IPWG Orographic Precipitation Focus Group Report

co-chairs: Dr. Shoichi Shige and Dr. Yagmur Derin

IPWG Orographic Precipitation Focus Group

Break out Room Agenda

27 participants: Thanks to Christopher Williams for taking notes.

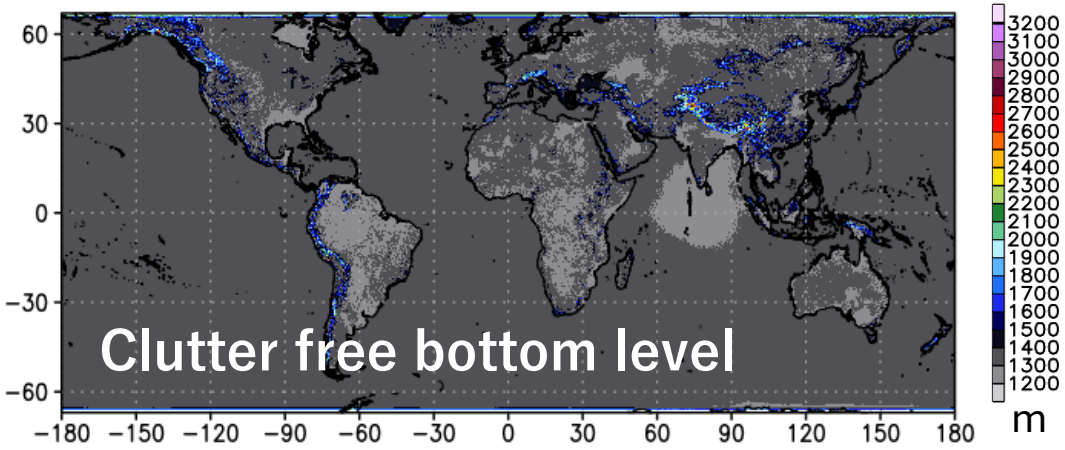
Start Time	Topic
2 min	Introduction of the Orographic Precipitation Focus Group
15 min	Go around the room and everyone introduces themselves
10 min	Short oral presentations 1. Masafumi Hirose 2. Munehisa Yamamoto
50 min	Go over the each science question targeted by our FG and ask everyone's input by considering "What can be done more, better, and different? "
5 min	Open discussion

1) Explore physical mechanism for understanding orographic/shallow precipitation
2) Algorithm validation
3) Hydrological applications over complex terrain
4) Weather radar networks and small weather radar QPE's to study orographic precipitation
5) How to bridge the gap in between observations (in-situ and remote sensing) and numerical models in order to improve orographic precipitation detection and quantification

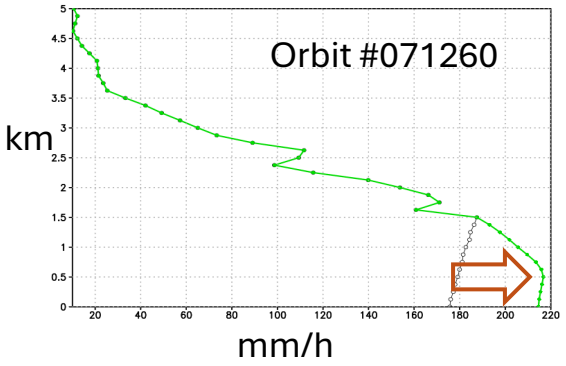
Retrieval uncertainties related to clutter removal in spaceborne precipitation radar data

Masafumi Hirose (Meijo University)

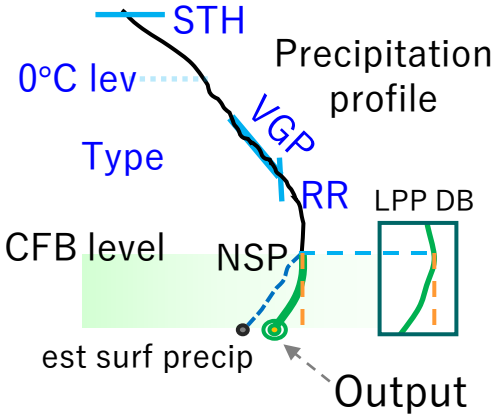
KuPR 06A 2014/6-2019/5



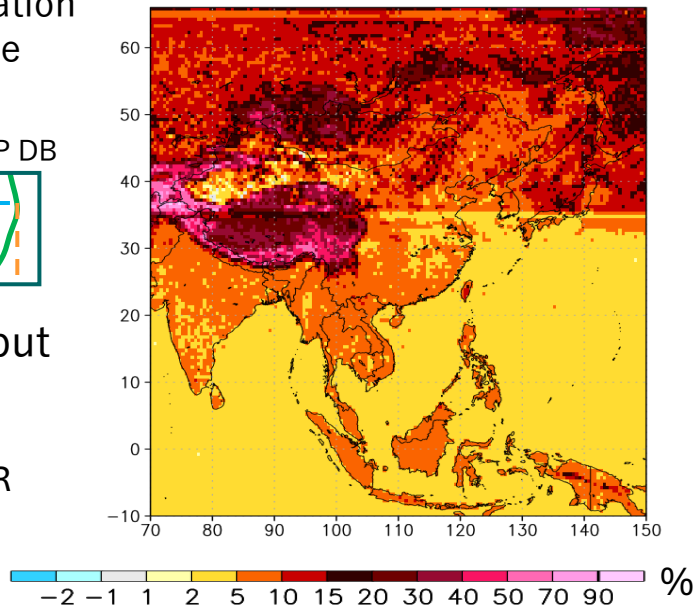
1. Effect of low-level precipitation profile correction



Input variables

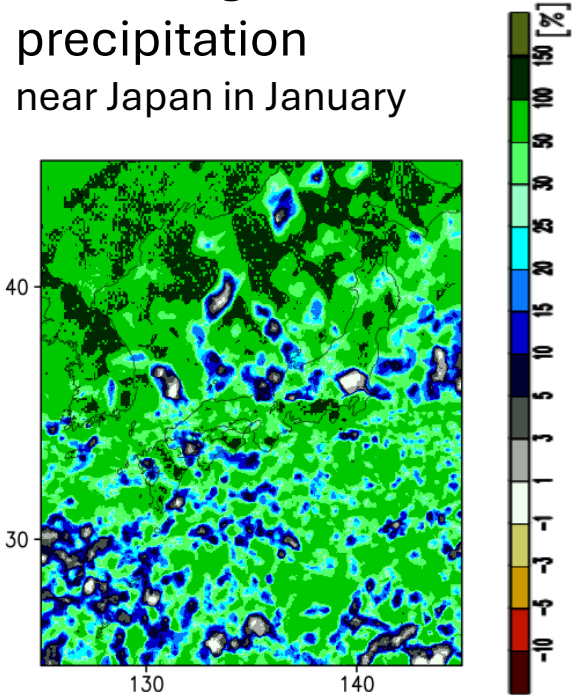


TRMM PR 07A 1998/1-2014/10, GPM DPR KuPR 07A 2014/4-2023/6

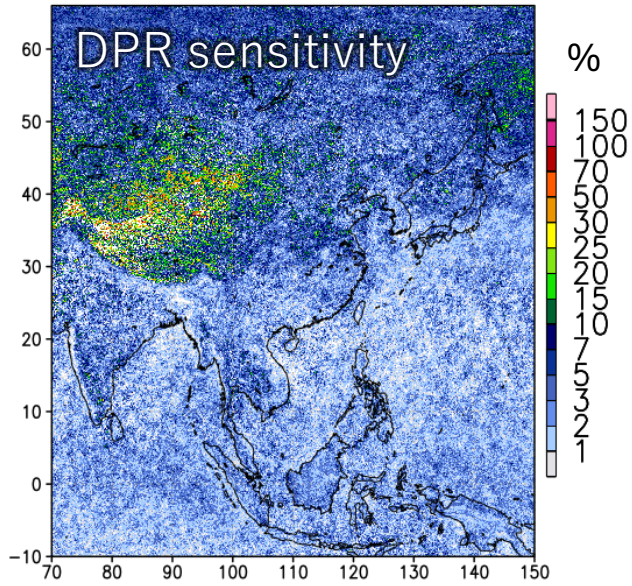


2. Missing shallow precipitation

near Japan in January

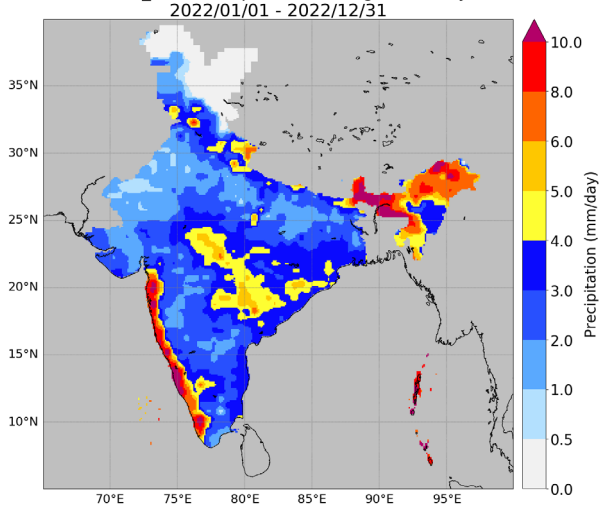


3. Missing precipitation below sensitivity

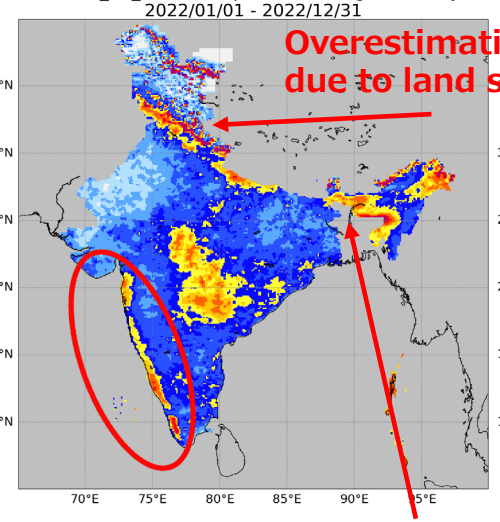


Evaluation of GSMaP_NRT V8 / IMERG Early Run V6 (Annual precip in 2022)

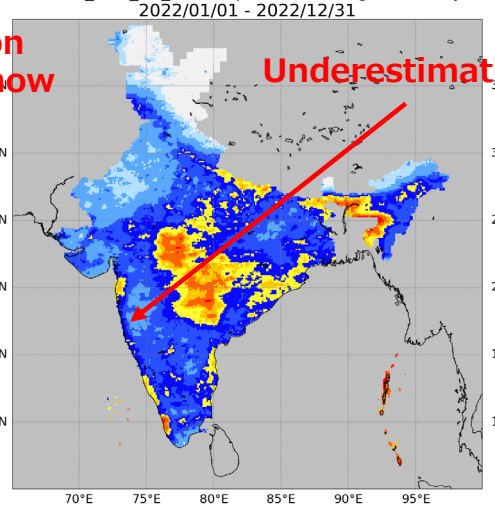
GSMaP_ISRO



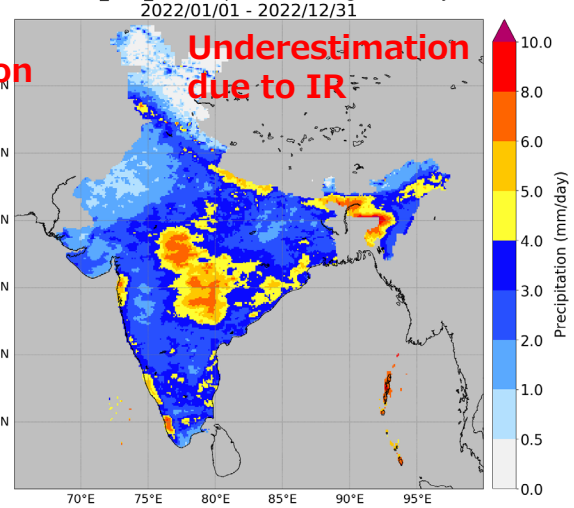
PMW only



IR only

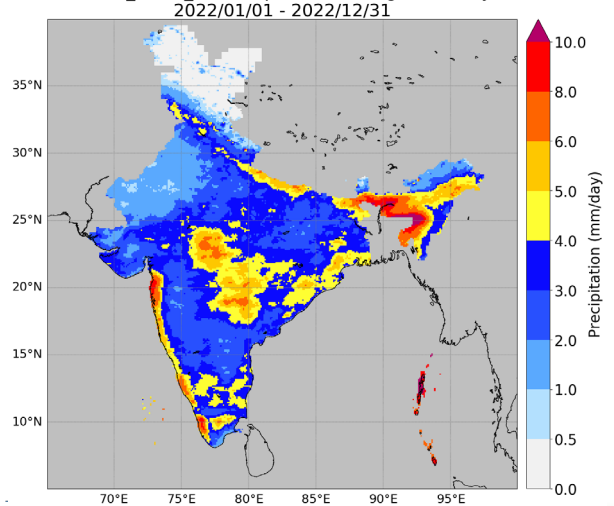


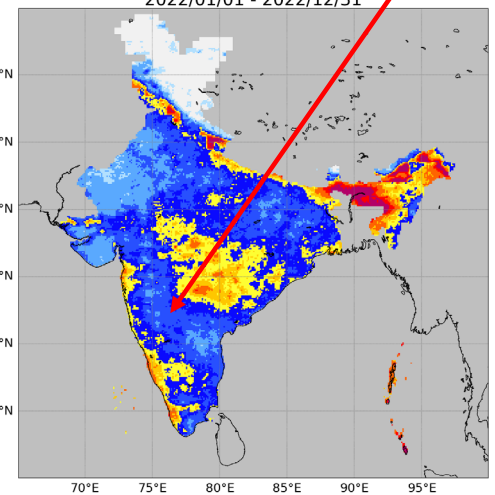
PMW + IR

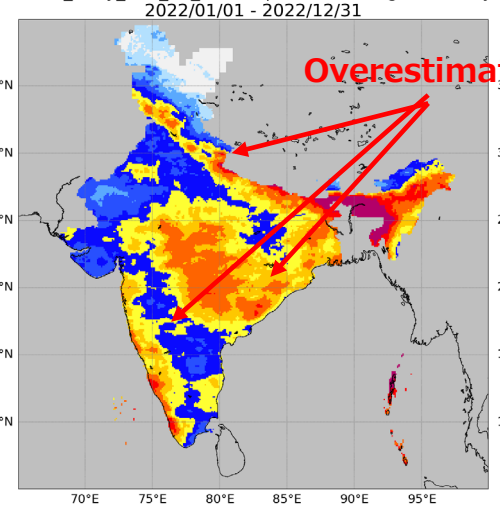


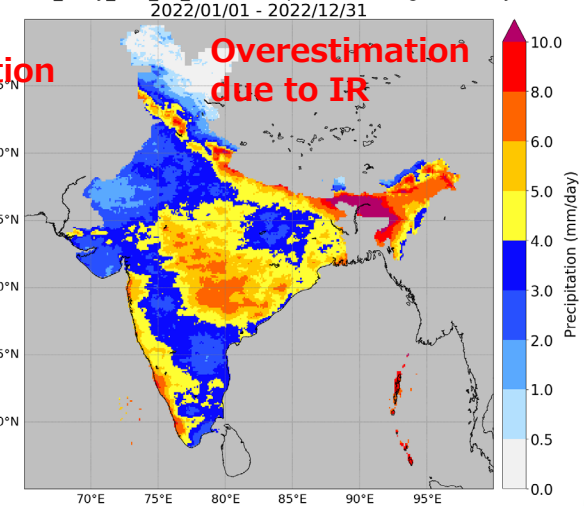
GSMaP

GSMaP_Gauge NRT









IMERG

1) Explore physical mechanism for understanding orographic/shallow precipitation
2) Algorithm validation

- Ground Truth: Want rain gauge networks at different heights along the mountain.
- ✓ A US-Mexico project North American Monsoon Experiment (NAME) installed a rain gauge network. NCAR has the data. Northwest Mexico NAME Event Raingage Network (NERN) 5 Minute Data https://data.eol.ucar.edu/dataset/82.001
- ✓ A field campaign coming up in the Colorado Rockies for this upcoming winter season called S2noCliME https://news.umich.edu/snowfall-and-drought-4-8m-field-campaign-will-improve-forecasts-in-western-us-led-by-u-m/
- ✓ Westcoast & Heartland Hyperspectral Microwave Sensor Intensive Experiment (WHYMSIE) field campaign https://earth.gsfc.nasa.gov/climate/campaigns/WH2yMSIE
- Ground truth data is needed in mountainous regions. There is some public Taiwan rain gauge data. But there may be more data available from the Taiwan Weather Service.
- ➢ Action Item: Seek the availability of Taiwan surface rainfall observation data such as at least one or two year rainguage-corrected radar rainfall products (Yun Lan Chen will help us communication.) (Taiwan-version GSMaP)

Field Campaigns that target Orographic Precipitation

1. MAP – 7 September to 15 November 1999 – Alpine Region
2. IMPROVE 1 & 2 -- 4 January to 14 February 2001 & 26 November to 22 December 2001 – Pacific Northwest
3. IPHEx – 1 May 2014 to 15 June 2014 – Southern Appalachians, North Carolina
4. CCOPE-2015 – 22 May 2015 to 15 August 2015 – Nahuelbuta Mountains, Chile
5. OLYMPEX – 1 November 2015 to 17 January 2016 – Olympic Peninsula, Washington
6. SNOWIE – 07 January 2017 to 17 March 2017 – Payette Mountains, Idaho, USA
7. CACTI & RELAMPAGO – 1 June 2018 to 30 April 2019 – Argentina
8. SAIL – 1 September 2021 to 15 June 2023 – Crested Butte, Colorado, USA
9. SPLASH – October 2021 to September 2023 – East River watershed of the Colorado Mountains, Colorado, USA
10. PRECIP 25 May 2022 to 10 August 2022 – Taiwan
11. HiPRECS – 2018 to 2027 – the Rolwaling valley, eastern Nepal Himalayas

3) Hydrological applications over complex terrain

- The PDF distribution of the rain rates is important to run the hydro-model in different ensembles. The PDF of rain for each time-step from over the grid boxes would be ideal to enable ensemble runs by hydrologic models.
- The spatial location of the rain is important so that the rain gets in the correct basin.

4) Weather radar networks and small weather radar QPE's to study orographic precipitation

- NOAA has a project over California of placing X-band radars between NEXRAD radars to fill the gap. Are the data from the gap filling radars available to the public for independent research? (Action Item: Jaince)

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5) How to bridge the gap in between observations (in-situ and remote sensing) and numerical models in order to improve orographic precipitation detection and quantification

- Doppler observation of the EarthCare satellite will provide important dynamics within cloud systems.

Open Discussion

- Some countries have rain gauge data and they are not sharing the data using the WMO standards. It would be appreciated if these countries had a tool that would allow them to use satellite data for their own rain gauge data correction.