



International Hydrological Programme

## **Precipitation Measurement from Space and its Applications**

The Twenty-second IHP Training Course

18 November - 1 December, 2012

Nagoya, Japan

Hydrospheric Atmospheric Research Center, Nagoya University

Supported by

Water Resources Research Center, Disaster Prevention Research Institute, Kyoto University

National Institute of Information and Communications Technology  
Atmospheric Research Promotion Team, Hydrospheric Atmospheric Research Center, Nagoya University

Japan Aerospace Exploration Agency



## **Outline**

A short training course on precipitation measurement from space and its applications will be programmed for participants from Asia-Pacific regions as a part of Japanese contribution to the International Hydrological Program (IHP). The course is composed of a series of lectures and practice sessions.

## **Objectives**

Precipitation is one of the major components of the Earth climate system. Precipitation has also a big impact as a major fresh water resource to the ecosystem and human activity. Thus, observation of precipitation distribution is crucial not only for understanding and predicting changes of precipitation under the current global climate change but also for human activities. Global or even locally, precipitation observation is, however, difficult, because it has large spatiotemporal variations.

Progress of Earth observation technology from space is remarkable. The observation targets are land/ocean surface conditions, air quality, cloud distribution, etc. Precipitation is one of the major targets of Earth observation from space. However, the spatial and temporal resolutions and accuracy of the rain retrieval from space are far from sufficient. To meet the requirements, along with the sensor and rain retrieval algorithm developments, other ideas to construct global precipitation maps have emerged. One is the so-called "constellation" satellites in which multiple satellites data are utilized to construct global precipitation maps. The other is data merging in which the satellite precipitation data and ground-based rain gauge data are combined. Nowadays, several satellite-satellite based precipitation maps have already been available, and tests on utilization of the maps to short-term weather forecast, river runoff prediction and flood warning have already started.

In this training course, the basics of precipitation retrieval from space and current global precipitation maps will be introduced. The accuracy will also be included. Examples of global precipitation maps from space will be demonstrated. Practices are for learning skills to utilize the precipitation maps.

## **Conveners**

Convener: Prof. NAKAMURA, Kenji

Chief assistant: Prof. KUMAGAI, Tomoomi

Assistant: Dr. TOMITA, Hiroyuki

Secretary: Ms. HAGA, Saori

Hydrospheric Atmospheric Research Center, Nagoya University

## **Lecturers**

NAKAMURA, Kenji

MASUNAGA, Hirohiko

TOMITA, Hiroyuki

UYEDA, Hiroshi

Hydrospheric Atmospheric Research Center, Nagoya University

KACHI, Misako

KUBOTA, Takuji

Japan Aerospace Exploration Agency

YAMAMOTO, Munehisa

Kyoto University

USHIO, Tomoo

Osaka University

FUKAMI, Kazuhiko

Public Works Research Institute

HIROSE, Masafumi

Meijo University

IGUCHI, Toshio

National Institute of Information and Communications Technology

AONASHI, Kazumasa

Meteorological Research Institute

## **Lectures' contents at Nagoya University**

L1: Basics of precipitation measurement from space

K. Nakamura

L2: Radar measurement from space (1)

T. Iguchi

L3: Radar measurement from space (2)

M. Hirose

L4: Microwave radiometer measurements

K. Aonashi

L5: Microwave radiometer/radar combined rain retrieval

H. Masunaga

L6: Ground validation of rain data (1)

H. Uyeda

L7: Ground validation of rain data (2)

M. Yamamoto

L8: Global rain map (1)

T. Kubota

L9: Global rain map (2)

T. Ushio

L10: Precipitation measurement in global warming era

K. Nakamura

L11: River runoff and flood warning

K. Fukami

## **Exercise**

E1: Exercise on satellite data

H. Tomita

E2: Exercises on global rain map

T. Kubota, M. Kachi

## **Technical visits**

Research and Survey Division, Nakanihon Air Service, Co., Ltd.

## Schedule (18 November to 1 December, 2011)

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18 (Sunday)	Arrival at Central Japan International Airport and movement to Nagoya University		
19 (Monday) [E&S]	09 : 30-09 : 40	Registration & Guidance	
	09 : 40-12 : 10	Lecture 1	K. Nakamura
	14 : 00-16 : 00	Lecture 2	T. Iguchi
	17 : 00-19 : 00	Welcome party	
20 (Tuesday) [Labo]	09 : 30-12 : 00	Lecture 3	M. Hirose
	14 : 00-16 : 30	Lecture 7	M. Yamamoto
21 (Wednesday) [Labo]	09 : 30-12 : 00	Exercise 2-1	T. Kubota, M. Kachi
	14 : 00-16 : 30	Exercise 2-2	T. Kubota, M. Kachi
22 (Thursday) [E&S]	09 : 30-12 : 00	Lecture 8	T. Kubota
	14 : 00-16 : 30	Lecture 5	H. Masunaga
23 (Friday) [E&S]	09 : 30-12 : 00	Lecture 4	K. Aonashi
	14 : 00-16 : 30	Lecture 6	H. Uyeda
24 (Saturday)	Free time		
25 (Sunday)	Lecture at Kyoto University and visit Japanese heritage sites (Move to Kyoto)		
	14 : 30-16 : 30	Lecture	S. Shige
26 (Monday) [E&S]	09 : 30-12 : 00	Lecture 9	T. Ushio
	14 : 00-16 : 30	Lecture 10	K. Nakamura
27 (Tuesday) [Labo]	09 : 30-12 : 00	Exercise 1-1	H. Tomita
[Labo]	14 : 00-16 : 30	Exercise 1-2	H. Tomita
28 (Wednesday)	Technical visit to Nakanihon Air Service Co., Ltd.		
29 (Thursday) [E&S]	09 : 30-12 : 00	Lecture 11	K. Fukami
	14 : 00-16 : 30	Making reports and discussions	K. Nakamura
30 (Friday) [IAR]	09 : 30-11 : 30	Report presentations and discussions	
	11 : 30-12 : 00	Completion ceremony of this course	
	13 : 30-15 : 30	Farewell party	
1 (Saturday)	Departure from Central Japan International Airport		
※Room	[E&S]: Meeting room, 1 <sup>st</sup> floor, E&S building		
	[Labo]: Center Laboratory, A room, 4 <sup>th</sup> Floor, School of Engineering Building 7		
	[IAR]: Conference Hall, 1 <sup>st</sup> floor, Institute for Advanced Research Hall		

### Downloading the Textbook for Participants from the Net

The textbook of “the 22nd IHP Training Course”, which is converted in PDF style, will be prepared and will be put on the IHP Nagoya forum website of “[www.ihpnagoyaforum.org](http://www.ihpnagoyaforum.org)”. The participants are requested to download such a PDF file from the website in advance as a preparation to the several lectures of the training course. The textbook should be constituted of contents (referred sentence bodies, figures, tables, pictures, equations and observed/calculated results) with authorized copyrights.

### Web broadcasting the Lectures

The lectures except with the exception of field trips will be webcasted to some universities in Asia via the UNESCO Office Jakarta and with other technology facilities. The slide materials will be distributed to the participants from the Net in advance. The materials are requested to be filtered out whenever copyrights apply in case of web broadcasting; part or its whole slides will be masked out with digital treatments such as overlaying mosaic images or with black-out screening during web broadcasting.