2010 Weather Modification Association (WMA) Annual Meeting

WEDNESDAY, APRIL 21

08:00-11:00	**Meeting registration**
08:30-8:40	**WELCOME/OPENING REMARKS**
08:40-09:00	**Beare et al. (Peak)** – Statistical modeling of rainfall enhancement
09:05-09:25	**Farber** – Statistical tools to consider in teasing out a signal from cloud seeding
09:30-09:50	**Rosenfeld & Clavner** – Quantitative estimates of the potential of aerosols to modify hurricane intensity
09:55-10:15	**Cotton & Carrió** – Virtual seeding flights mitigating the intensity of simulated hurricanes
10:20-10:40	**BREAK**
10:40-11:00	**Tessendorf et al.** – Overview of the Queensland cloud seeding research program
11:05-11:25	**Rhodes** – Texas weather modification operations in 2009
11:30-11:50	**Aungsuratana et al.** – Some characteristics in cold cloud seeding by aircraft: a case study of young cumulus over northeastern Thailand
11:55-13:30	**LUNCH**
13:30-13:50	**Yao** – Current weather modification activities in China
13:55-14:15	**Chen** – A direct flow wind tunnel system for multi-dilutions isokinetic and vacuum aerosol sampling
14:20-16:25	**KEYNOTE SPEAKERS**
14:20-14:50	**List** – Precipitation packaging in clouds
14:55-15:15	**BREAK**
15:15-15:45	**Kok and Baumgardner** - A New Sensor for Distinguishing Ice Crystals Mixed with Droplets: Implications for Detecting Cloud Seeding Signatures
15:50-16:20	**Dixon** – TITAN: basis, international use and the future

THURSDAY, APRIL 22

08:00-11:00	**Meeting registration**
08:30-08:40	**OPENING REMARKS**
08:40-09:00	**Givati et al.** – Planning the Israeli-4 experiment: using daily precipitation from high resolution WRF model as the formal controls for evaluating cloud seeding effect on orographic precipitation in northern Israel
09:05-09:25	**Glick** – Israeli cloud seeding program
09:30-09:50	**Freud** – Microstructure of Israeli clouds and their suitability for seeding
09:55-10:15	**Ware** – Thermodynamic profiling for weather modification operations
10:20-10:40	**BREAK**
10:40-11:00	**Boe –** The Wyoming Weather Modification Pilot Project: An operational update
11:05-11:25	**Golden** - Environmental Permitting and Wx Modification Programs: Lessons Learned from the Wyoming Project
11:30-11:50	**Rasmussen** – Update on the Wyoming Weather Modification Pilot Project evaluation efforts
11:55-13:30	**LUNCH**
13:30-13:50	**Super et al. (Boe)** – Comparison of silver iodide outputs from two different generators and solutions measured by acoustic ice nucleus counters
13:55-14:15	**Moser et al. (Tootle)** – Weather modification and climate variability impacts on streamflow
14:20-14:50	**KEYNOTE SPEAKER** **Geerts et al.** – Vertically-pointing airborne radar observations of the impact of glaciogenic cloud seeding on snowfall from orographic clouds
14:55-15:15	**BREAK**
15:15-15:35	**Roskovensky et al.** – Autonomous estimation of cloud supercooled liquid water from satellite data
15:40-16:00	**Silber** – Obstacles to New Mexico Meeting its Future Water Needs and the Role of Cloud Seeding in Addressing Some of these Obstacles.

POSTER SESSION 16:00-18:00

Beall – Texas projects summary
Axisa – Istanbul project summary
Weeks – Australia project summary
Axisa and/or Kucera – Saudi project summary
Kucera - Mali project summary
Tilley – Saudi project work
Jin – China project work

SOCIAL HOUR 18:00-19:00

BANQUET 19:00

FRIDAY, APRIL 23

08:00-09:00 WMA **BUSINESS MEETING**

09:00-12:00 **SPECIAL SESSION** "Cloud seeding for precipitation enhancement - status update"

09:00-09:30

PRECIPITATION FORMATION PROCESSES: A GLOBAL PERSPECTIVE
Roelof Bruintjes

The large- and meso-scale dynamics determining the characteristics of cloud systems down to the small-scale microphysics determining the nucleation and growth characteristics of water droplets and ice particles all form part of the chain of events of precipitation development. Although our knowledge of the individual aspects in the chain has significantly increased in the past twenty years there still exist major gaps about certain physical processes. The talk will focus on microphysical properties of convective clouds growing in different meteorological regimes around the world.

09:35-10:05

RECENT DEVELOPMENTS IN THE TECHNOLOGY AND SCIENCE OF HYGROSCOPIC SEEDING
Daniel Rosenfeld

Historically hygroscopic cloud seeding started with salt powders dispersed into clouds. This was discontinued in most places because of the large salt particle size that created a small number of rain embryos for a large mass of salt. The hygroscopic flares appeared to solve the technological challenge of producing smaller hygroscopic particles, and their application in two experiments produces statistically positive results. Simulations and field measurements indicated that particle sizes of the hygroscopic flares were lower than optimal, and that the seeding

amounts that are logistically possible with hygroscopic flares are much lower than needed for an optimal effect. The challenge in returning to salt powder with optimal particle size of 2-5 micron in diameter was finding a production procedure that will create the selected sizes without much clumping. With the advent of a technological solution, experiments in dynamic cloud chamber and field experiments showed clearly the expected microphysical effect of initiation of warm rain in the clouds.

10:10-10:40

GLACIOGENIC SEEDING OF OROGRAPHIC CLOUDS FOR SNOWFALL ENHANCEMENT: HAVE WE MADE ANY PROGRESS IN THE PAST 20 YEARS?
Arlen Huggins

Since about 1988, several review papers on the status of glaciogenic cloud seeding for snowfall augmentation have been published. These papers including the NRC (2003) "Critical issues in weather modification research" will be used as the basis for an assessment of the progress that has been made in this area of weather modification over the past 20 or so years. The assessment will focus on seeding materials and methods, physical studies that validate steps in a conceptual model, new instrumentation or analysis techniques that have aided research efforts, the use of atmospheric models in research or operations, and new statistical studies related to quantifying the effects of orographic cloud seeding.

10:45-11:15
MODELING OF CLOUDS AND PRECIPITATION IN THE LAST 20 YEARS
Roy Rasmussen

Within the last 20 years the field of cloud microphysics has experienced a very exciting development, with major achievements having resulted from the development of improved instrumentation (in situ, remote) as well as powerful computers capable of solving complicated parameterizations. This period has also seen advancement in multi-dimensional cloud resolving models with various microphysical schemes ranging from bulk schemes and explicit spectral bin schemes. This presentation will identify key developments in modeling parameterizations and schemes with a focus on their application in weather modification research.

11:20-13:00 PANEL DISCUSSION

13:00 END OF MEETING