



**INDIRA MEGHAMADHANAMU - 2006**  
Government of Andhra Pradesh



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**  
CENTRE FOR ATMOSPHERIC SCIENCES AND WEATHER MODIFICATION TECHNOLOGIES

KUKATPALLY, HYDERABAD, 500072, AP, India.

Phones : 91-(0)-40-32408785 / 32405311. Fax : 91-(0)-40-2305 3105, (R) 91-(0)-40-2352 0000, Mobile +91-98480 49624.

E-mail:coordinator@jntucloudseeding.com, coordinatorcas@gmail.com, ivm@ieee.org

## **Meghamadhanamu 2006 operations** **CLOUD SEEDING OPERATIONS 2006**

### **A brief appraisal of 90 days of operation in 10 RSAD Districts in Andhra Pradesh.**

1. Cloud seeding operations are carried with 2 aircraft and 2 Radars with flying operations from 19<sup>th</sup> September 2006 for a period of 90 days up to 17<sup>th</sup> December 2006 as per the Government order and further discussions in the first monitoring committee meeting held on 17<sup>th</sup> October 2006. The operations are carried out in 10 districts Viz., Guntur, Prakasam, Nellore, Chittoor, Kadapa, Anantapur, Kurnool, Mahabubnagar, Rangareddy and Nalgonda. Out of the 553 mandals in these 10 districts 358 mandals are covered corresponding to 65% (358/553). Some of the mandals are covered more than once and the gross mandals covered considering the actual operations covered correspond to 910 mandals.
2. The number of Flares used for seeding during the operations are **242 (200 Hygros, 27 BIPs and 15 Ejectables)** with corresponding **total flying hours of 267 hours**. Hygros are meant for warm cloud seeding and BIP (Burn in place) and Ejectables are meant for cold cloud seeding.
3. The rain fall enhancement details during 90 days of operation up to Dec 17<sup>th</sup> are as follows.
  - a. **Total Rainfall within the Zone of seeding Influence in 910 gross mandals - 12,160 mm**
  - b. **15% of the Total Rainfall within the Zone of Influence - 1,824 mm**

Generally, rainfall enhancement by cloud seeding as per internationally accepted norms can be considered to be varying between 15% to 45%. However taking only the minimum and 15% as the basis, the rainfall resulted due to seeding is 1824 mm (15% of 12,160mm) in all the districts. The results are being analyzed to find out the actual zone of influence based on correlation with Radar data and ground truth.

4. Out of the 242 flares fired, 204 yielded a total rainfall of 12,160 mm with in the zone of influence in 910 gross mandals corresponding to 358 rain gauges suggesting a success rate of 84%.
5. **Total quantity of rainfall enhanced by cloud seeding falling within the zone of influence corresponding to a circle of 40 km around point of seeding, is estimated to be 18.3 TMC.**

District	No of Mandals in influenced zone with repetition	No of days seeded	Total Rainfall in Zone of Influence in mm	Average Rainfall per Raingauge in mm
Guntur	8+1*	3	84.6	9.4
Prakasam	27+33*	12	851.8	14.2
Nellore	31+96*	13	2708.6	21.3
Chittoor	49+75*	10	1777.1	14.3
Kadapa	48+94*	20	1440.5	10.1
Anantapur	41+47*	18	733.2	8.3
Kurnool	38+31*	15	627.9	9.1
Mahabubnagar	46+58*	14	1022.4	9.8
Rangareddy	26+34*	9	724.5	12.1
Nalgonda	44+83*	9	2190.1	17.2
	<b>358+552*=910</b>		<b>12160.7 ~ 12160</b>	<b>14.4</b>

6. A record number of 610 rainwater samples are collected in 10 RSAD districts for chemical analysis. Out of these 382 are analyzed by JNTU, 77 samples by Rural Water Supply Circle (RWS) Kadapa, 30 samples by RWS Chittoor, 09 samples by Ground water department (GWD) Kurnool, 60 samples by RWS Nellore , 28 samples by Indian Institute of Chemical Technology (IICT), Govt. of India, CSIR Lab and 09 by National Geophysical Research Institute (NGRI), Govt. of India, CSIR lab for attributing and delineating the extent of rainfall due to the seeding carried out under the Meghamadhanamu program. More than 80 per cent of the samples are found to have Calcium and Potassium concentrations higher than the unseeded (control) rainwater samples. Some more samples are being analyzed at respective RWS centres. Rainwater samples collected in various Mandals beyond the existing concept of defining zone of influence demonstrate the presence of Calcium and Potassium above normal limits. Further data analysis is in progress. The details of Rainwater sample analysis are as follows:

Rainwater samples collected during the operations		
S.No	Place of Analysis	No. of Samples analyzed
1	Kadapa RWS	77
2	Chittoor RWS	30
3	Kurnool GWD	09
4	Nellore RWS	60
5	Indian Institute of Chemical Technology (IICT),CSIR Lab,Govt.of India	28
6	National Geophysical Research Institute (NGRI),CSIR Lab,Govt.of India	09
7	JNTU	382
8	Analysis Results awaited	15
	Total	<b>610</b>

**Prof.I.V.Muralikrishna**  
 Director R&D  
 and Coordinator CASWMT,  
 JNTU, Hyderabad.