

# **Implementation of GAME/SCSMEX Intensive Observing Period (IOP) May to July, 1998**

**T. Yasunari**  
**Institute of Geoscience, University of Tsukuba**  
**Tsukuba, Japan**  
**(Chairman, GAME International Science Panel)**

## 1. Scientific goals

The scientific goals of the GAME/SCSMEX IOP are as follows;

- a) To produce the data set for understanding the full energy transfer and water cycle processes both in the regional and continental scales, associated with the full seasonal march of the Asian monsoon (from the pre-monsoon stage, the onset stage, the mature stage and the withdrawal stage) with multi-scale interactions in the land-atmosphere-ocean system of this region.
- b) To achieve this objective, in the tropics and subtropics, the diurnal cycle of cumulus convection needs to be resolved in the continental-scale analysis of 4-DDA, and the cloud clusters of meso- $\alpha$  scale is to be resolved in the nested regional 4-DDA analysis.
- c) The land surface hydrological processes are to be measured intensively, to provide sufficient data for developing sub-grid scale hydrological models.

## 2. Network of enhanced radiosonde observations

The Intensive Observing Period (IOP) is planned in 1998, to obtain the highly-resolved energy processes and water cycles in the Asian monsoon system. The full-utilization of TRMM (Tropical Rainfall Measuring Mission) is required for the IOP, combined with the enhanced upper-air soundings and surface-based observations.

The full international cooperation for IOP was discussed at the first session meeting of GISP at NASDA/EORC in March 1996, particularly for the enhanced

radiosonde observations and special data archive of the routine-based meteorological and hydrological observations of the countries concerned, held. In this meeting the coordination with other GAME-related international, particularly with SCSMEX (South China Sea Monsoon Experiment) was discussed, of which the IOP are also planned in summer monsoon season of 1998. The agreement was met to have a unified IOP from May through July with enhanced radiosonde observation with 4 times per day (every 6 hours), at more than 70 stations in these two projects. Further details will be discussed at the ad-hoc committee for GAME/SCSMEX joint IOP, co-chaired by T. Yasunari (GAME) and K.M. Lau (SCSMEX).

In addition to these stations involved in GAME (HUBEX, Tropics, Tibet), TIPEX, and SCSMEX, 16 upper air stations in China, located between HUBEX and TIPEX region, are going to be involved in the IOP, as part of China-Japan cooperative study on monsoon research.

Korea will implement the enhanced radiosonde observations during IOP, as part of KORMEX enhanced observation. The meso-scale meteorological research group of Meteorological Research Institute (MRI), Tsukuba, is going to cooperate with this IOP, by deploying the enhanced radiosonde and radar observations in southwestern part of Japan and East China Sea.

In November 1996, India Meteorological Department (IMD) agreed to implement the enhanced radiosonde observations of 12 stations in Northern India and Port Blair, Andaman Islands, during the IOP. National Institute of Oceanography (NIO) in Goa, India is planning to deploy the research vessel observation in the Bay of Bengal, with the radiosonde observation during the IOP. The meteorological departments of Bangladesh, Nepal and Myanmar are also considering the cooperation for the enhanced radiosonde observations, provided that some necessary support for equipments, expendables etc. are made. The number of radiosonde stations to be involved is summarized in the Appendix.

To implement this unified IOP with the enhanced radiosonde observations of more than 110 stations of 13 countries, further financial support and endorsement from WMO/WCRP and are urgently required, particularly for some national meteorological agencies.

The surface hydro-meteorological observations will focus on the role of land-surface hydrological processes, including snow cover/permafrost, soil moisture and vegetation on the seasonal evolution from winter/spring to the mature phase of monsoon and summer condition. The one-full-year archive of these data from 1998 spring is also an essential task for this IOP. The GAME Siberia will implement the enhanced hydro-meteorological observation, emphasizing the melting snow and permafrost processes in May through July.

### 3. 4DDA and modeling studies

The global 4DDA with the renewed T213L30 NWP model with simple SIB has operationally been started at JMA since March 1996, with horizontal grid-size of about 55 km. The re-analysis of GAME/SCSMEX IOP phase, in conjunction with TRMM validation program, will be implemented by this 4DDA system at JMA.

The GCM group in Japan (led by Prof. Akimasa Sumi) has started to estimate continental-scale water recycling and transport processes (Numaguti, 1996), which will cooperate with the observational studies on transport and recycling processes of water substances based on stable isotope hydro-meteorology and chemistry.

The regional modeling group has been set up (chaired by Prof. Fujio Kimura, Univ. of Tsukuba). This group is preparing GAME Community Regional Models particularly for the modeling of the four regional study areas (i.e., tropics, subtropics, Tibetan Plateau and Siberia). The models used for GAME regional modeling will be, a simple atmospheric model developed by Prof. Kimura, JSM model (1988 version) developed by JMA and RAMS model supplied from CSU.

The regionally-nested modeling of energy and water cycle processes with grid size of 10-30 km are being tested for Huai-he river basin (HUBEX) and Tibetan Plateau (GAME-Tibet) by the university group of Japan (Nagoya, Tokyo, Tsukuba, and Kyoto), in cooperation with JMA/MRI group. HUBEX modelling group is planning cloud-system modelling with ARPS (developed by Oklahoma Univ.). The nested 4DDA for Chao-Praya river basin (GAME-Tropics) is being prepared by Kyoto University group based on RAMS model.