sept 60 days	Evaluation based on comparison with historical records and crop damage data EIS-No C/B-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-11	Op. PE (E) Hail	115,000 km^2	Precipitation Enhancement and Hail Suppression	Gansu Province	1972 Interrupted Yes	Agr. (G) Wea. Ser.	Cloud top and in-cloud seeding with acetone burner, pyrotechnic flares and liquid spray at temp. -5°C from 1 A/C, rockets and shells	AgI and liquid nitrogen. Total consumption: 25 kg and 6,500 L per year, respectively	Convective and stratiform clouds with bases colder than 10°C and top temp. between 0° and -20°C	Mar-Oct 43 days	Evaluation based on historical records, crop damage and hail pads EIS-Yes C/B-No
CROATIA											
CR-1	Op. Hail	94,000 km^2	Hail Suppression	Northern Croatia, Between Sava and Drava	1976 Every year Yes	Agr. (G), For., Wea. Ser.	In-cloud seeding with rockets at temp. -8° to -12°C and 411 G/B acetone burners	AgI, 8.5 kg/day. Total consumption 600 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 Radar and satellite data and mesoscale modelling	Apr-Oct 184 days	Estimation based on comparison with historical records and crop damage. Report is planned. EIS-No C/B-No
FRANCE											
FR-1	Res. Op. Hail	80,000 km^2 target 420,000 km^2 control	ANELFA	Southwestern France, Aquitain and Rhodanien Basins and Loire Valley	1952 Every year Yes	Agr. (P)	Ground-based seeding with 576 acetone burners	AgI 8 g/hour per generator. Total yearly consumption 430 kg	Convective clouds with bases warmer than 10°C and tops colder than -20°C. Seeding criterion: hailstones with diameter exceeding 15 mm being predicted	Apr-Oct 38 days	Evaluation based on crop damage and hail pad data. Report is available EIS-Yes C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FR-2	Res. Dev PE (R) Hail	800 km²	Test of Modification of th Hailstorm Characteristics by Seeding the Hygroscopic Nuclei at the Cloud Bases	Departments: Lot and Garonne and Tarn and Garonne	1993 Every year Yes	Agr. (P) Wea. Ser.	Cloud-base seeding with pyrotechnic flares from 1 A/C	NaCl + KCl, 30 kg/hour. Total consumption: 130 kg/year	Convective clouds with bases warmer than 10°C (June-Aug) and colder than 10° (May and Sept). Cloud top temp. below -20°C. Seeding criteria: hail predicted and confirmed near the target area; updraft exceeding 4 m/s; reflectivity at the -10°C level > 40 DBZ	May-Oct 16 days	Evaluation based on data from 159 raingauges, 11 recording gauges and 450 hail pads EIS-No
GERMANY											
GE-1	Op. Hail	2,500 km² target 10,000 km² control	Hail Prevention Stuttgart Area	49°N 10°E	1980 Every year	Agr. (G, P)	Cloud base seeding with acetone burners from 2 A/C	AgI, 10 litres of 7% solution per hour. Total consumption 2 kg per year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: degree of convective instability, radar reflectivity > 25 DBZ with echo top height exceeding 10 km	May-Aug 22 days	Estimation based on comparison with historical records and hail pad data. Report available EIS-Yes C/B-Yes
GE-2	Op. Dev. Hail	4,000 km² target	Hagelabwehr, Land Krezs Rosenheim / Hagelforschung-sverein Rosenheim e.v.	Northwestern side of the Alps (10°40' E to 12°30' E)	1975 Every year Yes	Municipal	As GE-1	AgI, 0.8 kg per hour. Total consumption: 14.4 kg per year	Convective clouds as GE-1. Seeding criteria based on temp., temp. advection, vertical wind speed, humidity, height of troposphere	May-Sept 13 days	Evaluation based on crop damage and hail observation data. Report available EIS-No C/B-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ISRAEL											
IS-1	Op. PE	Opera-tional: 4,200 km^2 target 150 km^2 control Experi-mental: 6,800 km^2 target 150 km^2 control	The Israeli Rain Enhancement Project	Central and Northern Israel	Experi-ments: 1960 Operations: 1975 Every year Yes	Agr. (G) Hyd (G)	60 G/B acetone burners and 4 A/C with acetone burners seeding at cloud base level	AgI G/B: 12 g/hour A/C: 550 g/hour	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; suitable wind direction	Jan-Apr, Nov-Dec 100 days	Estimation based on comparison with historical records. Report available EIS-No C/B-Yes
JAPAN											
JP-1	Res. PE (E) PR	500 km^2	Study on Feasibility of Orographic Snow Cloud Modification by Seeding	Niigata and Gunma Prefectures	1994 Every year Yes	Wea. Ser.	Cloud top seeding with dry ice from 2 A/C	Stratiform clouds with bases colder than 10°C and top temp. between 0°C and -20°C. Seeding criteria: cloud top temp. > -20°C and horizontal uniformity of clouds	Dry ice 10g/sec. Total consumption: 50 kg during the year	Jan-Mar, Nov-Dec 30 days	No evaluation planned EIS-No C/B-Yes
JORDAN											
JOR-1	Res. Op. Ext. (R) Inc. PR	14,500 km^2	Precipitation Enhancement Program in Jordan	North Middle and South of Jordan area, east of Jordan Valley	1986 Interrupted during 1990/1991 season Yes	Wea. Ser.	G/B seeding with 23 acetone burners. Cloud top, cloud base and in-cloud seeding with pyrotechnic flares from 1 A/C. In-cloud seeding at temp. -5°C to -10°C	AgI, 420 gm/hr, with the total yearly consumption 24.5 kg	All types of clouds with bases colder than 10°C and top temp. between 0°C and -20°C. Seeding criteria: in-cloud temp. -5°C to -10°C, presence of liquid water and low ice concentration	Oct-May 210 days	Evaluation based on historical records. Report available EIS-Yes C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
KOREA, REPUBLIC OF											
KOR-1	Res. PE (E)	900 km² target, 2,500 km² control	METRI Project 1995	Mid-eastern Korea (37.8 N, 128.4 E)	1995 Yes	Res.	G/B seeding with 6 acetone burners and dry ice dispersal from 1 A/C	AgI 30 g/hr. Dry ice 100 kg/hr. Total yearly consumption 10 kg and 600 kg, respectively	Orographic and stratiform clouds with bases colder than 10°C and top temp. between 0°C and -20°C. Seeding criteria: frontal passage or orographic storm	5 months, beginning from Mar., 40 days	Evaluation based on AgI analyses in the ground rain samples EIS-No C/B-No
LIBYAN ARAB JAMAHIRIYA											
LI-1	Op., PE, Inc	25,000 km² target, 40,000 km² control	Cloud Seeding Project	Jafara Plain, west coast of Libya	1980 Every year Yes	Wea. Ser.	Cloud top and in-cloud seeding with pyrotechnic flares from 3 A/C	AgI at a rate of 130 g/h. Total yearly consumption 5.5 kg	Orographic clouds with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: cloud tops colder than -8°C, LWC > 0.5 g/m, ice partical content < 10/l	Jan-Mar 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 km²	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 bases colder than 10°C and tops colder than -20°C. Seeding criteria: top temp. -28°C or lower, logorithm of maximum reflectivity exceeding 3.5 and maximum reflectivity region above 0°C level	Apr-Oct 25 days	Evaluation based on comparison with historical records

IV. REGISTER OF 1995 REPORTED 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 with liquid spray from 1 A/C	NaCl Total consumption 10,650 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	Sept-Nov 53 days	Evaluation is not planned EIS-No C/B-No
MOROCCO											
MO-1	Res. Op. 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 14 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, NaI 6 g/hour. Airborne seeding: NaI 115 g/h. Total yearly consumption: AgI 36,750 kg and 12 kg NaI	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 17 days	Estimation based on comparison with historical records. Report available EIS-Yes 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 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RUSSIAN FEDERATION											
RF-1	Dev. Hail		Upgrading Techniques and Technology for Hail Suppression	Northern Caucasus	1993 Every year Yes	Wea. Ser.	In-cloud seeding with pyrotechnic flares on rockets at levels with temp. -3° - -9°C. Tested in 1995 were the upgraded "Alazan-4M15" antihail rocket and automatic system for control of hail suppression operations "ANTIGRAD"	AgI 12.4 g/rocket. Total consumption: 0.24 kg during the year	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: radar reflectivity > 45 DBZ, with 45 DBZ region extending > 2.5 km above 0°C level	May-Sept 150 days	Estimation based on historical data. Report planned EIS-Yes 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 with pyrotechnic flares on rockets and cloud-base seeding with acetone burners. Both at levels with temp. -5°C to -15°C	AgI, 8 g/km^3 of cloud. Total consumption 40 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 15 days	Estimation based on historical records and crop damage data. EIS-No C/B-Yes
SOUTH AFRICA											
SA-1	Res. Dev. PE	Two target areas, 30,000 km^2 each	National Precipitation Research Program	Target 1: Bethlehem, Free State Target 2: Tzaneen, Northern Province	1990 Every year Yes	Res. Wea. Ser.	Seeding of cloud bases with pyrotechnical flares from 3 A/C	NaCl, KCl, MgO	Convective clouds with base temp. between 7°C and 13°C and tops colder than -20°C Seeding criteria: radar reflectivity ≥ 30 DBZ, well defined updraft area at cloud base	Oct-Dec	Estimation based on randomized experiment in one target area and rainfall and streamflow data in the other EIS-No C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SPAIN											
SP-1	Op. Hail	10,000 km^2	Nalogal	Northern Spain (Alava, La Rioja, Novarra)	1969 Every day	Agr. (G)	G/B seeding with 110 acetone burners	AgI. Total consumption 205 kg/year	Convective clouds with top temp. < -20°C. Seeding criterion based on hailstorm prediction	May-Sept 153 days	Evaluation based on hail pads EIS-No C/B-No
SP-2	Op.Hail	8,000 km^2	Compana de Lucha Antigranizo en Aragon 1995	Zaragoza and Teruel Provinces	1970 Every year Yes	Agr. (G)	G/B seeding with 150 acetone burners	AgI, 7.3 l/generator. Total yearly consumption 1,095 l	As SP-1	May-Oct 39 seeded days	Estimation based on crop damage data EIS-No
SP-3	Res. Op. Hail	5,000 km^2 target, 10,000 km^2 control	P.A.L.A	Provincia de Leon	1985 Every year Yes	Agr. (G) Res.	G/B seeding with 10 acetone burners	AgI. Total yearly consumption: 9 kg	As SP-1	June-July	Evaluation based on randomization, historical records, crop damage and hail pad data and modelling EIS-Yes C/B-No
SYRIAN ARAB REPUBLIC											
SY-1	Dev. Op. PE	150,000 km	Syrian Rain Enhancement Project	All over the country	1991 Every year Yes	Agr. (G)	Cloud top and in-cloud seeding with pyrotechnic flares at temp. < -13°C or < -17°C (depending on flare type) from 4 A/C	AgI. Total yearly consumption: 9 kg	Convective and orographic clouds with bases colder than 10°C and top temp. between 0°C and -20°C	Jan-May Nov-Dec 28 days	Evaluation is based on historical records EIS-No C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
THAILAND											
TH-1	Op. PE (E) Inc.	3,000 km^2 target, 3,000 km^2 control	Cloud Seeding Project (Operational)	Drought areas throughout Thailand	1969 Every year Yes	Agr. (G)	Cloud top, cloud base and in-cloud seeding by solid dispersal from 3 A/C. Moist clear air is also seeded to bring about cloud formation through nucliation	$CaCl_2$ and CaO, 100 kg/min; Urea and ammonium nitrate, 70 kg/min. Also used are NaCl and dry ice	Convective and orographic clouds with bases warmer than 10°C and tops warmer than 0°C. Seeding criteria: relative humidity in the lower atmosphere > 70%; stability index shows instability	Mar-Oct 120 days	No evaluation planned EIS-Yes C/B-Yes
TH-2	Res. PE Inc.	20 km^2 target, 20 km^2 control	Applied Atmospheric Resources Research Program (AARRP): Warm Cloud Seeding Activity	Bhumibol Catchment area in Northern Thailand	1995 Yes	Agr. (G)	In-cloud solid dispersal from 2 A/C at a level of about 3 km	$CaCl_2$ 100 kg/min	Convective clouds with bases warmer than 10°C and tops warmer than 0°C. Seeding criteria: cloud top above 3.3 km with temp. ≥ 0°C; cloud diameter 2-6 km; updraft velocity > 2.5 m/s; LWC ≥ 0.5 gm/m^3; no clouds with tops higher than 10 km or echo cores > 50 DBZ closer than 40 km	July-Oct 60 days	Evaluation based on randomized experiment EIS-Yes C/B-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TH-3	Res. PE Inc.	2,000 km² target, 2,000 km² control	AARRP: Cold Cloud Seeding Activity	Bhumibol Catchment area in Northern Thailand	1991 Every year Yes	Agr. (G)	In-cloud seeding with pyrotechnic flares at temp. about -8°C	AgI, 20 g per flare. Total yearly consumption: 14.78 kg	Convective clouds with bases warmer than 10°C and cloud top temp. between 0° and -20°C. Seeding criteria: isolated cloud with echo top higher than 10 km; updrafts ≥ 5 m/s; supercooled LWC ≥ 1 g/m³	Apr-June 32 days	Evaluation based on randomized experiment EIS-Yes C/B-No
UKRAINE											
UK-1	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-2	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 95-883	Fairchild AFB, Washington	-	Def. (G)	Cold fog seeding with G/B propane dispensers	Propane	-	No days with seeding	EIS-Yes
US-2	PE Snowpack augmenta-tion	10,336 km²	Ruby Mountains Project NOAA 95-888a	Western Ruby Mountains Watershed, Nevada	-	Res. (G)	9 G/B acetone burners and 1 A/C with wing-tip burners	AgI Total consumption 4,643 g	-	Dec 6 days	EIS-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-3	PE	10,423 km²	Nevada Carson-Walker Project NOAA 95-888b	Walker and Carson Watershed, Nevada	-	Res. (G)	A/C with pyrotechnic flares and wing tip burners and 3 G/B acetone burners	AgI G/B: 22.5 g/hour per generator, airborne: 200 g/hour per generator Total consumption 2,257 g	-	Dec 4 days	EIS-Yes
US-4	PE	3,532 km²	Truckee-Tahoe Project NOAA 95-888c	Truckee River Watershed, Nevada	-	Res (G)	7 G/B acetone burners and 1 A/C with pyrotechnic flares or burners	AgI Total consumption 6,506 g	-	Dec 6 days	EIS-No
US-5	Op. PE	765 km² target 3,240 km² control	NOAA 95-884	Sacramento area, California	-	Muni.	G/B generators	AgI. Total consumption 4,952 g	-	Jan, Dec 10 days	EIS-Yes
US-6	Op. Snowpack augmenta-tion	65 km²	Snowbird/Alta NOAA 95-894	Snowbird area, Utah	-	Recreation (P)	2 G/B generators	AgI. Total consumption 874 g	-	Nov-Dec 8 days	EIS-No
US-7	Mountain snowpack augmenta-tion	32,400 km²	Central and Southern Utah Cloud Seeding NOAA 95-891	Central and Southern Utah	-	Water resources (P)	80 G/B acetone burners	AgI, 8 g/hour per burner. Total consumption 66,238 g	-	Jan-Mar Nov-Dec 35 days	EIS-No
US-8	Mountain snowpack and water supply increase	550 km² target, 550 km² control	Mokelumne NOAA 95-887	Central Sierra Nevada Mountains, California	-	Enr. (P)	6 G/B acetone burners	AgI, 25 g/hour per burner. Total consumption 2,200 g	-	Dec 3 days	Evaluation is planned, based on target/control ratio EIS-No
US-9	Mountain snowpack and water supply increase	1,620 km² target, 454 km² control	Lake Almanor NOAA 95-886	Northern Sierra Nevada Mountains California	-	Enr. (P)	9 G/B acetone burners	AgI, 25 g/hour per burner. Total consumption 4,400 g	-	Dec 3 days	As US-8
US-10	Mountain snowpack augmenta-tion	848 km² target	WASATCH Front (mountains) NOAA 95-893	Utah	-	Muni. (G)	10 G/B acetone burners	AgI, 8 g/hour per burner. Total consumption 1,860 g	-	Nov-Dec 7 days	EIS-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-11	PE	12,960 km^2	Santa Barbara /Obispo NOAA 95-895b	Santa Barbara, California	-	Muni. (G)	7 G/B generators and A/C with wing-tip generators	AgI, 30 g/hour per G/B generator and 180 g/hour per airborne generator Total consumption 480 g	-	Dec 2 days	EIS-Yes
US-12	PE	632 km^2 target, 1,944 km^2 control	Santa Clara Project NOAA 95-869	Santa Clara County, California	-	Muni. (G)	Seeding from 1 A/C with pyrotechnics and liquid fuel generator	AgI, 60 to 600 g/h Total consumption 4,600 g	-	Jan 9 days	EIS-Yes
US-13	Mountain snowpack augmenta-tion	840 km^2 target, 1,460 km^2 control	Northern Utah NOAA 95-895a	Northern Utah	-	Water Resources (P)	37 G/B acetone burners	AgI, 8 g/hour per generator Total consumption 6,314 g	-	Dec 7 days	EIS-No
US-14	Winter snowpack augmenta-tion, PE	325 km^2 target, 2,590 km^2 control	Central Colorado Program NOAA 95-890	Vail and Beaver Creek areas, Colorado	-	Water Resources (P,G)	14 G/B acetone burners	AgI, 5 g/hour to 20 g/hour per burner. Total consumption 10,423 g	-	Nov-Dec 21 days	EIS-No
US-15	PE	1,134 km^2 target, 3,240 km^2 control	Calaveras River NOAA 95-870	California	-	Hyd. Muni.	Seeding from 1 A/C at -5°C level	AgI, 50 - 500 g/h. Total consumption 4,300 g	-	Jan-Mar 20 days	EIS-No
US-16	PE	3,888 km^2 target, 6,480 km^2 control	San Joaquin River Project NOAA 95-873	San Joaquin River, California	-	Water Resources (P)	Ground-based and in-cloud seeding with 19 G/B generators and pyrotechnics on 1 A/C	AgI Total consumption 37,271 g	-	Jan-Dec 49 days	EIS-No
US-17	Snowpack augmenta-tion	583 km^2	Big Sandy River NOAA 95-896	Wyoming	-	Muni.	G/B generators	AgI and NH_4I, 10-15 g/hour. Total consumption: 732 g	-	Jan-Feb 3 days	EIS-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-18	PE	3,900 km² target, 7,780 km² control	Tuolumne River Project NOAA 95-871	Tuolumne County, California	-	(G) Local	In-cloud and cloud top seeding with pyrotechnic devices and liquid spray from 1 A/C	AgI Total consumption 9,650 g	-	Jan-Mar Dec 30 days	EIS-Yes
US-19	PE	1,460 km² target, 3,240 km² control	Eastern Sierra Program NOAA 95-872	Eastern Sierra, California	-	(G) Local	Cloud top seeding with pyrotechnics from 1 A/C	AgI, 60 to 6,000 g/hour Total consumption 12,350 g	-	Jan-Mar Dec 19 days	EIS-Yes
US-20	PE	2,592 km² target, 3,900 km² control	Monterey Project NOAA 95-877	Monterey County, California	-	(G) Local	In-cloud and cloud-top seeding with pyrotechnics and liquid fuel generators, all from 1 A/C	AgI Total consumption 3,250 g	-	Jan-Mar, Dec 14 days	EIS-Yes
US-21	PE	1,620 km² target, 3,240 km² control	Kaweah River Project NOAA 95-875	Kaweah River, California	-	(G) Local	Ground-based, in-cloud and cloud top seeding with 6 G/B generators and pyrotechnics on 1 A/C	AgI Total consumption 16,384 g	-	Jan-Mar Dec 35 days	EIS-Yes
US-22	PE	3,900 km² target, 16,200 km² control	Kern River Project NOAA 95-876	Kern River Basin, California	-	(G) Local	In-cloud and cloud-top seeding with pyrotechnics and liquid fuel generator from 1 A/C	AgI Total consumption 18,410 g	-	Jan-Apr, Dec 31 days	EIS-Yes
US-23	Snowpack augmenta-tion	550 km² target, 648 km² control	Grand Mesa NOAA 95-897a	Delta County, Colorado	-	Hyd. Muni.	Ground-based generators	AgI	-	-	EIS-No
US-24	PE	11,340 km²	Boise Program NOAA 95-889	Boise River Basin, Idaho	-	(G) Local	20 G/B AgI generators	AgI 8 g/hour per generator Total consumption 8,586 g	-	Nov-Dec 14 days	EIS-No

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-25	PE	5,184 km² target, 4,860 km² control	Kings River, California NOAA 95-874	California	-	(G) Local	16 G/B ground-based, cloud-base and in-cloud seeding with generators and 1 A/C with pyrotechnics	AgI. Total consumption 31,565 g	-	Jan-Mar, Dec 36 days	EIS-Yes
US-26	PE Hail	5,590 km²	Atmospheric Modification Program NOAA 95-880	North Dakota	-	Res.	-	AgI, dry ice, snowmax. Total consumption 181,170 g, 1,195 kg and 190 g, respectively	-	June-Aug 45 days	-
US-27	PE Hail	22,080 km²	Atmospheric Modification Program NOAA 95-881	North Dakota	-	Res.	-	-	-	-	-
US-28	PE	17,820 km²	NOAA 95-878	Colorado River Basin, Texas	-	(G) Local Hyd.	Cloud-base seeding from 1 A/C	AgI, 3.3g/min. Total consumption 3,640 g	-	May-Oct 20 days	EIS-No
US-29	PE Hail	29,770 km²	Western Kansas Weather Modification NOAA Project 95-879	West Central and Southwest Kansas	-	(G) Local	-	AgI and dry ice. Total consumption 75,970 g and 2,622 kg respectively	-	May-Sept 55 days	EIS-No
US-30	PE	-	District V Cloud Seeding Consortium NOAA 95-897	Oneida County, Idaho	-	Muni.	Ground-based and in-cloud seeding with 30 G/B generators	AgI	-	-	-
UZBEKISTAN											
UZ-1	Op. Hail	8,600 km²		Eastern Uzbekistan	1969 Every year Yes	Agr. (G)	In-cloud seeding with rockets and shells with pyrotechnics at temp. -6° to -10°C	AgI. Total consumption: 12.5 kg	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criterion: radar reflectivity at 10 cm wave length $\geq 5.0 \times 10^{-9}$ cm^{-1}	Apr-Aug 29 days	Evaluation based on crop damage data EIS-Yes C/B-Yes

IV. REGISTER OF 1995 REPORTED PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UZ-2	Res. Dev. Hail	400 km^2	Modification of Hail Clouds through Ground Based Dispersion of the Agent	-	1991 Every year Yes	Res. Wea. Ser.	6 G/B generators	AgI. Total consumption: 6 kg	Convective clouds with cloud bases colder than 10°C and top temp. between 0° and -20°C. Seeding criteria: cloud base below 3 km; radar reflectivity at 3.2 cm wave length ≥ 5.0 x 10^{-9} cm^{-1}	Apr-Aug 11 days	Evaluation based on historical records, crop damage and hail pad data. Report can be available EIS-Yes C/B-Yes
YUGOSLAVIA											
YU-1	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

V. ADDRESSES OF REPORTING AGENCIES

ARGENTINA	Antigrad Latinoamericana S.A. Viamonte 1000-5570 San-Martin, MENDOZA Argentina
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	China Meteorological Administration 46 Baishiqiao Road BEIJING 100081 China
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
	Association Climatologique de la Moyenne Garonne Aerodrome d'Agen 47520 LE PASSAGE France
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	Landratsamt Rosenheim Wittelsbacherstr. 53 83022 ROSENHEIM Germany
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 P.O. Box 341011 - Marka AMMAN Jordan
KOREA, REPUBLIC OF	Korea Meteorological Administration International Cooperation Division 1 Songwol-dong, Chongno-gu SEOUL, 110-101 Republic of Korea
LIBYAN ARAB REPUBLIC	Meteorological Department 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
MOROCCO	Direction de la Météorologie Nationale Service de Recherche Atmospheriques/CNCRM Aéroport CASA/ANFA CASABLANCA 20200 Morocco
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RUSSIAN FEDERATION	Hail Suppression Research Centre "Antigrad" 2, Lenin Av. NALCHIK 360030 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 4-1°- 26003 LOGRONO Spain
	Universidad de Leon Dep. de Fisica 24071 LEON Spain
SYRIAN ARAB REPUBLIC	Meteorological Department of Syria P.O. Box 4211 Joul Jammal St. 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	National Oceanic and Atmospheric Administration National Weather Service 1325 East-West Highway SILVER SPRINGS, MD 20910 USA
UZBEKISTAN	
	Uzbek Administration for Modification of Hydrometeorological Processes 72, Observatorskay St. 700052 TASHKENT Uzbekistan
YUGOSLAVIA	Federal Hydrometeorological Institute Bircaninova 6 11001 BEOGRAD Yugoslavia

VI. MEMBER COUNTRIES REPORTING ON COMPLETED PROJECTS

VII. REPORTS ON COMPLETED PROJECTS 1995

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
CHINA				
Hebei Province, flat and hilly terrain Target: 30,000 km^2 Control: 30,000 km^2 Variable	Research for weather conditions of artificial precipitation enhancement and operational techniques 1990-1995 Apr-July	Cloud types: orographic, stratiform, frontal. Agent: AgI. Airborne seeding at a rate of 0.36 kg/hour at altitudes 4-6 km along 5-20 km seeding tracks. Standard seeding period: 2-3 hours. Results: more precipitation at a remarkable statistical level. See also Register 1993-1994	.	China Meteorological Administration Department of Science and Education 46 Baishiqiao Road BEIJING 100081 China
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 576 ground-based generators. Control is based on hail pad data and crop damage data. Seeding criterion: hail with diameter ≥ 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 and 1993-1994 Registers	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 Association Nationale d'Etude et de Lutte contre les Fleaux Atmospheriques, Brochure N44 (1996), 35 pp.	ANELFA 52, rue Alfred Dumeril 31400 TOULOUSE France
GERMANY				
Hilly terrain in Stuttgart area Target: 2,500 km^2 Control: 4 areas, 2,500 km^2 each Areas are fixed and adjacent	Suppression of hail from convective and frontal clouds 16 years Operational since 1990 Apr-Oct	Airborne seeding with AgI at cloud base level. For more information see WMO Register for 1992	-	University of Hobenheim STUTTGART Germany
JAPAN				
Sea of Japan facing Yamagata Prefecture Target: 100 km^2 Variable	Study of precipitation formation in snow clouds and feasibility of snow cloud modification by seeding 1989-1993	Convective clouds with top temp. > -20°C seeded from an aircraft at a level of 3,000 m. Agent: dry ice at a rate of 60 g/min, the standard seeding period being 10 min. Basis for evaluation: airborne cloud measurements. Results: high concentration of ice crystals (1,000 per litre) for the first few minutes. Formation of aggregates (30 min later)	-	Meteorological Research Institute Japan Meteorological Agency Nagamine 1-1 TSUKUBA Ibaraki 305 Japan

VII. REPORTS ON COMPLETED PROJECTS 1995

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
JORDAN				
Hill and flat area. North, middle and south of Jordan Fixed target: 14,500 km^2	Rainfall augmentation from all types of clouds 1986-1995 Oct-May	Agent: AgI, seeded at a rate of 0.4 kg/hour with 23 G/B generators and A/C operating at 3,000 m. Seeding criteria: in-cloud temp. -5° to -10°C; presence of liquid water; low number of ice particles. 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 increased 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
KOREA, REPUBLIC OF				
Mid-eastern part of Korea. Mountainous terrain Target: 200 km^2 Control: 2,500 km^2 Both fixed, 10 km apart	Rainfall augmentation from orographic and frontal clouds Mar-Sept 1995	Agent: AgI (6 G/B generators) and dry ice (aircraft). Dry ice seeded at 5,000 m at a rate of 100kg/hour. Seeding criteria: orographic storms; cloud base height < 600 m a.g.l. Seeded 40 days. Basis for evaluation: AgI components in the rain samples from 4 raingauges in the target area and 6 gauges in the control area. Result: no difference	Final Report on Metri Project 1996 "Artificial Rainfall Enhancement Experiments in Korea"	Korea Meteorological Administration International Cooperation Division 1 Songwol-dong, Chongno-gu SEOUL 110-101 Republic of Korea
MALAYSIA				
Mountainous terrain in Northern Malaysia, Peda Muda Catchmeut Target: 1,136 km Fixed	Rainfall augmentation from convective clouds 1993-1994 Sept-Nov	Airborne seeding with NaCl at 1.5-2.1 km during 10 min on each flight. Result: more precipitation presumed. No evaluation made because of mountainous terrain in the target area	-	Malaysian Meteorological Service Jalan Sultan 46667 PETALING JAYA Malaysia
MOROCCO				
Atlas Mountains. Mountainous terrain Target: 16,400 km^2 Control: 6,000 km^2 Both fixed, 100 km apart	Rainfall and snowfall augmentation from all types of clouds Nov-Apr	Ground-based and airborne seeding with AgI and NaI at temp. less than -5°C. Seeding rate: 0.375 kg/hour. Seeded unit: individual storm. Evaluation basis: data from 20 and 10 rain gauges in target and control areas. Statistical method: Multiresponse Permutation Test. Result: 14-17% increase in rainfall at 0.1 significance level	"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

VII. REPORTS ON COMPLETED PROJECTS 1995

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
SOUTH AFRICA				
Bethlehem, Free State and Carolina, Mpumalanga. Hilly terrain Target: 2 areas, 30,000 km^2 each	Rainfall enhancement from convective clouds 1991-1996 Oct-Mar	Agent: hygroscopic materials in flares seeded from aircraft at a rate of 20 kg/hour. Seeding unit: individual storm. Seeding criteria: radar reflectivity ≥ 30 DBZ; well-define updraft region at the cloud base. Seeded/unseeded: 62/65 units. Seeding period: 20 min. Basis for evaluation: radar-inferred precipitation data. Statistical test: Permutation Test. Method: radar-inferred rain mass was computed for 7 ten-minute intervals, beginning with ten minutes before the treatment decision. Result: 24% increase in rain mass at 0.0152 significance level	Cooper et. al, 1996, "Some calculations pertaining to hygroscopic seeding with flares", accepted for publication in Jour. Appl. Meteor.	South African Weather Bureau Bethlehem Precipitation Research Project Private Bag X15 BETHLEHEM, 970 South Africa
SYRIAN ARAB REPUBLIC				
Mountainous, hilly and flat terrain Target: 150,000 km^2 Control: variable Location of target and control areas are variable, depending on clouds and wind direction	Precipitation enhancement from orographic convective and frontal clouds 1991-1995 Nov-May	Agent: AgI. Airborne seeding at 2.5 - 7.5 km. Total seeding duration: about 1000 hours. Basis for evaluation: 125 precipitation gauges (including 32 recording) in target area and 20 gauges in control area. Result: 9-42% precipitation increase at 0.05 significance level	Sixth WMO Scientific Conference on Weather Modification (Italy, 1994) WMO TD/No. 596, Vol. 1, pp. 325	Syrian Ministry of Agriculture and Agrarian Reform Rain Enhancement Project DAMASCUS Syrian Arab Republic

VII. REPORTS ON COMPLETED PROJECTS 1995

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

VIII. MEMBER COUNTRIES REPORTING *NO* WEATHER MODIFICATION PROJECTS IN 1995

Algeria
Armenia
Bahamas
Bahrain
Bangladesh
Barbados
Benin
Botswana
British Caribbean Territories
Canada
Chile
Colombia
Czech Republic
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
Estonia
Ethiopia
Fiji
Gambia
Guinea-Bissau
Hong Kong
Iceland
India
Kazakstan
Kyrgyz Republic
Latvia
Lithuania
Macao
Mauritania
Mauritius
Micronesia, Federated States of
Monaco
Myanmar
Netherlands
New Zealand
Nicaragua
Oman
Peru
Qatar
Seychelles
Sierra Leone
Singapore
Sri Lanka
Sweden
Switzerland
Trinidad and Tobago
Turkey
Uganda
United Kingdom
Venezuela

WORLD METEOROLOGICAL ORGANIZATION

R/CLA/4, ANNEX A
FORM (1 January 1995)

CLOUD PHYSICS AND WEATHER MODIFICATION RESEARCH PROGRAMME

QUESTIONNAIRE TO GATHER DATA FOR THE 1995 REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS

PLEASE MARK APPROPRIATE BOXES

MEMBER OF WMO .....

No weather modification activities in 1995 ☐

(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): .....

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 1994, January-February 1995; another might be: January-February 1995. December 1995).

(b) On how many days will 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 temperature (°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 September 1996.**

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 1994, January-February 1995.**

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.

WORLD METEOROLOGICAL ORGANIZATION

R/CLA/4, ANNEX B

REPORT ON COMPLETED 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):

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

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
WMP-No. 26	Expert Meeting to Review the Present Status of Hail Suppression (Golden Gate Highlands National Park, South Africa, 6-10 November 1995)	WMO/TD-No. 764
WMP-No. 27	Nineteenth Session of the Executive Council Panel of Experts/CAS Working Group on Physics and Chemistry of Clouds and Weather Modification Research (Geneva, Switzerland, 5-9 May 1997)	WMO/TD-No. 820