

# WORLD METEOROLOGICAL ORGANIZATION

## PROGRAMME ON PHYSICS AND CHEMISTRY OF CLOUDS AND WEATHER MODIFICATION RESEARCH

WMP REPORT NO. 23

### REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS 1992



25 AOUT 1995



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**REGISTER**

**OF**

**NATIONAL WEATHER MODIFICATION PROJECTS**

**1992**



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**WMO/TD - No. 686**

[1995]

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### Annexes

Annex A:	QUESTIONNAIRE CIRCULATED TO OBTAIN INFORMATION FROM MEMBER COUNTRIES
Annex B:	FORM USED FOR REPORTING COMPLETED WEATHER MODIFICATION PROJECTS

## I. INTRODUCTION

As part of the WMO activities in weather modification, as approved by the World Meteorological Congress, the Secretary-General maintains a Register of experiments and operations in weather modification carried out within Member countries since 1975.

The present publication is the seventeenth of its kind and is based on information received from Member countries on experiments and operations sponsored by governmental agencies and private concerns that took place during 1992.

To assist the reader in understanding the content of each of the 12 columns used in the tabular presentation, detailed explanations are given in Section II. The questionnaire which was sent to all Members in October 1994 is reproduced in Annex A to the report, in the four official languages of WMO, to ensure that the tabular information will be readily understood by all readers. Information from these questionnaires is given in Section IV. Section VI provides summaries of completed weather modification projects. The form to be used in reporting completed programmes or for which a physical and/or statistical evaluation has been carried out is reproduced as Annex B.

The list of Member countries for which information is included in the Register is given in Sections III and V. The Member countries which replied that no weather modification activities had taken place in their country during 1992 are listed in Section VIII.

Requests for further information on the projects may be addressed to the reporting agency for each country which is included in Section VII of the Register. The WMO Secretariat will be happy to assist if necessary.

## II. DETAILED EXPLANATION OF COLUMNS USED IN TABULAR INFORMATION IN THE REGISTER

*(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. LIST OF MEMBER COUNTRIES REPORTING WEATHER MODIFICATION PROJECTS IN 1992

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IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ARMENIA											
AR-1	Hail	10,000 km <sup>2</sup> target 8,500 km <sup>2</sup> control	Modification of hydrometeorological processes	Yerevan area (40°10' N 44°30' E)	1964 Every year (?)	Agr. (G)	-	-	-	-	-
AUSTRALIA											
AU-1	Res. PE	3,000 km <sup>2</sup> target. 40,000 km <sup>2</sup> control	Tasmanian Dry-Ice Cloud Seeding Experiment (DICSE), Stage III	Central Plateau, Tasmania	1992 Yes	Enr. (G)	One A/C dispersing dry ice in clouds and cloud tops at -5°C level	Dry ice, 40 kg/hour Total consumption 1200 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/m <sup>3</sup> , expected time of seedable cloud persistence ≥ 30 min	May-Oct 19 days	Evaluation based on randomization, report planned, EIS-No C/B-Yes
AUSTRIA											
AUS-1	Op. Hail	1,800 km <sup>2</sup>	STYRIA Hail Test Program	Weiz district 46°50' N 15°45' E	1985 Every year Yes	Agr. (P)	5 A/C with acetone burners and pyrotechnic flares for seeding in cloud base	17 l/hour of AgI Total consumption 4500 l for year	Convective clouds, bases colder than 10°C and tops colder than -20°C. Seeding criteria: subjective decision of pilots, regional forecasts and radar data	May-Aug 30 days	Evaluation based on historical records, crop damage and hail pad data, report planned EIS-No C/B-No

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AUS-2	Op. Hail	500 km <sup>2</sup>	Lower Austria - Hail Test Program	Krems district 48°20' N 15°31' E	1981 Every year	Agr. (P)	2 A/C with acetone burners and pyrotechnic flares for seeding in cloud base	10 l/hour of AgI Total consumption 625 l per year	Convective clouds with bases colder than 10°C and tops colder than -20°C. Seeding criteria: as AUS-1	May-Aug 25 days	As AUS-1
BULGARIA											
BG-1	Op. Res Hail	15,000 km <sup>2</sup>	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 <sub>2</sub> per rocket. Total consumption 9620 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-Sept 45 days	Evaluation based on historical records, report planned. EIS-No C/B-Yes
BG-2	Res. Dev. PE, (E)	2,000 km <sup>2</sup>	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 <sub>2</sub> per rocket Total consumption 37 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 11 days	Evaluation based on randomization EIS-No C/B-No
CHINA											
CN-1	Res., Op. PE, Hail	300,000 km <sup>2</sup>	-	-	- Every year Yes	Agr. (G)	One A/C and artillery shells at -10°C to -20°C	Dry ice 100-1000 g/km Total consumption 1900 kg per year	Stratiform clouds with bases colder than 10°C. Seeding criteria: cloud base lower than 1500 m, cloud depth more than 600 m, cloud top temp. warmer than -20°C	Apr-July for PE, Apr-Sept for hail suppression	Evaluation based on historical records and crop damage data B/C-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-2	Res. Op. PE Hail	60,000 km <sup>2</sup>	-	Heilongjiang province	- Every year Yes	Agr. For. (G)	One A/C and artillery shells at temp. below -10°C, in- cloud seeding	Dry ice and AgI (in flares) Total consumption 300 kg and 5 kg respectively	Convective and stratiform clouds with bases colder than 10°C and tops colder than -20°C	May-Oct for hail suppression, May (23 hours of A/C seeding) for PE	Evaluation based on historical records and crop damage data
CN-3	Res. Op. PE, Hail	25,000 km <sup>2</sup>	-	40°40' N 116°30' E (near Beijing)	1990 Every year Yes	Agr. (P)	In-cloud seeding with artillery shells and one A/C. Explosive generators and liquid spray used at temp. below -5°C	Liquid nitrogen, 0.5-1 l/km Total consumption 900 kg during the year	Stratiform clouds, with bases colder than 10°C and top temp. between 0° and -20°C. Seeding criterion: cloud depth more than 1 km	May 15-Oct 1 for hail suppression July 14-Sept 30 for PE 33 days of hail suppression 20 hours of A/C PE	Estimation based on historical records C/B Yes
CN-4	Res. Op. PE, Hail	220,000 km <sup>2</sup>	-	Ainghai province	1989 Every year Yes	Agr. (G)	In-cloud seeding with artillery shells and liquid spray from 1 A/C	Liquid nitrogen 1-6 l/hour	Stratiform clouds with bases colder than 10°C, and tops warmer than -20°C	Mar-May for PE, June-Sept for hail suppression. 20 hours of A/C PE	Estimation based on historical records and crop damage data
CN-5	Res. Op. PE, Hail	230,000 km <sup>2</sup>	-	Ningxia province	1989 Every year Yes	Agr. (G)	In-cloud seeding with acetone burner and dry ice dispersal from one A/C. Artillery shells for hail suppression	800 g/hour of AgI and 700 g/km of dry ice	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C	May-June for PE (32 hours of A/C seeding) and May-Sept for hail suppression	Evaluation based on historical records and crop damage data
CN-6	Res. Op. PE, Hail	360,000 km <sup>2</sup>	-	Inner Mongolia province	1960 Every year	Agr. (G)	In-cloud seeding with acetone burners and solid dispersal from 2 A/C. Artillery shells for hail suppression	-	As CN-5	Apr-Sept for PE (125 hours), May-Sept for hail suppression	As CN-5

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-7	Res. Op. PE Hail	600,000 km <sup>2</sup>	-	Shandong province	1987 Every year Yes	Agr. (G)	In-cloud and cloud base seeding with acetone burner and solid dispersal from 1 A/C. Artillery shells for hail suppression	0.25-0.35 kg/min of AgI and 0.3-0.4 kg/km of dry ice.	Convective and stratiform clouds with bases colder than 10°C and top temp. between -10°C and -20°C	Mar-June, Sept-Oct for PE (66 hours of A/C seeding), May-Sept for hail suppression	Evaluation based on historical records and crop damage data
CN-8	Res. Op. PE Hail	20,000 km <sup>2</sup>	-	Jiangxi province	- Every year Yes	Agr. Wea. Ser. (G)	Artillery shells are fired into clouds and cloud bases	-	Convective and stratiform clouds with bases colder than 10°C and tops colder than - 20°C. Seeding criteria: cloud top at more than 9 km, cloud depth more than 5 km	June-Aug for PE, Apr-May for hail suppression	As CN-7
CN-9	Res. Op. PE Hail	100,000 km <sup>2</sup>	-	Hebei province	- - Yes	Agr. (G)	In-cloud seeding with acetone burner and pyrotechnic flares from 1 A/C and artillery shells	-	Convective and stratiform clouds with bases colder than 10°C and tops colder than -20°C	Apr-July for PE (60 hours of A/C seeding) and May-Oct for hail suppression	As CN-7
CN-10	Res. Op. PE Hail	40,000 km <sup>2</sup>	-	Xinjiang province	1978 Every year Yes	Agr. (G)	In-cloud and cloud base seeding with acetone burners from 2 A/C and artillery shells	-	Stratiform clouds for PE and convective clouds for hail suppression. Cloud base temp. below 10°C, cloud top temps. more than -20°C.	Nov-Jan and May-Aug for PE (42 hours) and Apr-Sept for hail suppression	As CN-7

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CN-11	Res. Op. PE, Hail	20,000 km <sup>2</sup>	-	Shanxi province	1989 Every year Yes	Agr. (G)	Cloud top and in-cloud seeding by solid dispersal and artillery shells	1-2 kg/km of dry ice	Stratiform clouds for PE 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 2 km and LWC > 0.2 g/m <sup>3</sup>	Mar-Sept for PE (16 hours of A/C seeding) and May-Sept for hail suppression	Evaluation based on historical records and crop damage data. C/B-Yes
CN-12	Res. Op. PE Hail	130,000 km <sup>2</sup>	-	Guangxi province	- Every year Yes	Agr. (G)	Cloud top and in-cloud seeding with acetone burner from 1 A/C and artillery shells	AgI at a rate of 4 g/min	Stratiform clouds for PE with bases colder than 10°C and tops warmer than -20°C	Feb-Oct for PE (30 hours of A/C seeding) and Feb-May for hail suppression	As CN-7
CN-13	Res. Op. PE Hail	10,000 km <sup>2</sup>	-	Guizhou province	1989 Every year Yes	Agr. (G)	Cloud base and in-cloud seeding with rockets and artillery shells	-	Convective clouds. Seeding criterion: radar expert system	June-Oct for PE, Mar-Oct for hail suppression	As CN-7
CROATIA											
CR-1	Op. Hail	11,000 km <sup>2</sup>	Croatian Hail Suppression System	Between Sava and Drava rivers	1976 Every year Yes	Wea. Ser. (G)	In-cloud seeding with rockets at temp. -8° to -12°C	1.23 kg/day of AgI. Total consumption 16 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 1-Sept 30 13 days	Estimation based on historical records, crop damage and hail pads data. Report is planned. EIS-No C/B-No

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FRANCE											
FR-1	Res. Op. Hail	80,000 km <sup>2</sup> target 420,000 km <sup>2</sup> control	ANELFA	Southwestern France	1952 Every year Yes	Agr. (P)	Ground-based seeding with 605 acetone burners	AgI 8 g/hour per generator	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 15-Oct 15 50 days	Evaluation based on crop damage and hail pad data. Report is available EIS-Yes C/B-Yes
GERMANY											
GE-1	Res. Op. Hail	2,400 km <sup>2</sup>	Hagelabwehrver- suchder Landkreise Rosenheim und Miesbach	Mountainous to hilly terrain on the northern side of Alps	1975 Every year Yes	County (G)	Ground-base and airborne seeding with acetone generators. Two G/B generators and 2 A/C seeding at cloud base level.	0.8 kg/hour of AgI Total consumption 37.8 kg during the year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criterion: radar echo parameters	May 1-Sept 30 23 days	Estimation based on comparison with historical records and crop damage data. Report available EIS-No C/B-No
GE-2	Op. Hail	2,500 km <sup>2</sup> target 7,500 km <sup>2</sup> control	Hail Suppression Stuttgart Area	49°N 10°E (SW Germany)	1980 Every year Yes	Agr. (G, P)	Cloud base seeding with acetone burners from 2 A/C	AgI Total consumption 315 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, humidity, radar data	Apr 25-Oct 15 31 days	Estimation based on comparison with historical records, crop damage and hail pad data. Report available EIS-Yes C/B-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
GREECE											
GR-1	Op. Hail	5,000 km <sup>2</sup>	Hellenic National Hail Suppression Program	Northern Greece	1984 Every year Yes	Agr. (G)	5 A/C with pyrotechnic flares for seeding in clouds, cloud tops and bases at -5° to -10°C temp. levels	AgI at a rate of 70 g/km Total consumption 78.26 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	June-Sept 121 days	Estimation based on comparison with historical records, crop damage and hail pad data EIS-No C/B-Yes
HUNGARY											
HG-1	Op. Hail	8,000 km <sup>2</sup>	-	Southern Hungary	1991 Every year Yes	Agr. (P) and local government	67 G/B acetone burners	AgI at a rate of 8 g/hour Total consumption 64 kg during the year	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: 1) hail clouds forecasted 2) radar data	May-Sept 35 days	Estimation based on crop damage data EIS-No C/B-Yes
ISRAEL											
IL-1	Res. Op. PE Inc	Operational: 5,775 km <sup>2</sup> target 1,125 km <sup>2</sup> control Experimental: 8,663 km <sup>2</sup> target 1,000 km <sup>2</sup> control	EMS-Rain Enhancement	Operational: Northern Israel Experimental: Central and Southern Israel	1960 Every year Yes	Agr. (G)	60 G/B acetone burners and 4 A/C with acetone burners seeding at cloud base level	AgI Airborne: 550 g/hour G/B: 12 g/hour Total consumption 300 kg during the year	Convective clouds with bases warmer than 10°C and tops warmer than -20°C (usually) or colder (sometimes)	Nov 91- Apr 92, Nov 92- Dec 92 180 days	Estimation based on randomized experiment and comparison with historical records Report available EIS-No C/B-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
JORDAN											
JOR-1	Op. PE PR	14,500 km <sup>2</sup>	Precipitation Enhancement Program (PEPG) in Jordan	Marka Airport, Amman	1986 Every year except 1989-90 rain season 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 -12° and -20°C	AgI, airborne dispersal rate 120 g/hour Total consumption 5,100 kg during the year	Orographic clouds with bases colder than 10°C and tops warmer than -20°C	Oct 91- Apr 92, Oct 92-Dec 92 27 days	Estimation based on comparison with historical records Report planned EIS-No
MADAGASCAR											
MAD-1	Op. PE (E)	-	-	Southwest of Lake Alaotra	1990 - (?)	Agr. (G, P) Wea. Ser. Def.	Cloud top seeding from one A/C	NaCl at a rate of 250 g/min Total consumption 500 kg during the year	Convective and orographic clouds with bases warmer than 10°C and tops warmer than 0°C Seeding criterion: unstable clouds	Dec 91- Mar 92	Estimation based on comparison with historical records and pluviometric data EIS-No C/B-Yes
MALAYSIA											
MAL-1	Op. PE (R) PR	1,445 km <sup>2</sup>	Peđu Muda Cloud Seeding Operation	Northern part of Peninsular Malaysia	1977 Interrupted	Wea. Ser. (G)	In-cloud seeding from 2 A/C. Solid dispersal and liquid spray used	NaCl Total consumption liquid spray 11,850 kg. solid 24,500 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	Aug 17- Nov 30 106 days	Evaluation is not planned EIS-No C/B-No
MONGOLIA											
MON-1	Dev. Hail	300 km <sup>2</sup>	Hail	47° 30'N 102°30'E	1990 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding with artillery shells	AgI	Convective and orographic clouds with bases colder than 10°C and tops colder than -20°C	June-Sept 100 days	Estimation based on comparison with historical records. Report available C/B-Yes



IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
MOROCCO (MAROC)											
MO-1	Res. PE (E) (R) Inc	16,400 km <sup>2</sup> target 6,000 km <sup>2</sup> control	Programme AL CHAIT	Atlas Mountains, Central Basin	1984 Every year Yes	Wea. Ser. (G)	G/B seeding with 9 acetone burners. Seeding cloud tops, bases and in-clouds with acetone burners from 2 A/C	G/B seeding: AgI 20 g/hour Total consumption 26.25 kg during the year Airborne seeding: PbI <sub>2</sub> 375 g/hour	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-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	-
PERU											
PE-1	Op. PE	-	Modification Artificial Del Tiempo	Upper and middle flow of Mantaro River	1992 - No	Enr. (G)	G/B seeding with 10 acetone burners and in- cloud, cloud base and top seeding with acetone burner and solid dispersal from 1 A/C	AgI, dry ice, NaCl	Convective and orographic clouds with cloud bases colder than 10°C and tops warmer than -20°C	Nov 92- April 93 120 days	Estimation based on comparison with historical records EIS-No C/B-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RUSSIAN FEDERATION											
RF-1	Op. Hail	750 km <sup>2</sup>	Hail suppression	Krasnodar district	1967 Every year Yes	Agr. (G) Wea. Ser.	In-cloud seeding at temp. between -6° 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	Apr-Sept 37 days	Estimation based on historical data. Report available EIS-Yes C/B-Yes
RF-2	Op. Hail	1,096 km <sup>2</sup>	Hail suppression	Northern Caucasus	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 37 days	Estimation based on comparison with historical records EIS-Yes C/B-Yes
RF-3	Avalanche prevention	150-200 km <sup>2</sup>	Avalanche prevention	Northern Caucasus 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.	-	-	Dec.	Estimation based on comparison with a control area
RF-4	Op. PE (E)	23,000 km <sup>2</sup>	Cloud seeding for precipitation enhancement	Stavropol District (Northern Caucasus)	1986 Every year Yes	Agr. Wea. Ser. (G)	Cloud top seeding with pyrotechnical flares from 2 A/C	AgI Total consumption 3 kg	Convective and stratiform clouds with base temp. warmer than 10°C	May-June	Estimation based on radar data Report available EIS-Yes C/B-No
RF-5	Op. Fog	84 km <sup>2</sup>	Supercooled fog clearing in the airports	Sheremetevo International Airport, Moscow	1989 Every year No	Trans. Wea. Ser. (G)	Fog seeding at temp. between 0° and -20°C with the G/B liquid nitrogen generator	Liquid nitrogen	Supercooled fog	Jan-Mar	Estimation based on visibility data

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SLOVENIA											
SLO-1	Op. Hail	9,700 km <sup>2</sup>	Hail suppression system of Slovenia	Eastern Slovenia	1972 Every year Yes	Agr. Wea. Ser. (G)	In-cloud seeding at temp. -5 to -15°C with pyrotechnic flares on rockets	AgI 4 g/km <sup>3</sup> of cloud Total consumption 79 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 the height exceeding 0°C level by 1.5 km	May 15- Oct 15 20 days	Estimation based on crop damage data. EIS-No
SOUTH AFRICA											
SA-1	Res. PE	20,000 km <sup>2</sup>	-	-	-	-	2 A/C seeding 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 warmer than -20°C Seeding criteria: radar reflectivity > 30 DBZ, well defined updraft area and growing cells on upshear side	Jan-Mar, Oct-Dec	Estimation based on randomized experiment, 3D radar data, rain gauge network EIS-in process C/B-in process
UKRAINE											
UK-1	Op. PE	5,000 km <sup>2</sup>	Precipitation Enhancement in Drepropetrovsk district	45°30'N 30°E	1960 Every year Yes	Agr. Res. (G)	In-cloud seeding with pyrotechnic flares and dry ice dispersal	AgI Total consumption 5,045 flares. Dry ice. Total consumption 5.3 tons during the year	Convective and stratiform clouds with bases colder than 10°C and tops warmer than -20°C Seeding criteria based on radar data	May-June, Nov-Sept 38 days	Estimation based on historical records Report available EIS-No B/C-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
UK-2	Op. Hail	5,010 km <sup>2</sup> target 5,010 km <sup>2</sup> control	Hail Suppression in Republic of Crimea	Crimea Peninsular	1968 Every year Yes	Agr.	Cloud base and in-cloud seeding with pyrotechnical flares on the rockets	AgI 6.0-15.3 g per rocket Total consumption 32 kg	Convective clouds with bases warmer than 10°C and tops colder than -20°C Seeding criteria: based on radar data	May-Sept	Estimation based on comparison with historical records, crop damage data and comparison to control area EIS-No C/B-Yes
UNITED STATES OF AMERICA											
US-1	Fog	162 km <sup>2</sup>	Fairchild Cold Fog Dispersal System NOAA 92-771	Fairchild AFB, Washington	-	Def. (G)	Cold fog seeding with G/B propane dispensers	Propane Total consumption 5320 l	-	Jan-Apr, Nov-Dec 17 days	EIS-Yes
US-2	PE	2,916 km <sup>2</sup>	Nevada Ruby Mountains Project NOAA 91-739 92-7761	Western Ruby Mountains Watershed	-	Res. (G)	6 G/B acetone burners	AgI Total consumption 17,622 g	-	Jan-Mar Nov-Dec 39 days	EIS-No
US-3	PE	9,720 km <sup>2</sup>	Nevada Carson-Walker Project NOAA 91-740 92-775	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 14,404 g	-	Jan-Mar Oct-Dec 54 days	EIS-No
US-4	PE	5,410 km <sup>2</sup>	Nevada Truckee-Tahoe Project NOAA 91-741 92-776	Truckee River Watershed, Nevada	-	Res (G)	7 G/B acetone burners and 1 A/C with pyrotechnic flares or burners	AgI Total consumption 46,078 g	-	Jan-Mar Oct-Dec 37 days	EIS-No
US-5	PE	765 km <sup>2</sup> target 3,240 km <sup>2</sup> control	NOAA 91-738	American River Watershed, California	-	Muni. (G)	8 G/B acetone burners	AgI 20 g/hour per burner. Total consumption 5,800 g	-	Jan-Mar 11 days	EIS-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-6	Snowpack augmentation	16,200 km <sup>2</sup> target, 16,000 km <sup>2</sup> control	NOAA 91-750 92-793	Box Elder, Cache and Rich Counties, Utah	-	Water resources (P)	30 G/B acetone burners	AgI 8 g/hours per burner. Total consumption 27,212 g	-	Jan-Apr, Dec 36 days	EIS-No
US-7	Mountain snowpack augmentation	36,930 km <sup>2</sup> target, 24,300 km <sup>2</sup> control	Central and Southern Utah Cloud Seeding NOAA 91-751 92-782	Central and Southern Utah	-	Water resources (P)	80 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 55,295 g	-	Jan-Mar Nov-Dec 36 days	EIS-No
US-8	Mountain snowpack increase water supply increase	810 km <sup>2</sup>	Mokelumne NOAA 91-746 92-779	Central Sierra Nevada Mountains, California	-	Enr. (P)	6 G/B acetone burners	AgI 25 g/hour per burner. Total consumption 41,631 g	-	Jan-May, Nov-Dec 53 days	Evaluation is planned based on target/control ratio EIS-No
US-9	Mountain snowpack increase water supply increase	1,620 km <sup>2</sup> target, 454 km <sup>2</sup> control	Lake Almanor NOAA 91-747 92-780	Northern Sierra Nevada mountains California	-	Enr. (P)	9 G/B acetone burners	AgI 25 g/hour per burner, Total consumption 85,325 g	-	Jan-May, Nov-Dec 49 days	As US-8
US-10	Mountain snowpack augmentation	650 km <sup>2</sup> target, 490 km <sup>2</sup> control	WASATCH Front (mountains) NOAA 91-752 92-783	Utah	-	Muni. (G)	14 G/B acetone burners	AgI 8 g/hour per burner. Total consumption 21,829 g	-	Jan-Mar, Nov-Dec 37 days	EIS-No
US-11	PE	11,340 km <sup>2</sup>	Santa Barbara NOAA 91-742 92-725	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 Dec 24 days	EIS-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-12	PE	632 km <sup>2</sup> target, 1944 km <sup>2</sup> control	Santa Clara Project NOAA 92-766	Santa Clara County, California	-	Muni. (G)	Seeding from 1 A/C with pyrotechnics and liquid fuel generator	AgI Total consumption 3,260 g	-	Feb-Apr 13 days	EIS-Yes
US-13	Mountain snowpack augmentation	32,400 km <sup>2</sup> target, 16,200 km <sup>2</sup> control	West Uintas NOAA 91-755 92-792	Northern Utah	-	Water Resources (P)	15 G/B acetone burners	AgI, 8 g/hour per generator Total consumption 13,276 g	-	Jan-Mar, Dec 23 days	EIS-No
US-14	Winter snowpack augmentation PE	325 km <sup>2</sup> target, 2,590 km <sup>2</sup> control	Central Colorado Program NOAA 91-748 92-787	Vail and Beaver Creek areas, Colorado	-	Water Resources (P,G)	10 G/B acetone burners	AgI 5g/hour to 20g/hour per burner. Total consumption 14,461 g	-	Jan-May, Nov-Dec. 48-days	EIS-Yes
US-15	Fog	3.5 km <sup>2</sup> target, 16.2 km <sup>2</sup> control	Fog Dispersal NOAA 91-735 92-781	Salt Lake City International Airport	-	Trans. (P)	G/B dry ice dispersal	Dry ice. Total consumption 20834 kg	-	Jan-Feb, Nov-Dec 27 days	EIS-Yes
US-16	PE	3,564 km <sup>2</sup> target, 1,040 km <sup>2</sup> control	Upper San Joaquin Project NOAA 91-744	Upper San Joaquin River Basin, California	-	Enr. (P)	19 G/B generators 1 A/C with 2 acetone burners and pyrotechnic flares	AgI 6 g/hour per G/B generator and 120 g/hour per A/B generator. Pyrotechnic flares generating 100-200 g/hour. Total consumption 26,116 g	-	Jan-Sept 77 days	EIS-No
US-17	PE	7,210 km <sup>2</sup>	Kings River NOAA 91-756A	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 2,202 g	-	Jan-Apr 10 days	EIS-Yes

IV. REGISTER OF 1992 PROJECTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
US-18	Fog	32.5 km <sup>2</sup>	NOAA 91-753	Medford airport, Oregon	-	Trans (P)	A/C	Dry ice Total consumption 40 kg	-	Jan, Dec 3 days	EIS-No
US-19	Snowpack augmentation	1,300 km <sup>2</sup>	Ogden River NOAA 91-754 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 8,827 g	-	Jan-Mar, Dec 24 days	EIS-No
US-20	PE	3,888 km <sup>2</sup> target, 6,480 km <sup>2</sup> control	San Joaquin River Project NOAA 92-773	San Joaquin River, California	-	Water Resources (P)	19 G/B generators and pyrotechnics on 1 A/C	AgI Total consumption 8,662 g	-	Oct-Dec 15 days	EIS-No
US-21	Winter snowpack augmentation, PE	325 km <sup>2</sup> target, 2,590 km <sup>2</sup> control	Aspen Colorado Program NOAA 91-749	Aspen, Colorado	-	(P)	10 G/B acetone burners	AgI Total consumption 9,534 g	-	Jan-Mar, Nov-Dec 41 days	EIS-No
US-22	Snowpack augmentation	583 km <sup>2</sup>	Northern Colorado NOAA 92-788	Willow Creek Watershed	-	Muni (G)	15 G/B generators	AgI 8 g/hour Total consumption 2,792 g	-	Dec 10 days	EIS-No
US-23	PE	1,620 km <sup>2</sup> target, 1,620 km <sup>2</sup> control	Solano County NOAA 92-757	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 6,040 g	-	Jan-Mar 14 days	EIS-Yes
US-24	PE	1,135 km <sup>2</sup> target, 3,240 km <sup>2</sup> control	Calaveras River Project NOAA 92-758	Calaveras River basin, California	-	(G) Local	In-cloud A/C seeding at -5°C level	AgI 50-500 g/hour. Total consumption 2,310 g	-	Jan-Apr 13 days	EIS-No
US-25	PE	3,900 km <sup>2</sup> target, 7,780 km <sup>2</sup> control	Tuolumne River Project NOAA 92-759	Tuolumne County, California	-	(G) Local	In-cloud and cloud top 1 A/C seeding with pyrotechnic devices and liquid spray	AgI Total consumption 7,060 g	-	Jan-Apr, Nov-Dec 20 day	EIS-Yes







IV. REGISTER OF 1992 PROJECTS

Project No.	Project Name	Project Description	Project Status	Project Location	Project Date	Project Budget	Project Manager	Project Sponsor	Project Contact	Project Phone	Project Fax	Project Email
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## V. LIST OF MEMBER COUNTRIES REPORTING COMPLETED PROJECTS

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## VI. INFORMATION ON COMPLETED PROJECTS

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
<b>AZERBAIJAN</b>				
Azerbaijan Target: 10,000 km <sup>2</sup>	Suppression of hail from convective clouds 25 years 1967-1991	Seeding clouds at 3.5-5.5 km with AgI from rockets. Seeding criteria based on radar reflectivity. Seeding unit: 1 hour in the afternoon Seeded: 105 units Results: less hail mass	-	State Hydrometeorological Committee of Azerbaijan 3, Rasul Rza St. 370601 BAKU Azerbaijan
<b>FRANCE</b>				
Hilly terrain in southwestern France Target: 80,000 km <sup>2</sup> Control: 420,000 km <sup>2</sup> Both areas fixed	Suppression of hail from convective and frontal clouds 41 years Apr-Oct	Seeding with AgI with 605 ground-based generators. Control is based on hail pad data and crop damage. Seeding criterion: hail with hailstone diameter $\geq$ 15 mm expected Seeding unit: 1 day. Seeding time: 8 hours/day Evaluation method: bivariable test with logarithmic transformation Result: 42% decrease in hailstone mass at 99% statistical significance	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, 48-58 Someonov, P., 1992. "Comparative Study of the Hail Suppression Efficiency in Bulgaria and France"-Atm. Res., 28, pp 227-235	ANELFA 52, rue Alfred Dumeril 31400 TOULOUSE France
<b>GERMANY</b>				
Hilly terrain in Stuttgart area Target: 2,500 km <sup>2</sup> Control: 7,500 km <sup>2</sup> Both areas fixed	Suppression of hail from convective and frontal clouds 15 years Apr-Oct	Airborne seeding with AgI at 1.5-2 km levels. Experimental unit: 12 hours, 08-20 h LT Evaluation methods: ranks (Mann-Witney) and t-test difference of total kinetic hail energy on seeding/unseeding days. Results: less hail mass, but at insignificant statistical level Extended area effects: increase in precipitation frequency up to 50 km downwind	Muller, W., 1989. "Some Results of a 10 Year Project (1980-89) on Hail Suppression in Stuttgart Area, FRG"-WMO Rep. No. 12, V. II, pp. 613-616 Muller, W., 1994. "Aspects of Verification of the Efficiency of Active Hail Defence"-Tech. Rep. No. 22, WMO Confr. on Weather Mod., Paestum, 6.3, pp. 205-208	University of Hobenheim D-7000 STUTTGART 70 Germany

## VI. INFORMATION ON COMPLETED PROJECTS

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
<b>GREECE</b>				
Hilly and mountainous terrain in Northern Greece Target: 1000 km <sup>2</sup> Control: 1000 km <sup>2</sup> Both fixed	Suppression of hail from convective clouds 5 years (1984-1988) Apr-Sept	Airborne seeding with AgI 14.4 kg/hour at -10°C level Experimental unit: 24 hours. Seeded 37 units Seeding criterion: 35 DBZ echo above -5°C level Evaluation methods: 130 hail pads in target and same number in control areas. Mann-Whitney U test applied Results: 70% reduction in hail mass at 95% statistical significance	-	ELGA Antihail Department 30, Patisson St. 10170 ATHENS Greece
<b>INDIA</b>				
Maharashtra State. Flat terrain Target area: 1,600 km Control area: 1,600 km Distance between areas: 40 km Cross-over design	Rainfall augmentation from warm clouds 11 years (1973-74, 1976, 1979-86) July-Sept	In-cloud seeding with NaCl at 200-300 m above cloud base Seeding criteria: cloud depth $\geq$ 1 km and liquid water content $\geq$ 0.5 g/m <sup>3</sup> . Seeding rate: 500-1000 kg/hour Experimental unit: 1 day, with standard seeding period of 1-2 hours, 284 units (142 pairs of days) seeded. Basis for evaluation: 40 rain gauges in target and the same number in control areas and cloud parameters and chemical composition measured from aircraft. Mann-Witney test applied Results: about 24% more rainfall at statistical significance 96%	Murthy, A.S.R. 1989. "An Overview of Warm Cloud Modification in India"-5th WMO Conf. on Wea. Mod. and Cloud Physics, WMO Report No. 12, pp. 521-524	Indian Institute of Tropical Meteorology PUNE 411008 India
<b>ISRAEL</b>				
Flat and hilly terrain. Target: 5,775 km <sup>2</sup> in the north 8,663 km <sup>2</sup> in the south Control: 1,125 km <sup>2</sup> in the north 1,000 km <sup>2</sup> in the south All fixed Randomized experiment	Rainfall augmentation from convective clouds 1960-1992 Nov-Apr	Ground-based and airborne seeding with AgI at a rate of 0.55 kg/hour Experimental unit: 24 hours Basis for evaluation: more than 400 rain gauges in each area (target and control) Results: 13-18% increase in rainfall at > 97.5% statistical significance	Gagin, A. and J. Neuman, 1981. "The Second Israeli Randomized Cloud Seeding Experiment: Evaluation of the Results"- J. App. Met., 20, pp. 1301-1311	Israel Meteorological Service P.O. Box 25 BET-DAGAN 50250 Israel

## VI. INFORMATION ON COMPLETED PROJECTS

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
<b>MADAGASCAR</b>				
Southwestern Madagascar. Flat terrain Target: 1,000 km <sup>2</sup> Fixed	Augmentation of rainfall from convective and frontal clouds Dec-Mar	Airborne seeding with NaCl at 1.5-2.5 km levels at a rate of 15 kg/hour Results: 20-50% increase in rainfall as compared to "normal" (multi-year averages based on historical records) amounts.	-	Division Application de la Météorologie au Développement BP 1254 ANTANANARIVO 101 Madagascar
<b>MALAYSIA</b>				
Mountainous terrain Target: 1,445 km Fixed	Rainfall augmentation from convective clouds 3.5 months in 1992 Aug-Nov	Airborne seeding with NaCl at 1.5-2.1 km Results: more precipitation presumed. No evaluation made because of mountainous terrain in the target area	-	Malaysian Meteorological Service Jalan Sultan 46667 Petaling Jaya SELANGOR Malaysia
<b>MOROCCO (MAROC)</b>				
Atlas Mountains. Mountainous terrain Target: 16,400 km <sup>2</sup> Control: 6,000 km <sup>2</sup> Both fixed	Rainfall augmentation from all types of clouds 10 years Nov-Apr	Ground-based and airborne seeding with AgI at temp. less than -5°C. Seeding rate: 0.375 kg/hour Evaluation basis: 20 and 10 rain gauges in target and control areas Statistical method: linier regression Results: 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 atmosphériques/CNCRM Aéroport CASA/ANFA CASABLANCA Morocco
<b>PERU</b>				
Upper and middle Mantara River. Flat and hilly terrain	Precipitation augmentation for energy production. Convective and orographic clouds 4 months Nov 92-Apr 93	Seeding with 10 AgI generators. NaCl and dry ice also used Experimental unit: 3 hours Basis for evaluation: 9 and 10 rain gauges in target and control areas, respectively	-	Servicio Nacional de Meteorología e Hidrología Jr. Cahuide 805 OF.411 LIMA 11 Peru

VI. INFORMATION ON COMPLETED PROJECTS

LOCATION AND TERRAIN	PURPOSE AND DURATION	AGENT AND ALTITUDE OF SEEDING	REFERENCES TO PUBLISHED RESULTS	CONTACT FOR INFORMATION
UKRAINE				
Odessa District. Flat and hilly terrain Target: 4,000 km <sup>2</sup> Control: 4,000 km <sup>2</sup> Both fixed	Hail suppression from convective clouds 13 years May-Sept	AgI dispersed from rockets	-	State Committee on Hydrometeorology of Ukraine Supervisory Service for Weather Modification 6, Zolotovorotskay St. KIEV-34 252601 Ukraine
Dnepropetrovsk District. Flat terrain Target: 5,000 km <sup>2</sup> Control: 5,000 km <sup>2</sup> Both fixed	Precipitation enhancement from convective, stratiform and frontal clouds 9 years May-Dec	Airborne AgI and dry ice dispersal Experimental unit: 12 hours in day time Basis for evaluation: 96 rain gauges in target and control zones (each) Result: more rainfall	-	State Committee on Hydrometeorology of Ukraine Supervisory Service for Weather Modification 6, Zolotovorotskay St. KIEV-34 252601 Ukraine

## VII. ADDRESSES OF REPORTING AGENCIES

ARMENIA  
Service for Modification of  
Hydrometeorological Processes  
54, Leo St.  
YEREVAN  
375 002 Armenia

AUSTRALIA  
Hydro-Electric Commission  
Cloud Seeding Unit  
GPO Box 355D, Hobart  
TASMANIA  
7001 Australia

and

Melbourne Water  
P.O. Box 4342  
MELBOURNE  
3001 Australia

AUSTRIA  
Department of Climatology  
Central Institute of Meteorology  
and Geodynamics  
Hohe Warte 38  
A-1190 VIENNA  
Austria

AZERBAIJAN  
State Hydrometeorological Committee  
for Azerbaijan  
3, Rasul Rza St.  
BAKU  
37060 Azerbaijan

BULGARIA  
National Institute of Meteorology  
and Hydrology  
66, blvd. Tsarigradsko chaussee  
1784 SOFIA  
Bulgaria

CHINA  
State Meteorological Administration  
Weather Modification Program Office  
46 Baishiqiaolu  
BEIJING 100081  
China

CROATIA  
Meteorological and Hydrological  
Service of Croatia  
Hail Suppression Department  
Gric 3  
ZAGREB 41000  
Croatia

FRANCE  
Association Nationale d'Etude et de  
Lutte Contre les Fieaux Atmospheriques  
52, rue Alfred Duméril  
31400 TOULOUSE  
France



GERMANY	Landratsamt Rosenheim Wittelsbacherstr., 53 83022 ROSENHEIM Germany
	and
	University of Hohenheim D7000 STUTTGART 70 Germany
GREECE	Hellenic Agricultural Insurance Organization Antihail Department 30, Patisson St. ATHENS 10170 Greece
HUNGARY	Hungarian Meteorological Service Kitaibel Pal u.l. 1024 BUDAPEST Hungary
INDIA	Indian Institute of Tropical Meteorology PUNE 411008 India
ISRAEL	Israel Meteorological Service Rain Enhancement Division P.O. Box 20 Ben Gurion International Airport 70100 Israel
JORDAN	Jordan Meteorological Department Marka-P.O. Box 341011 AMMAN Jordan
MADAGASCAR	Direction de la Météorologie Division Application de la Météorologie au Développement BP 1254 ANTANANARIVO (101) Madagascar
MALAYSIA	Malaysian Meteorological Services Ibu Pejabat Kaji cuaca Jalan Sultan 46667 Petaling Jaya SELANGOR Malaysia
MONGOLIA	Ministry of Nature and Environment Office of Hydrometeorology and Monitoring Hudaldaany gudang 5 ULAANBAATAR-11 Mongolia

MOROCCO (MAROC)	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 Nacional de Meteorologia e Hidrologia Jr. Cahuide 805 OF. 411 LIMA 11 Peru
RUSSIAN FEDERATION	Federal Service for Hydrometeorology and Monitoring of Environment Department of Weather Modification 12 Novovagankovskay str. 123342 MOSCOW Russian Federation
SLOVENIA	Hydrometeorological Institute 113, Vojkova LJUBLJANA 61000 Slovenia
SOUTH AFRICA	National Precipitation Programme Weather Bureau Private Bag X15 BETHLEHEM 9700 South Africa
UKRAINE	State Committee on Hydrometeorology Supervisory Service for Weather Modification 6, Zolotovorotskay St. KIEV-34 252601 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 Uzbekistan

## VII. MEMBER COUNTRIES REPORTING NO WEATHER MODIFICATION PROJECTS IN 1991

Albania	Sweden
Algeria	Switzerland (Suisse)
Angola	United Republic of Tanzania
Argentina	Trinidad and Tobago
Bahrain	Uganda
Belgium (Belgique)	United Kingdom
Belize	Venezuela
British Caribbean and Territories	Socialist Republic of Viet Nam
Canada	Republic of Yemen
Chile	Zambia
Colombia	
Costa Rica	
Côte d'Ivoire	
Denmark	
Dominica	
Ecuador	
Egypt	
Ethiopia	
Fiji	
Finland	
Guyana	
Iceland	
India	
Islamic Republic of Iran	
Japan	
Kazakstan	
Republic of Korea	
Lao People's Democratique Republic	
Latvia	
Malawi	
Namibia	
Nepal	
Netherlands	
Netherlands Antilles	
New Zealand	
Niger	
Sultanate of Oman	
Portugal	
Qatar	
Romania	
Rwanda	
Saudi Arabia	
Senegal	
Seychelles	
Sierra Leone	
Singapore	
Solomon Islands	
Sri Lanka	
Sudan	

**QUESTIONNAIRE CIRCULATED TO OBTAIN  
INFORMATION FROM MEMBER COUNTRIES**

CLOUD PHYSICS AND WEATHER MODIFICATION RESEARCH PROGRAMME

QUESTIONNAIRE  
TO GATHER DATA FOR THE 1992  
REGISTER OF NATIONAL WEATHER MODIFICATION PROJECTS

PLEASE MARK APPROPRIATE BOXES

MEMBER OF WMO .....

No weather modification activities in 1992

(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 ...  ) ACTIVITY
  - ( Operational ...  )

3. PROJECT AREA

- (a) Approximate size of the project target area (km<sup>2</sup>): .....
- (b) Approximate size of the control area (if used) (km<sup>2</sup>): .....

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 1991, January-February 1992; another might be: January-February 1992, December 1992).

(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 <sub>2</sub>	.....	.....
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 1994.

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

NOTES FOR COMPLETING REPORT ON WEATHER MODIFICATION ACTIVITIESWeather 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.

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 1992 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 1992 .....

(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. (de recherche .....   
(  
IL S'AGIT PRINCIPALEMENT D'UNE ACTIVITE (de développement ..   
(  
(d'exploitation ....

3. ZONE COUVERTE PAR LE PROJET

- a) Superficie approximative de la zone cible du projet (km<sup>2</sup>) : ....  
b) Superficie approximative de la zone témoin  
(le cas échéant) (km<sup>2</sup>) : .....

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 1992

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 1991, janvier-février 1992, ou janvier-février 1992, décembre 1992.

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	<input type="checkbox"/>	Nombre de générateurs	<input type="checkbox"/>
Aéronef	<input type="checkbox"/>	Nombre d'appareils	<input type="checkbox"/>
Fusées	<input type="checkbox"/>	Projectiles d'artillerie	<input type="checkbox"/>

Divers (veuillez préciser) .....

b) Type de générateur :

Brûleur à acétone	<input type="checkbox"/>	Fusée pyrotechnique	<input type="checkbox"/>
Explosif	<input type="checkbox"/>	Vaporisation de liquide	<input type="checkbox"/>
Dispersion de solide	<input type="checkbox"/>	Divers .....	

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

Au sol	<input type="checkbox"/>	A la base du nuage	<input type="checkbox"/>
Au sommet du nuage	<input type="checkbox"/>	Dans le nuage	<input type="checkbox"/>

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 <sub>2</sub>	.....	.....
Neige carbonique	.....	.....
NaCl	.....	.....
Propane	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

10. CARACTERISTIQUES DES NUAGES ENSEMENCES :

- a) Convectifs  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 1994 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 avions 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 ce formulaire pour chaque activité de modification artificielle du temps (dénommées 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 granules (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 1992)

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

CUESTIONARIO  
PARA RECOPIRAR DATOS DESTINADOS AL INVENTARIO DE 1992 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  1992

(Sírvasse 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<sup>2</sup>): .....
- b) Superficie aproximada de la zona de control (si procede) (km<sup>2</sup>): .....

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 1992

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 1991, enero-febrero de 1992 o enero-febrero de 1992, diciembre de 1992 ).

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 sus-                       Otros: .....  
tancias sólidas

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 <sub>2</sub>	.....	.....
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) Indique si existe o si se ha previsto preparar un documento sobre la evaluación de la actividad      Sí       No
- g) Si procede indique 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            No
- b) Indique si se han analizado los costos y las ventajas previstos      Sí

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 1994 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 relleno 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

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- PREGUNTA 1 - Escribábase 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 - Escribábase 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 aplicación 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 aparato 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 características 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 А  
ФОРМА (1 ЯНВАРЯ 1992 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 1992 г.

ПРОСЬБА ПОМЕТИТЬ СООТВЕТСТВУЮЩИЕ КВАДРАТЫ

ЧЛЕН ВМО .....

Деятельность по активным воздействиям на погоду в 1992 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:

а) 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 ..

б) Перераспределение осадков .....

с) Подавление града .....

д) Рассеивание тумана .....

е) Другие виды (просьба указать) .....

2. ЭТА ДЕЯТЕЛЬНОСТЬ НОСИТ ПРЕЖДЕ ВСЕГО ХАРАКТЕР
- |                                |                          |   |
|--------------------------------|--------------------------|---|
| { исследований .....           | <input type="checkbox"/> | } |
| { разработок .....             | <input type="checkbox"/> | } |
| { оперативных применений ..... | <input type="checkbox"/> | } |

3. РАЙОН, ОХВАТЫВАЕМЫЙ ПРОЕКТОМ

- а) Приблизительный размер целевого района, где осуществляются воздействия, предусмотренные проектом (км<sup>2</sup>): .....
- б) Приблизительный размер контрольного района (если используется) (км<sup>2</sup>): .....

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

.....

5. МЕСТОНАХОЖДЕНИЕ РАЙОНА, ГДЕ ОСУЩЕСТВЛЯЕТСЯ ПРОЕКТ:

.....

6. ИСТОРИЯ ПРОЕКТА

- а) Год начала проекта: .....
- б) Осуществлялся ли проект каждый год после его начала?
- Да  Нет  Неизвестно

- с) 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

а) 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 1991 г., январь-февраль 1992 г.; другой пример: январь-февраль 1992 г., декабрь 1992 г.).

б) 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)

а) 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 <sub>2</sub>	.....	.....
Сухой лед	.....	.....
NaCl	.....	.....
Пропан	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

10. ХАРАКТЕРИСТИКИ ОБРАБАТЫВАЕМЫХ ОБЛАКОВ

- a) Конвективные (кучевые)  Орографические  Слои (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 1994 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 - а) Укажите год осуществления первоначальной деятельности по настоящему проекту;
- б) Укажите, были ли перерывы в деятельности, или же она проводилась каждый год со времени начала;
- с) 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.

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**FORM USED FOR REPORTING COMPLETED  
WEATHER MODIFICATION PROJECTS**

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<sub>2</sub>  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<sup>-1</sup>): .....

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<sup>2</sup>): .....
- 5.3 Size of control area (km<sup>2</sup>): .....
- 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: .....













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<sup>2</sup>) : .....

5.3 Superficie de la zone témoin (km<sup>2</sup>) : .....

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 avions, 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 ensemençées et non ensemençées (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 diffé- Augmentation Diminution Diminution  
rence  des précipi-  des précipi-  de la masse   
 tations pitations 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 (sírvese 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<sub>2</sub>  NaCl

Otros (sírvese 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) .....

Índice de la siembra (Kg h<sup>-1</sup>) .....

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 (sírvese 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<sup>2</sup>) .....

- 5.3 Tamaño de la zona de control (km<sup>2</sup>) .....
- 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 dife- rencia	<u>  </u> / <u>  </u>	Más precipi- tación	<u>  </u> / <u>  </u>	Menos precipi- tación	<u>  </u> / <u>  </u>	Menos masa de gra- nizo	<u>  </u> / <u>  </u>
---------------------------	-----------------------	---------------------------	-----------------------	-----------------------------	-----------------------	-------------------------------	-----------------------

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 ca-  
bo 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 pro-  
yecto:

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 transformación:  
    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 В

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<sub>2</sub>  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<sup>2</sup>): .....

5.3 Размер контрольного района (км<sup>2</sup>): .....

5.4 Количество осадкомеров:

5.4.1 Все вилы осадкомеров в целевом районе: .....

Все вилы осадкомеров в контрольном районе: .....

5.4.2 Осадкомеры-самотисцы 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(ий) 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

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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