

10th WMO Scientific Conference on Weather Modification
Bali, Indonesia, 4-7 October 2011

About 100 scientists from 29 countries attended the 10th WMO Scientific Conference on Weather Modification that was kindly hosted by the Indonesian Agency for the Assessment and Application of Technology (BPPT) in Bali between 4 and 7 October 2011. During the afternoon of 7 October, the WMO Expert Team on Weather Modification also met to review the achievements since their previous meeting in March 2010, reflect on the conference and plan activities for the upcoming period.

The conference focussed on the following topics:

- 1) Weather Modification Research and the study of cloud and precipitation processes:
 - Observational and laboratory studies;
 - Modelling studies;
 - Developments in seeding material and methods of delivery;
 - Data analysis and statistical methods as applied to current and previous experiments and projects;
- 2) Weather Modification and the physical and socio-economic environment:
 - Environmental issues, user requirements and cost-benefit studies
 - Inadvertent weather modification, Climate Change and Geo-engineering

The presentations provided an overview of not only scientific results but also on operational experience in weather modification supported by scientific studies/analyses. Highlights were the new results on winter cloud seeding from programs in the State of Wyoming in the USA and Australia where new tools such as dual polarization radars and satellite products provided new insights in cloud modification processes. In addition, the work on Queensland program in Australia on summertime convective clouds also provided new insights. Finally, it is worthwhile mentioning the Indian Institute of Tropical Meteorology and the Bureau of Royal Rainmaking and Agricultural Aviation in Thailand have started major aerosol-cloud interaction and cloud modification five-year research programs with significant investments utilizing the latest technologies in these countries on summer monsoon clouds.

A special evening session was dedicated to an overview of the status of weather modification and identifying key outstanding scientific question, critical issues to enhance the scientific basis, global and regional cooperation, capacity building and the funding mechanisms required to support such initiatives. The feedback from participants on these topics will be included in the plans of Expert Team for the upcoming period.

On the last day a special session was dedicated to geo-engineering and overview presentations were presented on this subject and the links between specific geo-engineering ideas and weather modification. During the Expert Committee meeting this subject was again discussed in considerable depth. It was agreed that although those geo-engineering proposals that aim at introducing changes in cloud microphysical properties of clouds has some links to weather modification techniques, the scale of suggested applications is vastly different. In terms of these geo-engineering ideas it is suggested that interested parties should refer to the WMO Statement on Weather Modification in which clear guidelines are presented on the confidence of affecting changes in different cloud systems. Future updates to the WMO statement on weather modification will include more specific language to the geo-engineering ideas related to cloud modification. A general outcome of the conference and the Expert Team meeting was that extreme caution should be applied when attempting to modify elements of the weather climate system as it is difficult to measure and confirm the complex cause and affect relationships and associated environmental and societal issues.

The conference again highlighted the growing desire of human kind to modify weather specifically to augment water resources, reduce the damage of hail and other severe and damaging weather

phenomena. However, despite promising advances being made, several scientific issues remain unsolved. Fortunately the technology to observe, model and analyse the intentional interventions made by weather modification now exist to make great progress in this field. There is also the realisation that many of the outstanding issues are also central to improve weather and climate predictions and that more effected cooperation on a regional and global scale between scientists will be beneficial to all.