International Research for Prevention and Mitigation of Meteorological Disasters in Southeast Asia

MEXT Special Coordination Funds for Promoting Science and Technology for FY 2007 - 2009
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振興調整費

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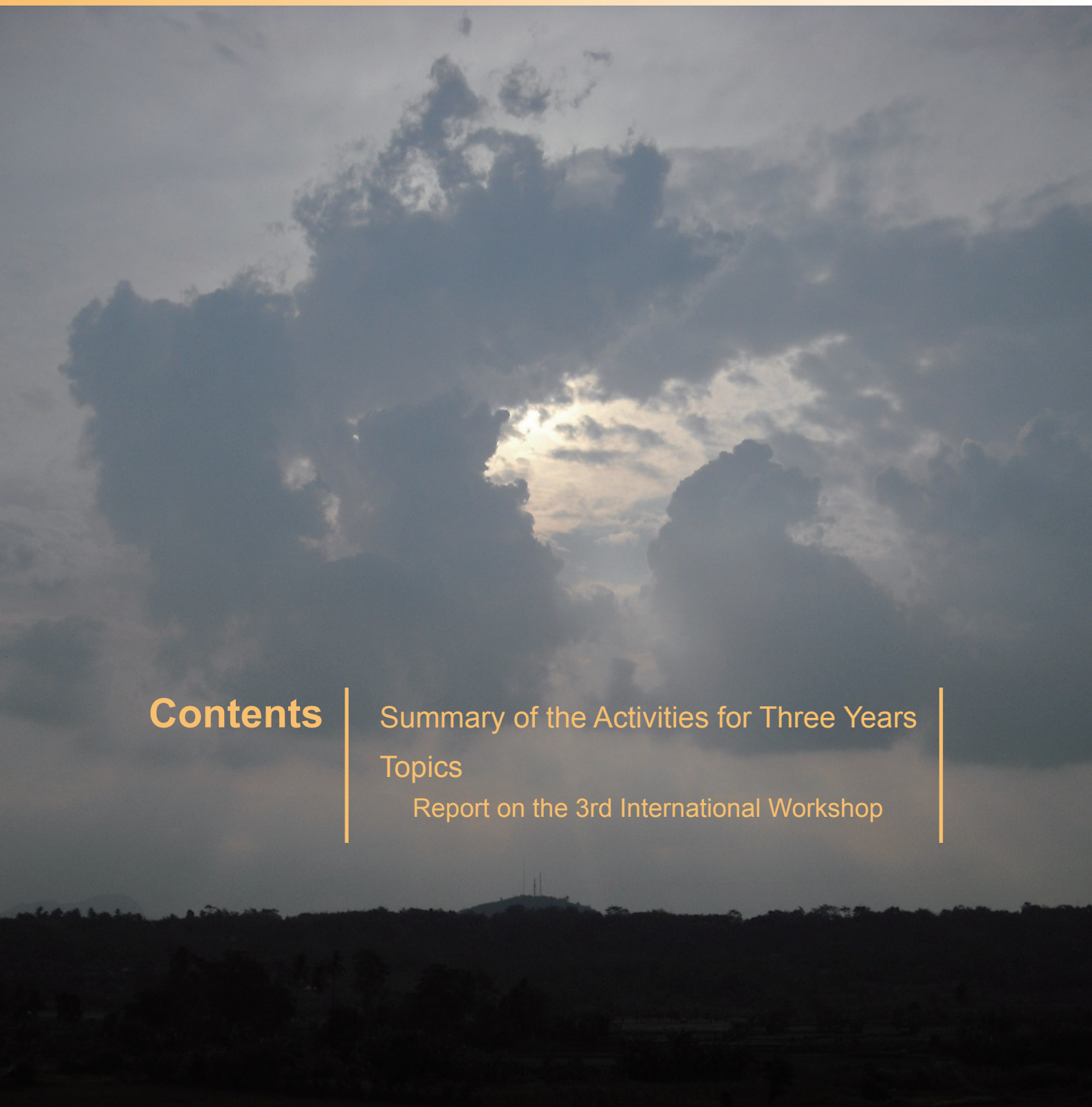

Contents

Summary of the Activities for Three Years

(1) Fundamental Research and System Development (Kyoto University)

In Kyoto University, a number of experimental downscaling Numerical Weather Predictions (NWPs) were performed to investigate meteorological disasters in Southeast Asia (a flood event in Jakarta in February 2007, Myanmar cyclone Nargis, etc). In those experiments, several regional atmospheric models including JMA-NHM were used. New observational data were utilized in those research activities for model validation. For example, performance of downscaling NWPs over Indochina region was investigated using surface station data in Laos for validation. Numerical experiments with very high resolution (~ 100 m in horizontal) were also performed to investigate highly isolated heavy rainfall events such as a flash flood event in Kobe city.

A prototype of a decision support system for prevention and mitigation of meteorological disasters is developed, by which ensemble NWP data can be analyzed and displayed. The system was developed based on Gfdnavi, a web-based database server and analysis tool. Using the output of an experimental ensemble NWP on Myanmar cyclone Nargis which was provided by MRI as a test dataset, how to analyze and display ensemble NWPs on tropical cyclones is documented with an interactive documentation system.

(Shigenori Otsuka, Kyoto Univ.)

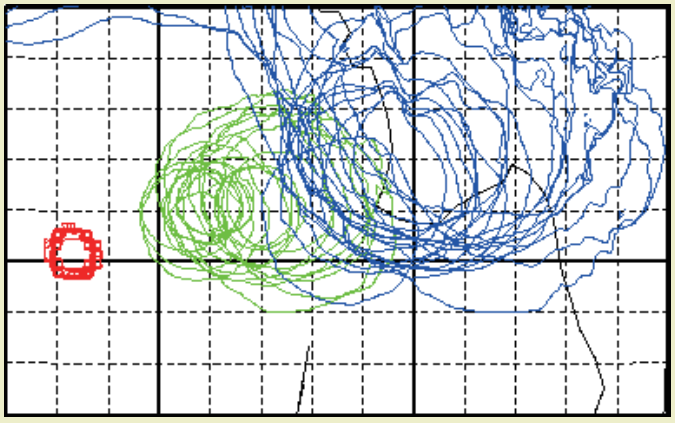

Figure 1. Spaghetti diagram of surface pressure for the experimental ensemble NWP on cyclone Nargis. The figure was produced by the prototype of a decision support system.

(2) Operational Model Development (Meteorological Research Institute / Japan Meteorological Agency)

Among the research groups of the International Research for Prevention and Mitigation of Meteorological Disasters in Southeast Asia, the Meteorological Research Institute of the Japan Meteorological Agency (MRI/JMA) was in charge of the part of 'Operational model development'. This part was divided into the following three subjects:

-- Development of NHM and verification of its performance in the tropics.
-- Preparation of experimental tools and collaborations for tropical NWP.
-- Data assimilation experiment in the tropics.

As for the first subject, Seko et al. (2008) conducted a numerical simulation of the Mumbai heavy rainfall which occurred in July 2005 in India. Using the global analysis data of JMA for initial and lateral boundary conditions, the intense rainfall system was successfully reproduced. Hayashi et al. (2008) conducted statistical verification of short term NWP over Southeast Asia and compared two mesoscale models (NHM and WRF) using the same conditions. Threat scores for precipitation from the two models were comparable, while WRF tended to predict more rains than NHM.

Figure 2. Group photo taken at the High Performance Computing Center of VNU on 6 October 2009. From left, Dr. L. Duc of NHMS, Prof. D. Uu and Prof. P. Anh of VNU, Dr. Kuroda and Dr. Saito of MRI, Prof. K. Xin of VNU and Dr. Son and Dr. N.H. Dien of HPCC.

As for the second subject, experimental tools using the JMA's NWP data were prepared for oversea collaborators. Information on tropical NWP is on the project website of MRI. (http://www.mri-jma.go.jp/Project/Kashinhi_seasia/Eng/ en_MRI_kashinhi.htm). As the link of the international partnership, MRI scientists visited partner institutes and discussed collaborations (Table 1). The latest visit was on 6-9 October for Vietnam [Vietnam National University (VNU; Figure 2), National Hydro-Meteorological Service of Vietnam (NHMS), and Department of Meteorology, Hydrology and Climate Change of the Ministry of Natural Resources and Environment].

On 2 May 2008, a cyclone 'Nargis' made landfall in Myanmar and caused the worst natural disaster in the country. Numerical simulations and mesoscale ensemble prediction (MEP) of Nargis and the associated storm surge (Kuroda et al., 2010; Saito et al. 2010) and data assimilation experiments (Kunii et al. 2010; Shoji et al. 2010) were conducted. A prototype of the decision support system was developed using the MEP result as the input data.

Table 1. Visits of MRI scientists to partner institutes. (*Visit to HKO was supported by HKO.)

Partner Institute	Country/ Region	Period	Report in Newsletter
ITB	Indonesia	2008.2.11-12	
NTU	Singapore	2008.2.14-15	No.2
CSIR	India	2009.3.23-25	No.5
VNU	Vietnam	2009.10.6-9	No.6
HKO	Hong Kong	2009.2.9-13*	

(Kazuo Saito, MRI)

(3) Real-Time Experiment (Institute Teknologi Bandung in Indonesia and partners in the other countries)

The "International Research on Prevention and Mitigation of Meteorological Disaster in Southeast Asia (IRPMMDSEA)", in a sense, is some sort of a survey on implementation of high resolution Numerical Weather Prediction (NWP) and its potential to mitigate the meteorological disasters in Southeast Asia through a series of workshops in Indonesia and Japan. At least, the need to increase the accuracy of weather and climate prediction through enhanced utilization of NWP in Southeast Asian countries has been successfully raised as one consensus in these workshops. I observed that more indigenous efforts to develop better NWP systems in each of the countries have also been demonstrated in the last workshop in Beppu, Japan.

During the 3-year implementation of IRPMMDSEA, we are trying to focus on developing "NWP literacy" among key meteorological communities in Indonesia. Academically, introductory courses on NWP have been included in the new curriculum (2008) of undergraduate program of meteorology at ITB. NWP is also being socialized on the official web site of ITB (http://www.itb.ac.id/). It has also been reported that NWP experiments are now being set up and carried out at several research and operational institutions in Indonesia.

IRPMMDSEA is approaching its end in March 2010 but efforts to develop "NWP literacy" in Indonesia must not stop. Rather, it requires more concrete and sustainable programs. Our new initiatives include submission of a new proposal that aims mainly for a real implementation of operational NWP and establishment of a local forum on NWP development in Indonesia. I hope the snow ball of NWP in Southeast Asia will keep rolling and growing for the advances of tropical meteorology and the betterment of mankind in the region where meteorological disasters are a common problem.

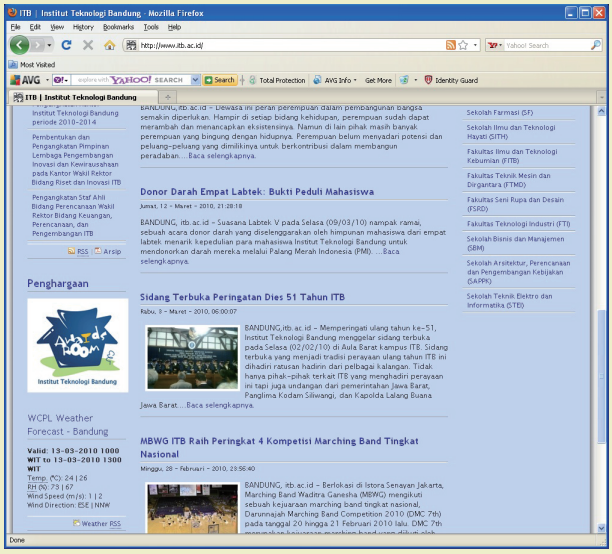

Figure 3. A screen shot of ITB web site. Red circle indicate the link to our experimental NWP results.

(Tri Wahyu Hadi, ITB)

Topics

Report on the 3rd International Workshop

The third international workshop on "Prevention and Mitigation of Meteorological Disasters in Southeast Asia" was held on March 1-3, 2010, and the open symposium on "Meteorological Disasters and Adaptable Society in the Asia-Pacific Region" was held on March 4, 2010, at Ritsumeikan Asia Pacific University (APU) in Beppu, Japan. 61 researchers and graduate students from 13 countries participated in the workshop, and 63 people including the citizens of Beppu participated in the open symposium.

At the workshop, 41 researchers made oral presentations and 15 researchers and graduate students presented their posters.

At the open symposium, Dr. Sanga-N. Kazadi (APU) took the chair and gave opening and closing remarks. And Dr. Shigeo Yoden (Kyoto University), Dr. Shunso Tsukada (APU), Dr. Tieh Yong Koh (Nanyang Technological University) and Dr. Toshitaka Tsuda (Kyoto University) gave talks related to meteorological disasters and adaptable society. We also had valuable comments from Dr. Takashi Nishigaki (Japan Science and Technology Agency) and Mr. Masahiro Kobayashi (Kyushu International Center, Japan International Cooperation Agency).

After the open symposium, the lunch buffet party was held at Pacific Café, APU, and the participants had further discussion on the theme of the symposium.

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