The Bureau of Meteorology

AOMSUC-15 FYSUC-2025
FIFTEENTH ASIA-OCEANIA METEOROLOGICAL SATELLITE USERS' CONFERENCE
THE JOINT 2025 FENGYUN SATELLITE USER CONFERENCE

AOMSUC-15 Training Event: Case Study Analysis and Discussion

Resource and Worksheet

Mr Bodo Zeschke
Teacher, Australian Bureau of Meteorology Training Centre
Point of Contact, Australian VLab Centre of Excellence

Using the Socrative cloud-based learner response system to enhance interaction

1

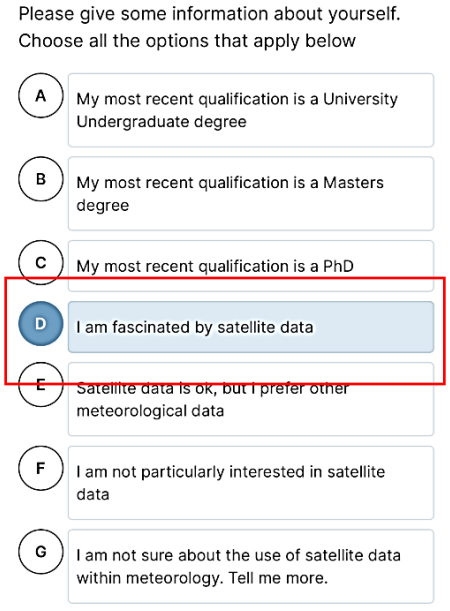
On your computer or smartphone type in Link 1

b.socrative.com

choose Student login

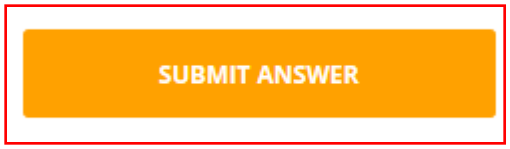
then Room Name

AOMSUC15TE



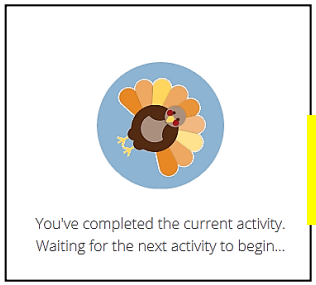
2

Answer the question



3

Submit the Answer



4

Please wait for the next question

Contents

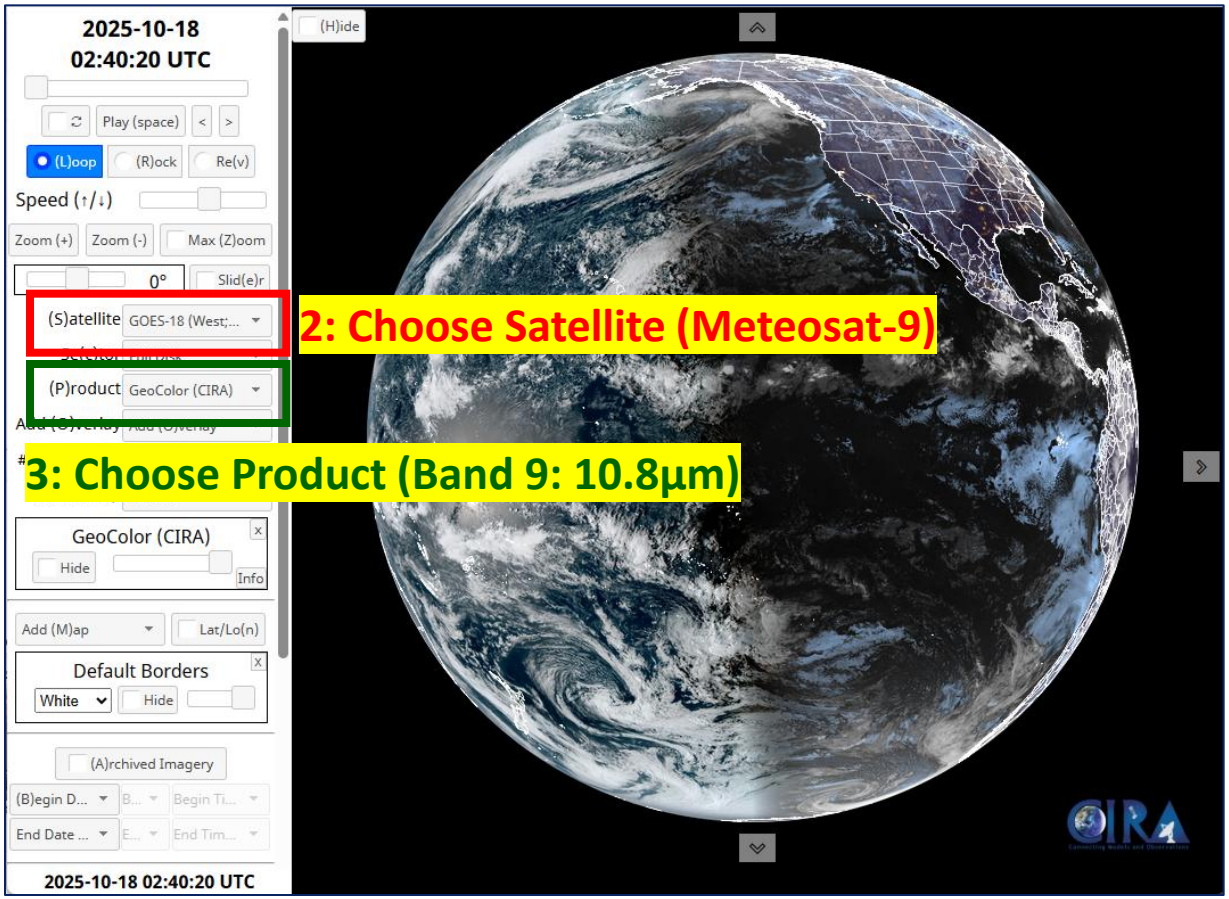
Case studies, and associated exercises in the context of WMO Early Warning For All (EW4ALL) Initiative Priority Hazards. (Gap analysis).

- **Main topics examined here:**
  - **Thunderstorms**
  - Heavy Rainfall and Flooding
  - Rapid Scan Imagery
  - Tropical Cyclones
- **Within each topic:**
  - Resources available on the Australian VLab CoE RFG archive.
  - One case study introduced, with associated satellite data.
  - Socrative questions.
  - **Follow up activities. Exploring web pages.**

Exercise 1a

1: Open the CIRA SLIDER resource

https://rammb-slider.cira.colostate.edu/

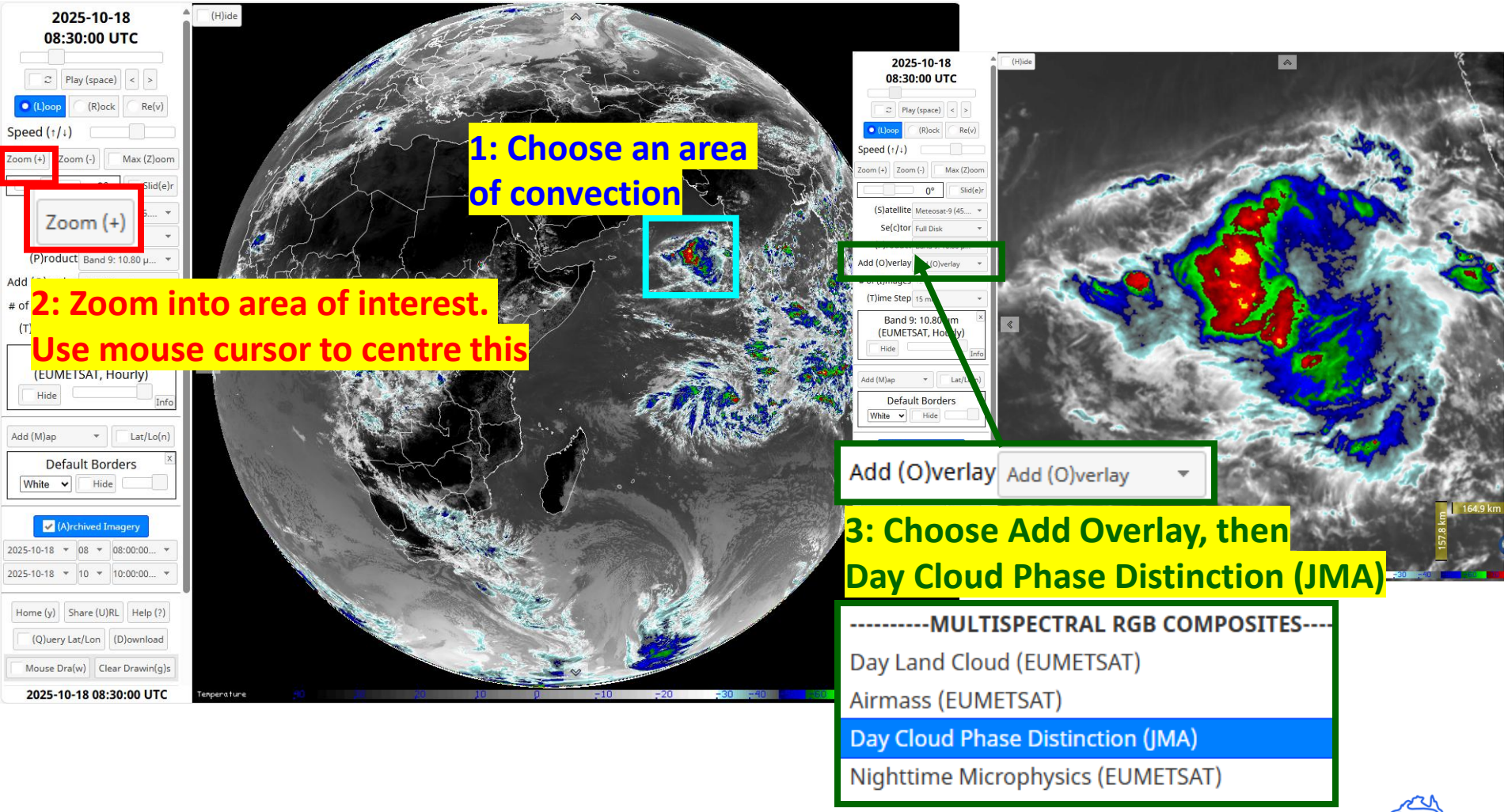


images courtesy CIRA Colorado State University

Exercise 1b

Exploring the CIRA SLIDER resource

https://rammb-slider.cira.colostate.edu/

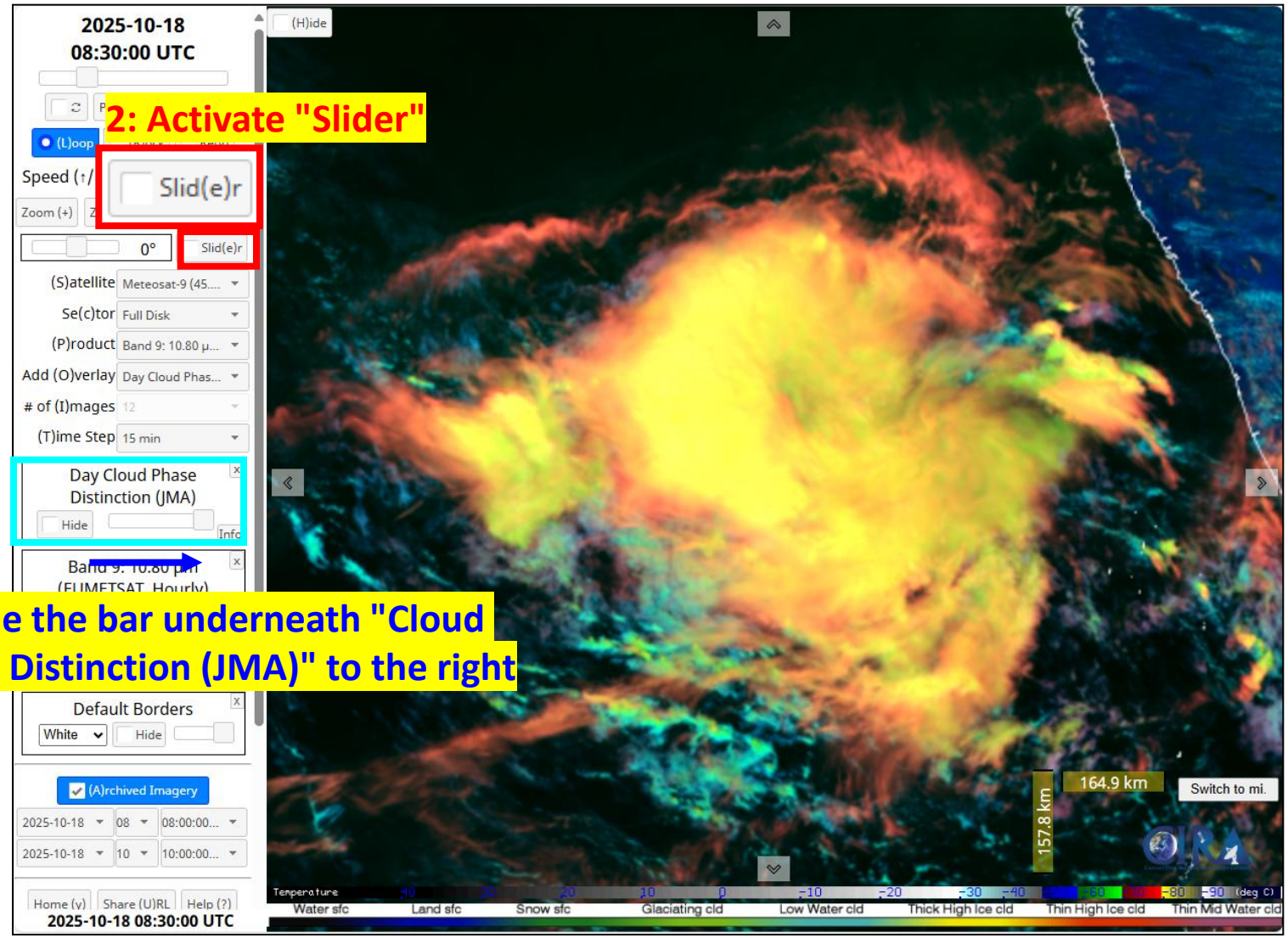


images courtesy CIRA Colorado State University

Exercise 1c

Exploring the CIRA SLIDER resource

https://rammb-slider.cira.colostate.edu/

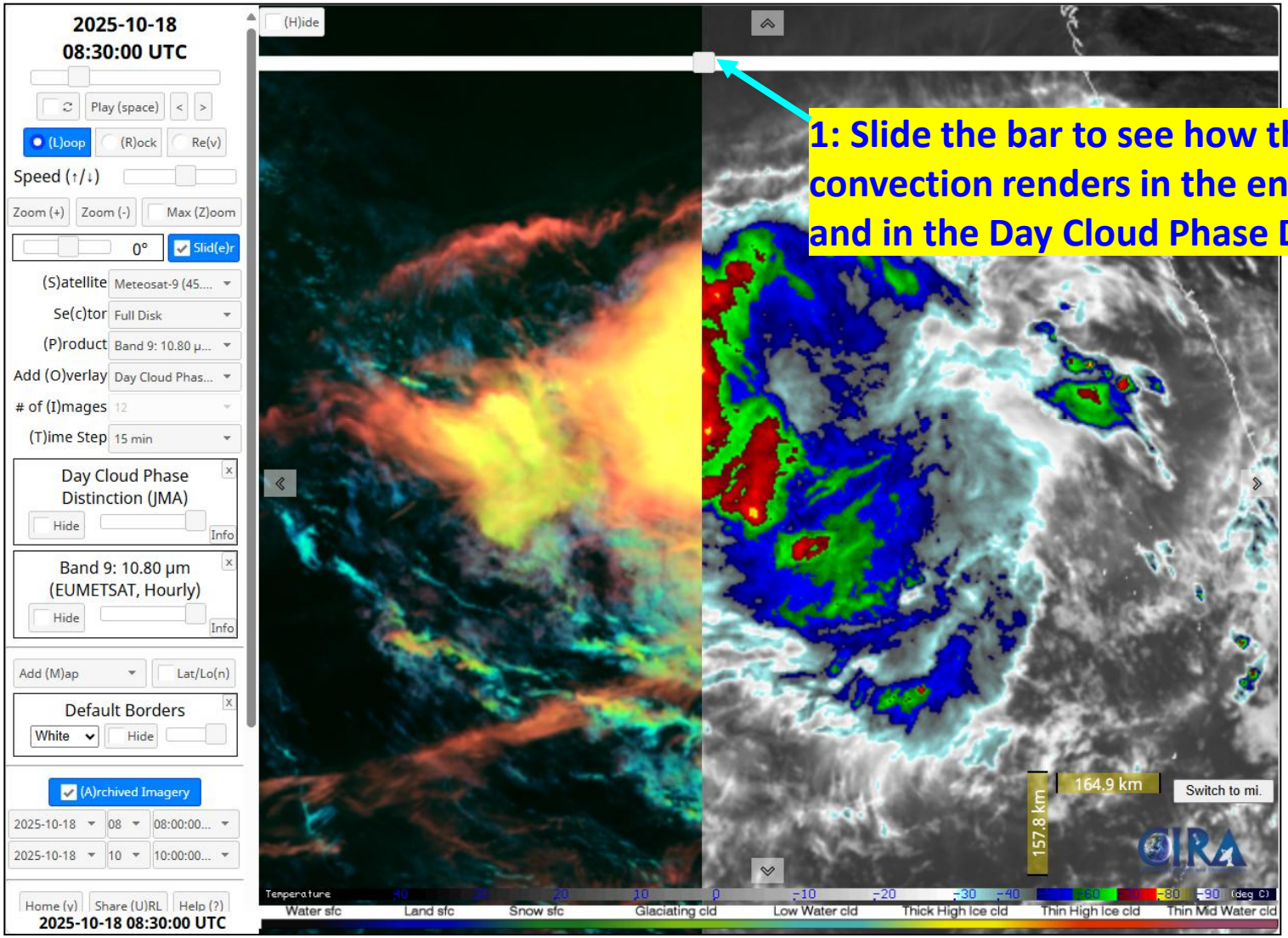


images courtesy CIRA Colorado State University

Exercise 1d

Exploring the CIRA SLIDER resource

https://rammb-slider.cira.colostate.edu/

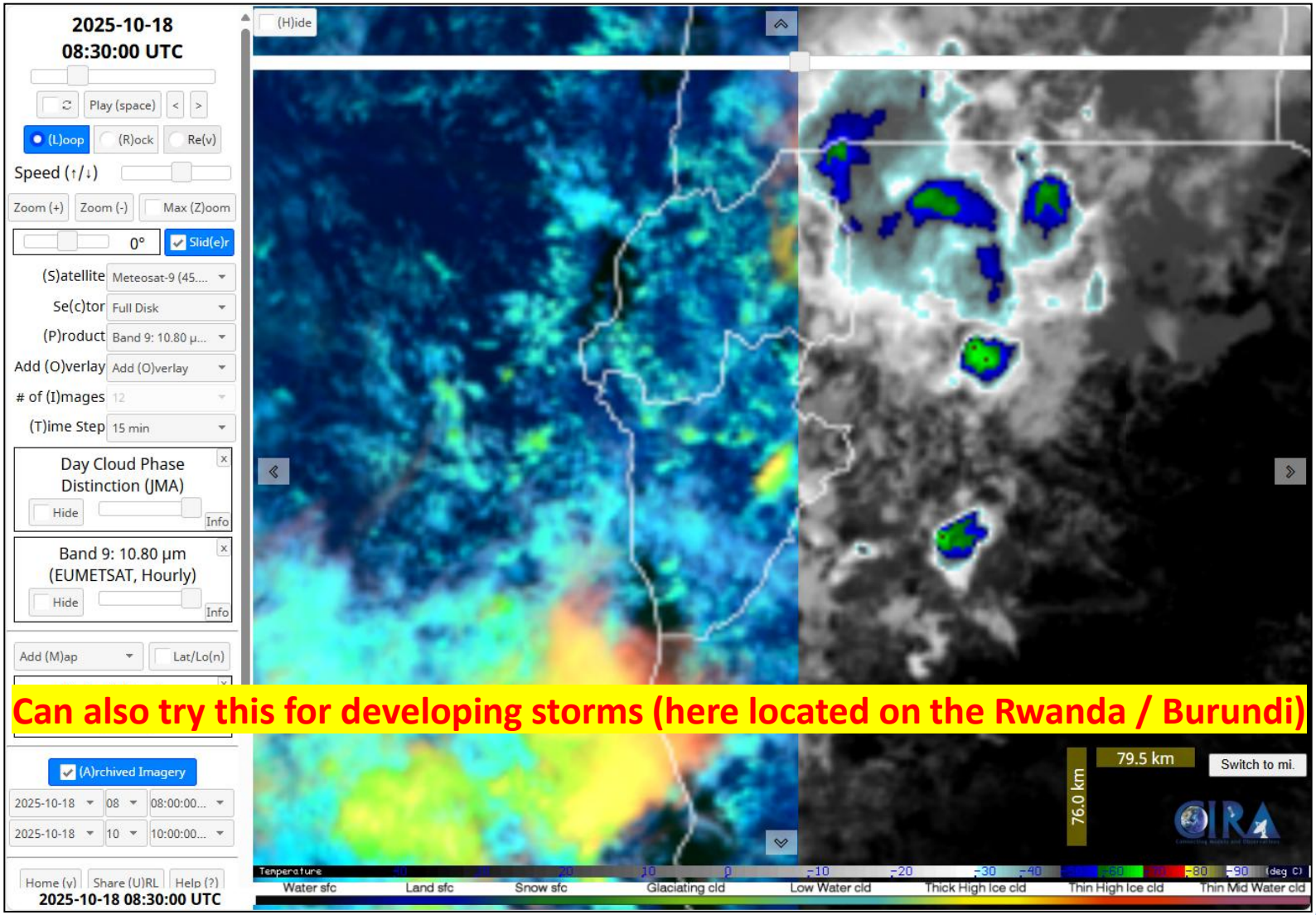


images courtesy CIRA Colorado State University

Exercise 1e

Exploring the CIRA SLIDER resource

https://rammb-slider.cira.colostate.edu/



images courtesy CIRA Colorado State University

Exercise 2a

1: Open the CMA SWAP website

http://rsapp.nsmc.org.cn/geofy/

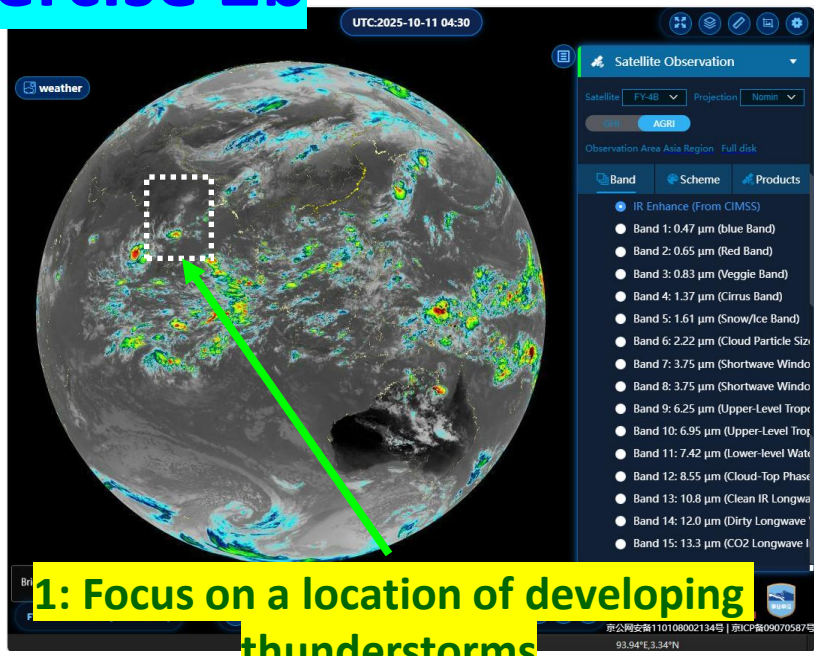
2: Menu

4: Scheme

Day Microphysics RGB Composite

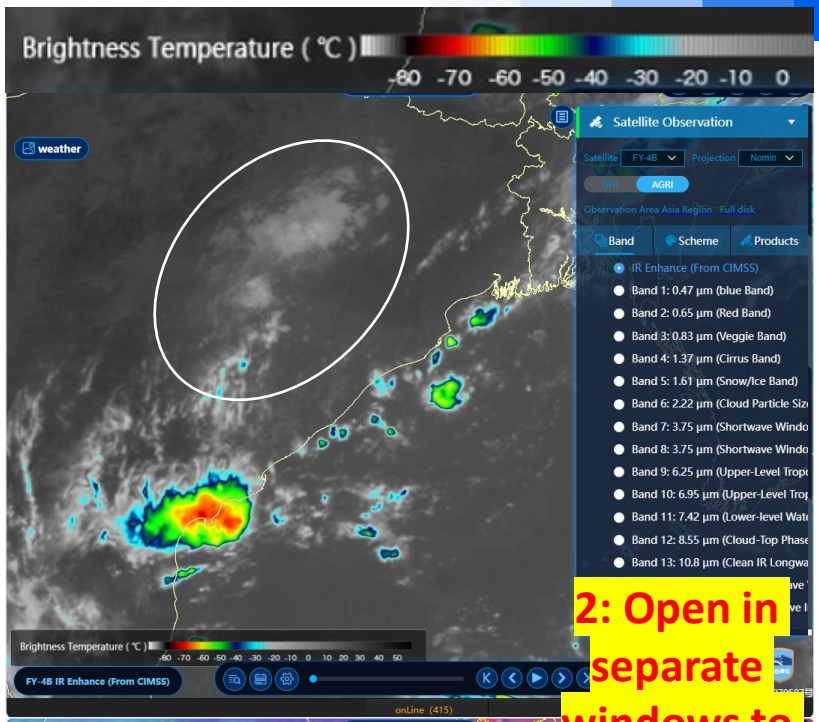
images courtesy China Meteorological Administration (CMA)

Exercise 2b

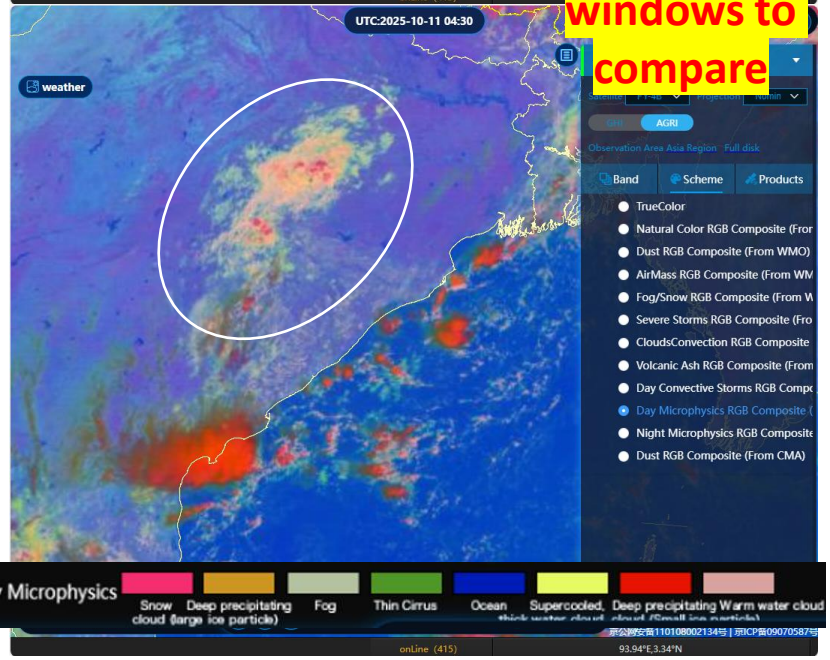


1: Focus on a location of developing thunderstorms

Maybe over your own country



2: Open in separate windows to compare



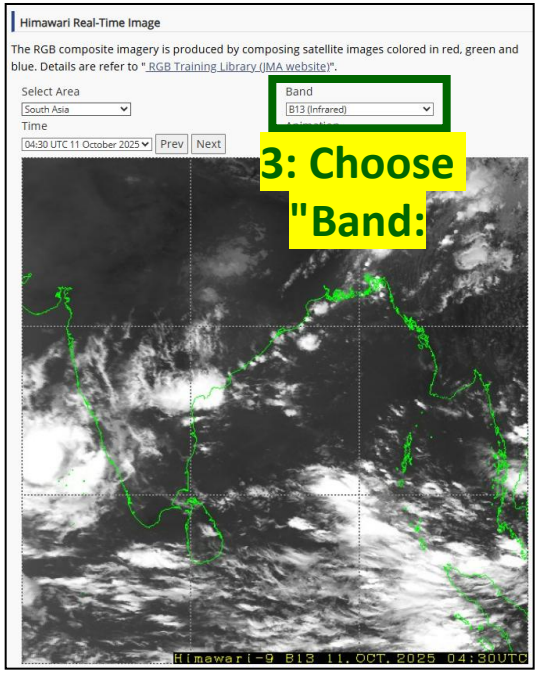
images courtesy China Meteorological Administration (CMA)

Exercise 3

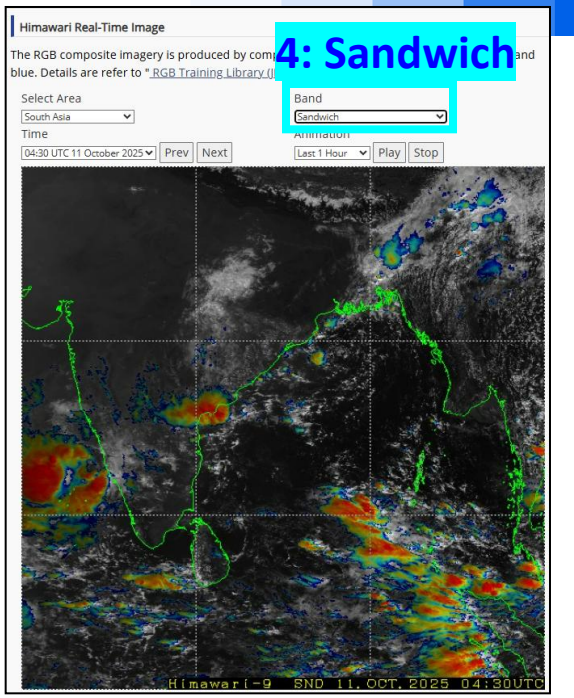
1: Open the JMA AHI Real-Time image website

https://www.data.jma.go.jp/mscweb/data/himawari/

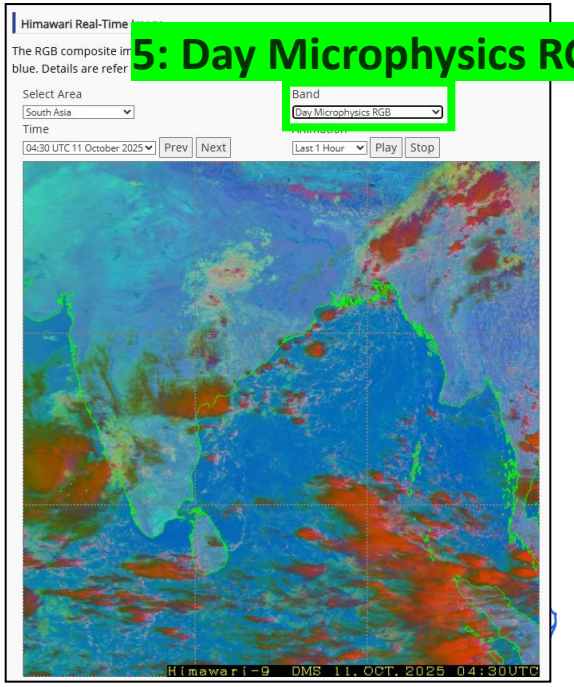
2: Choose area of interest



3: Choose "Band:



4: Sandwich



5: Day Microphysics RGB

6: Open in separate windows to compare

OFFICIAL

Exercise 4a

1: Open the NOAA / CIMSS web resource over Fiji / Tonga / Samoa

https://cimss.ssec.wisc.edu/severe_conv/pltg.html

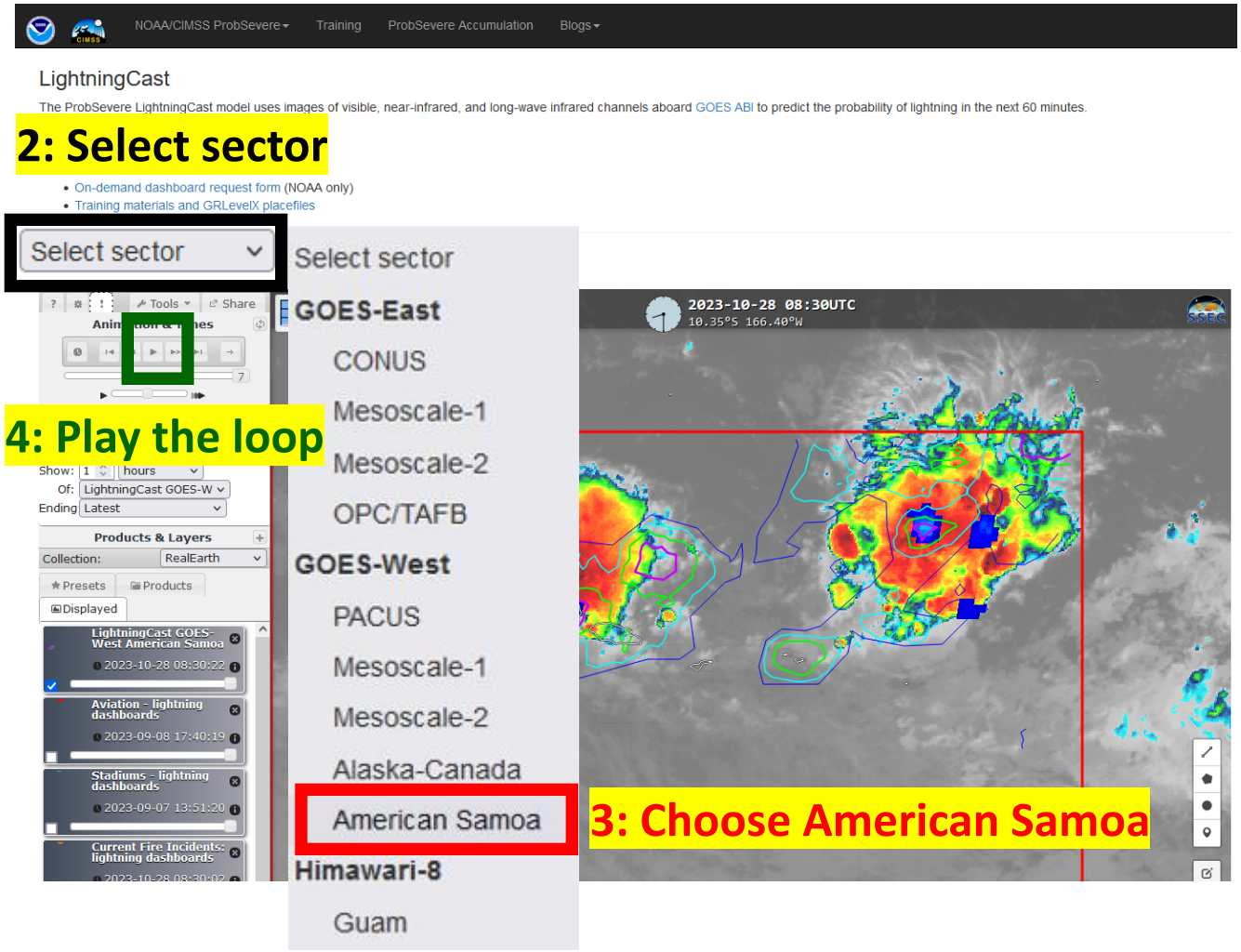


image courtesy NOAA / CIMSS

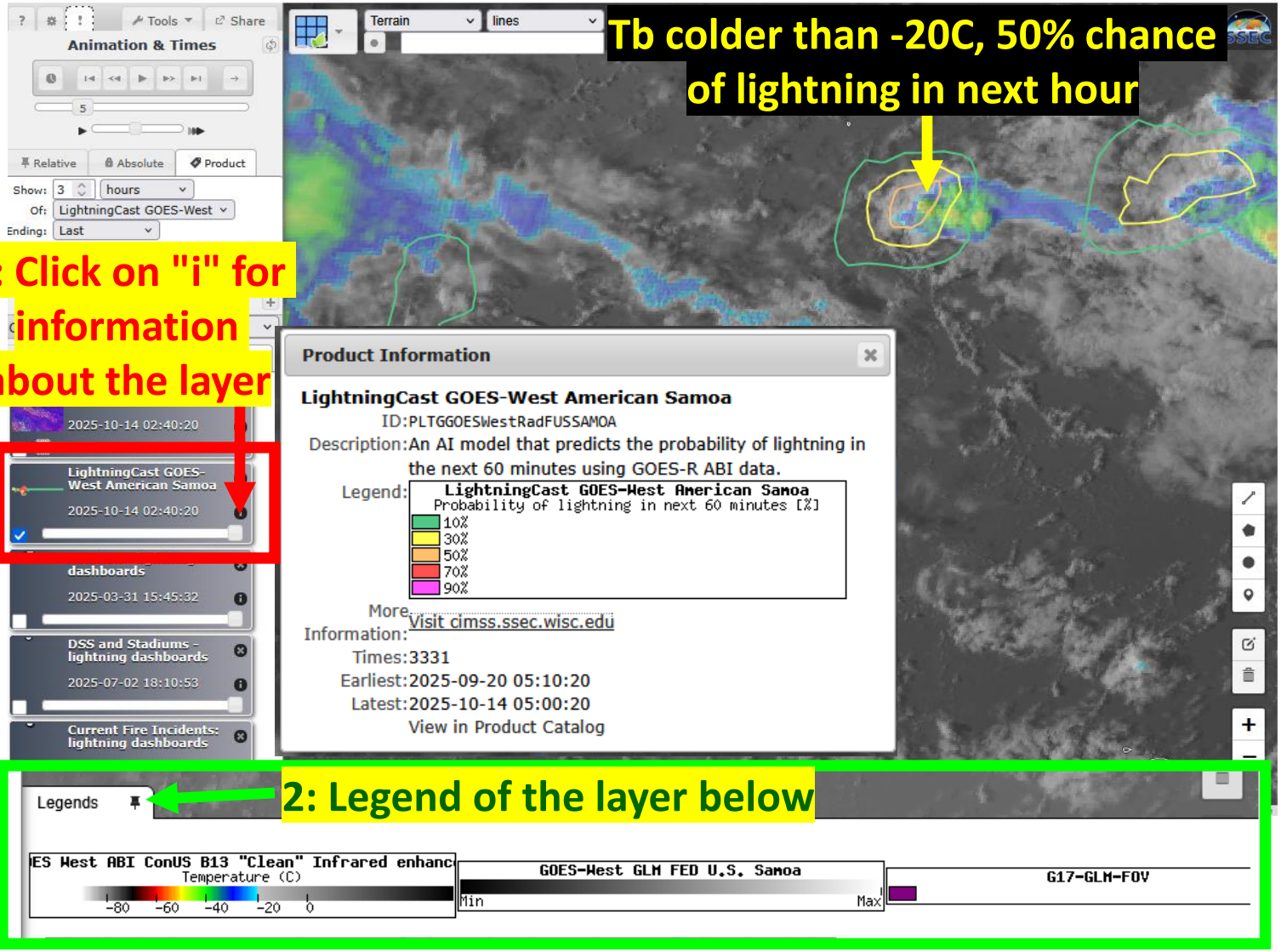
Exercise 4b

image courtesy NOAA / CIMSS

Interpreting LightningCast

using the NOAA / CIMSS web resource at

https://cimss.ssec.wisc.edu/severe_conv/pltg.html



Contents

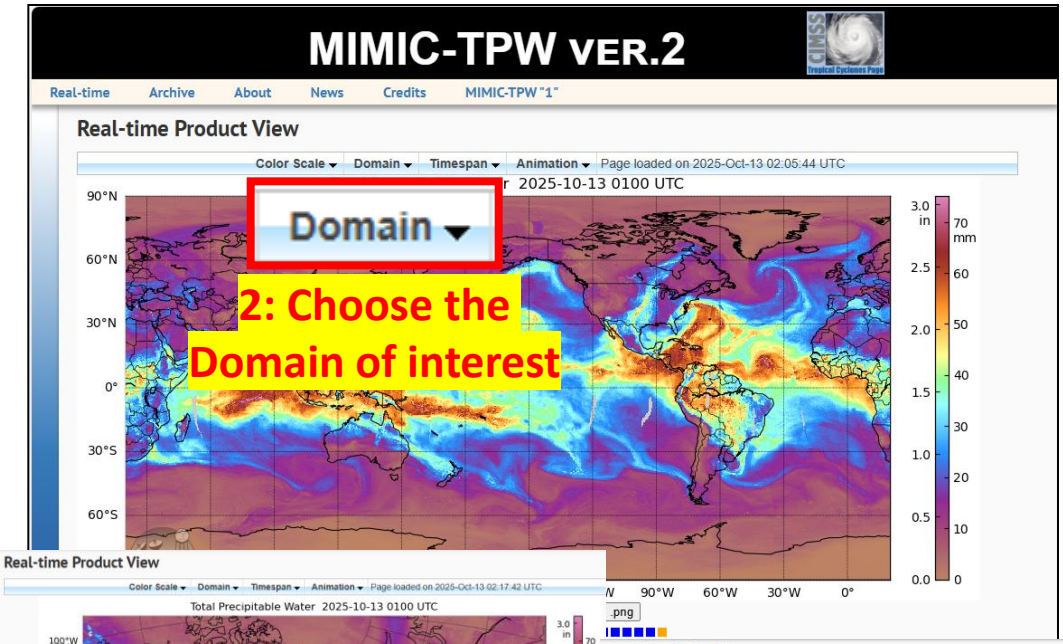
Case studies, and associated exercises in the context of WMO Early Warning For All (EW4ALL) Initiative Priority Hazards. (Gap analysis).

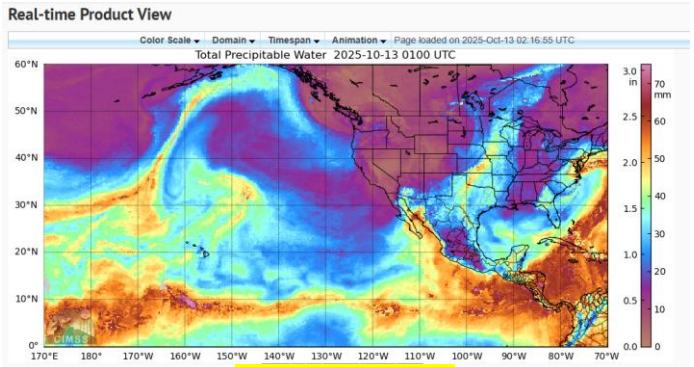
- **Main topics examined here:**
  - Thunderstorms
  - **Heavy Rainfall and Flooding**
  - Rapid Scan Imagery
  - Tropical Cyclones
- **Within each topic:**
  - Resources available on the Australian VLab CoE RFG archive.
  - One case study introduced, with associated satellite data.
  - Socrative questions.
  - **Follow up activities. Exploring web pages.**

Exercise 5a

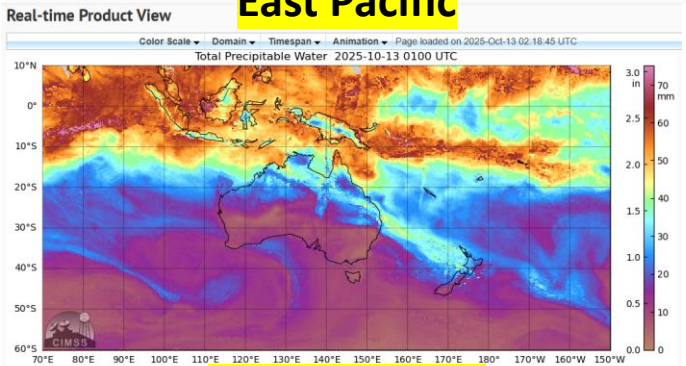
1: Open the MIMIC-TPW web page

http://tropic.ssec.wisc.edu/real-time/mtpw2/

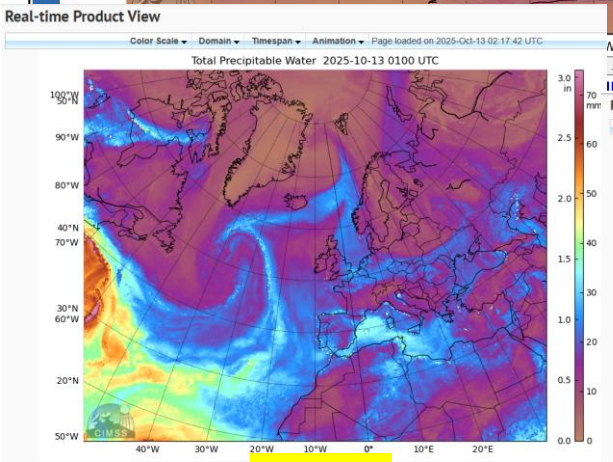




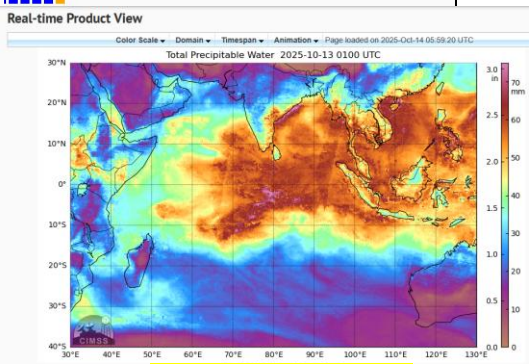
East Pacific



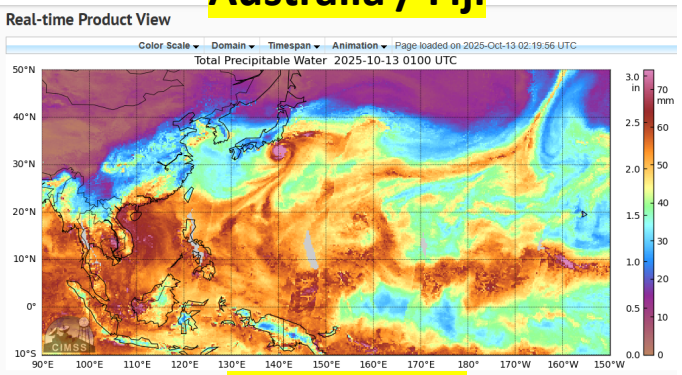
Australia / Fiji



Europe



Indian Ocean

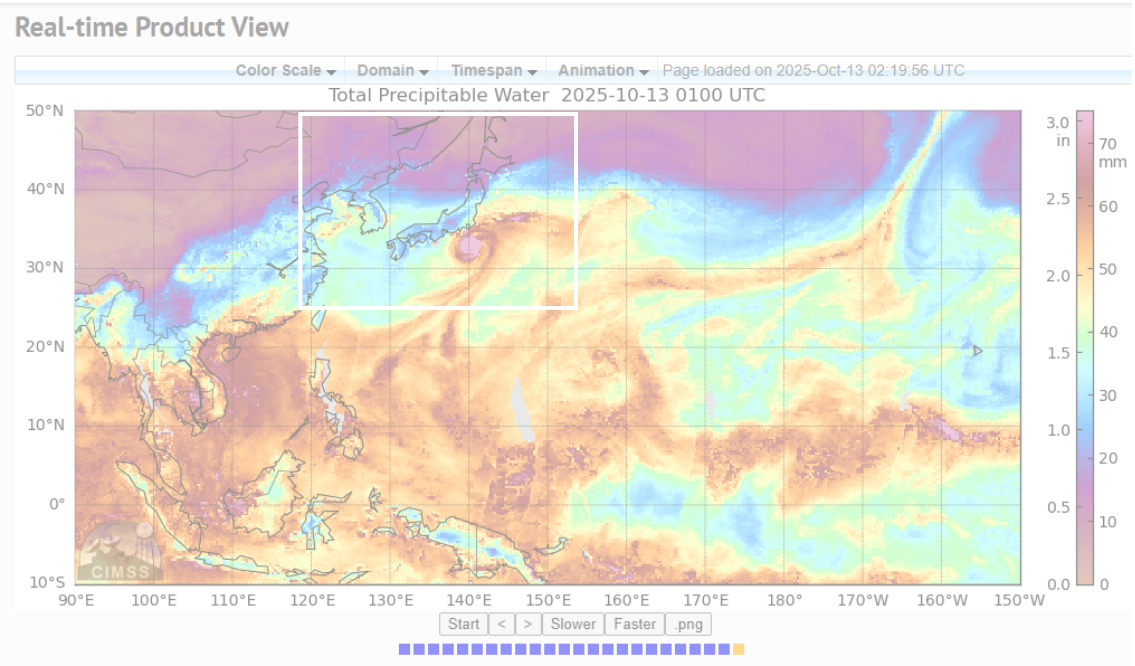


West Pacific

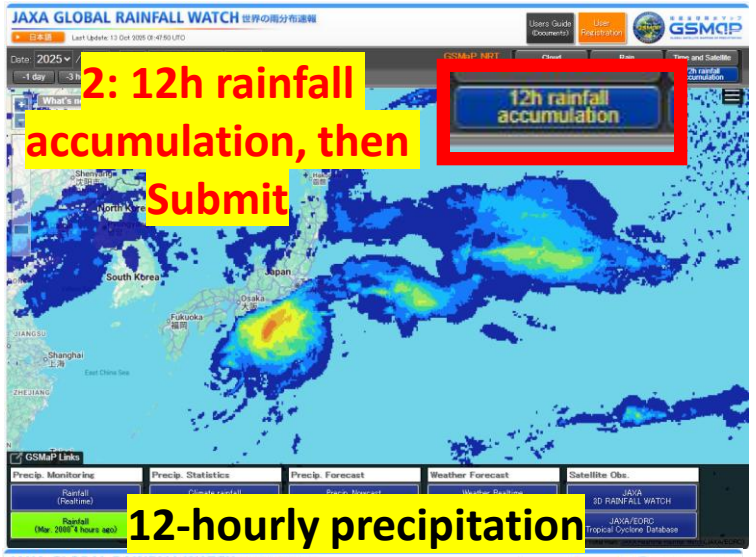
images courtesy CIMSS

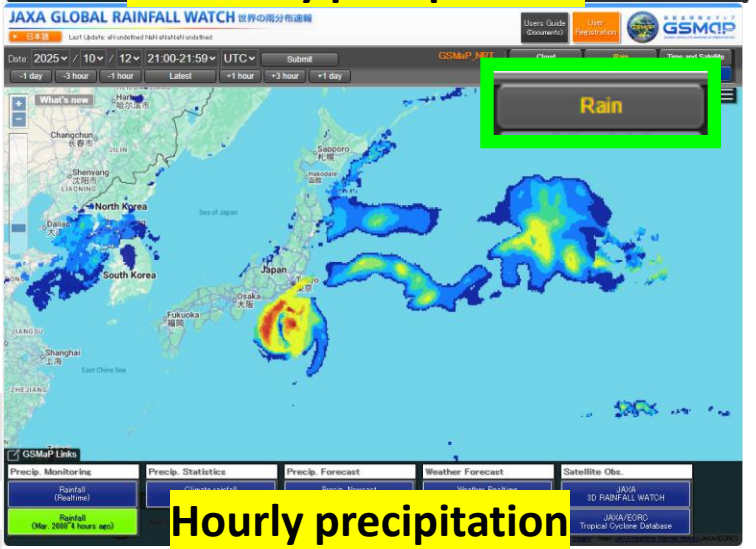
Exercise 5b

1: Open the JAXA GSMap web page https://sharaku.eorc.jaxa.jp/GSMaP/

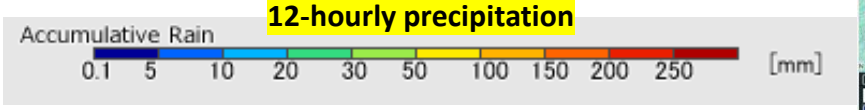


http://tropic.ssec.wisc.edu/real-time/mtpw2/

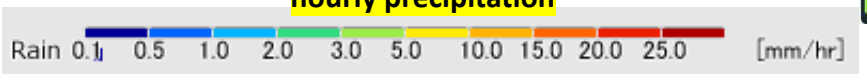




12-hourly precipitation



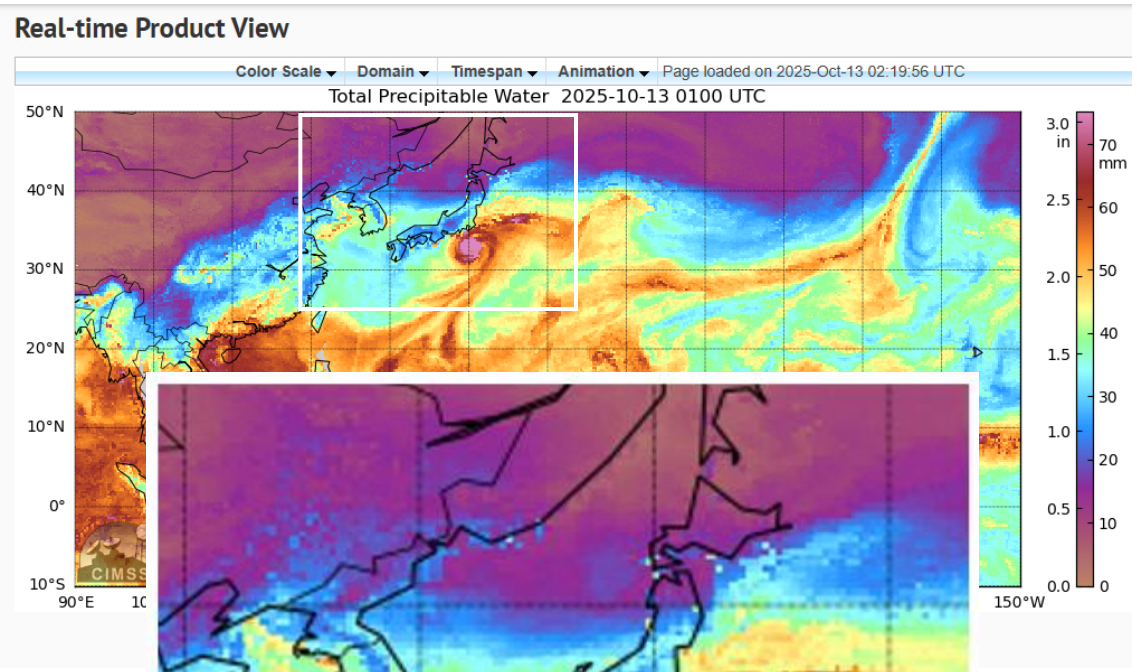
hourly precipitation



images courtesy JAXA EORC

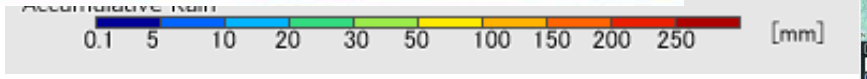
Exercise 5c

Comparing across MIMIC-TPW and JAXA GSMap data

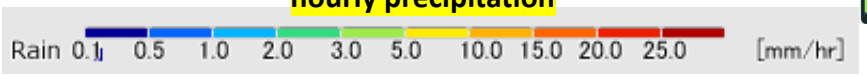


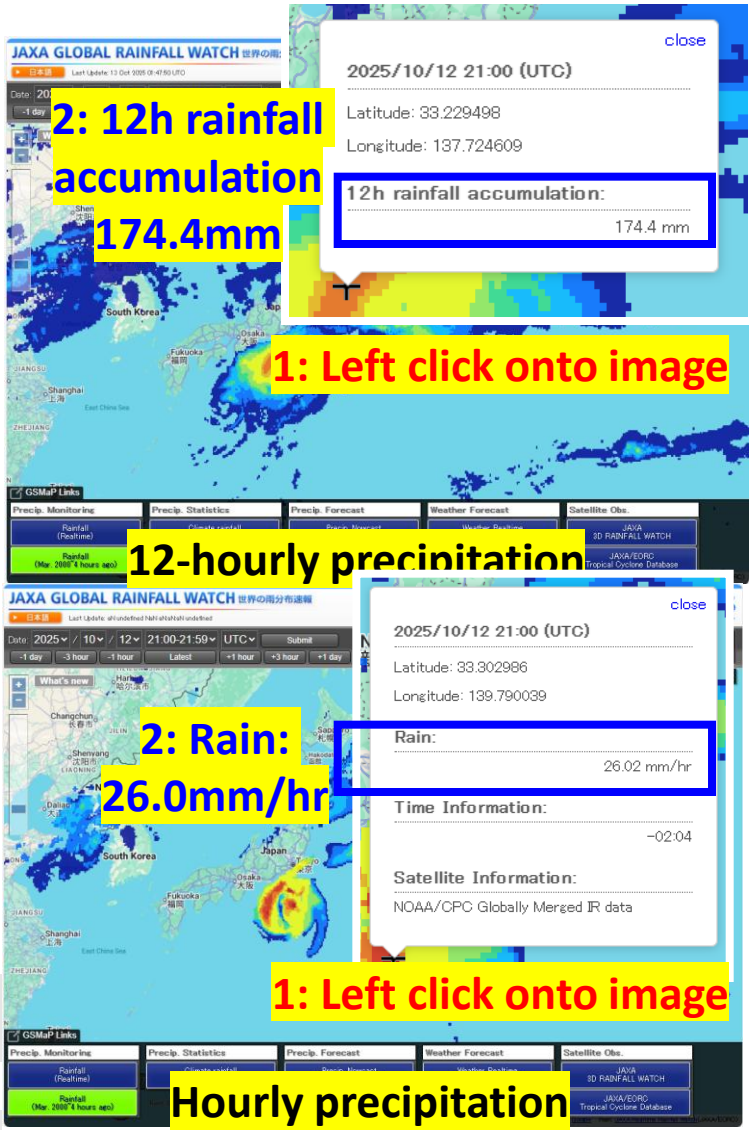
http w2/

GSMaP/



hourly precipitation





images courtesy CIMSS

images courtesy JAXA EORC

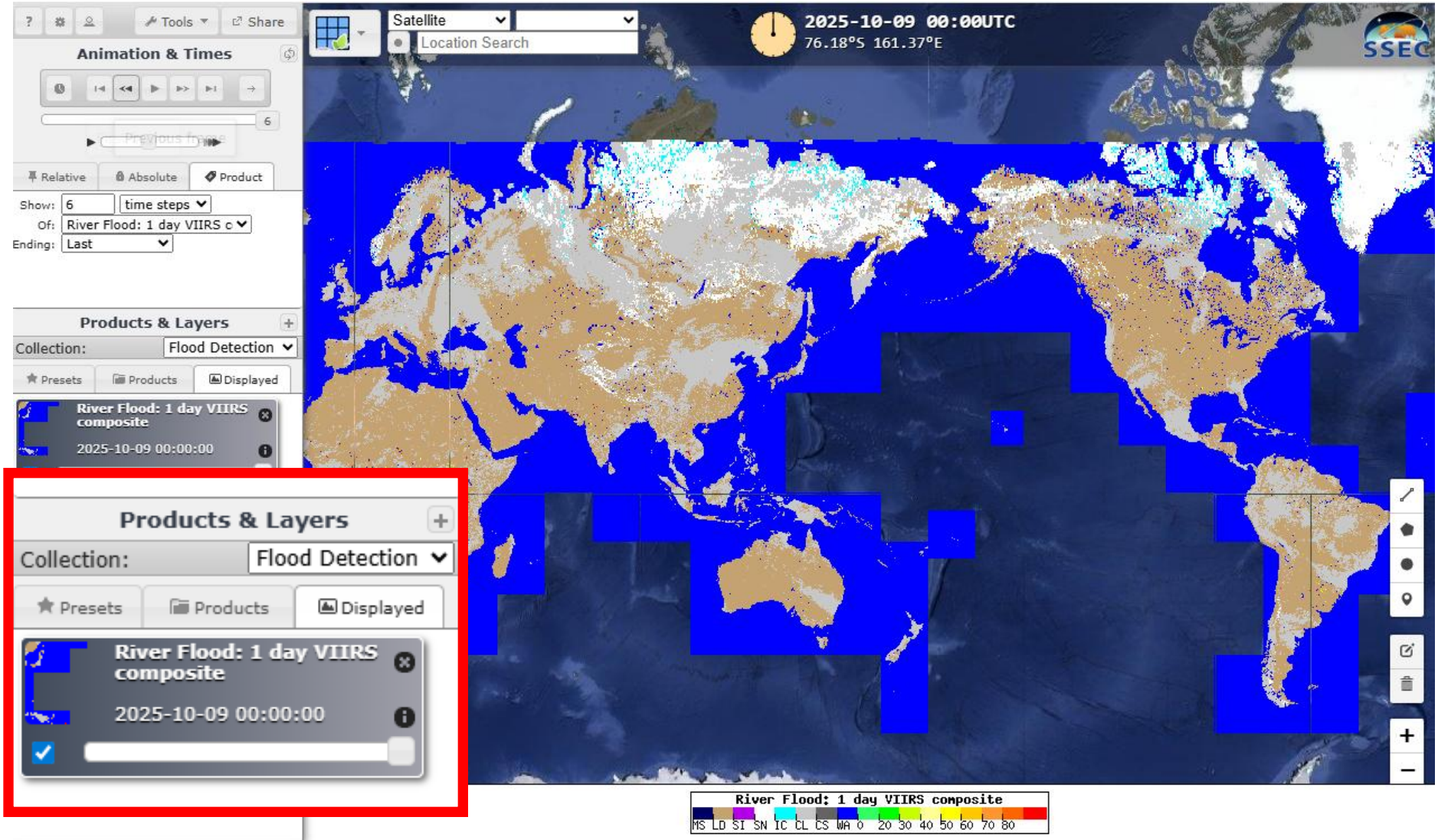
Exercise 6a

image courtesy GMU / CIMSS

OFFICIAL

1: Open the River Flood: 1 day VIIRS composite.

https://floods.ssec.wisc.edu/?products=RIVER-FLDglobal-composite1.75&center=10,0&zoom=3&basemap=satellite&labels=-&timestep=1d



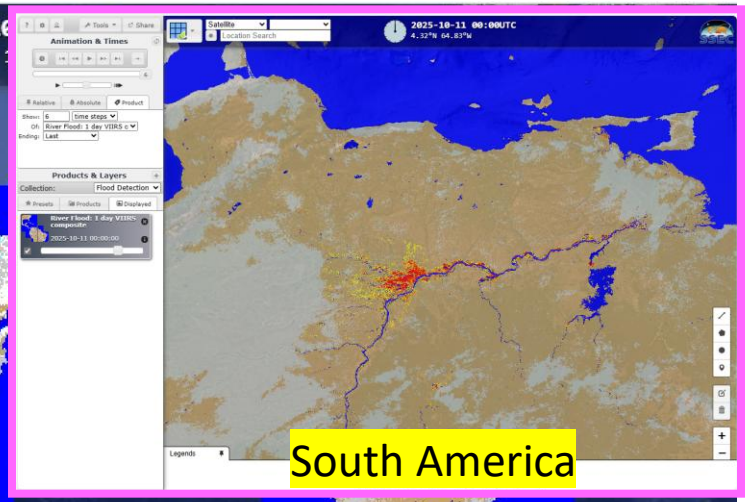
Exercise 6b

image courtesy GMU / CIMSS

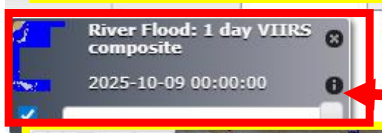
Exploring the River Flood: 1 day VIIRS composite.

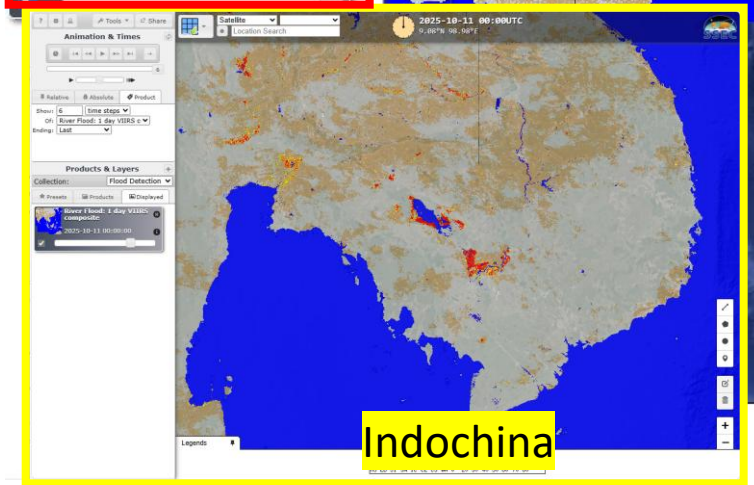
1: Chose a region of interest. 3 examples are shown here.

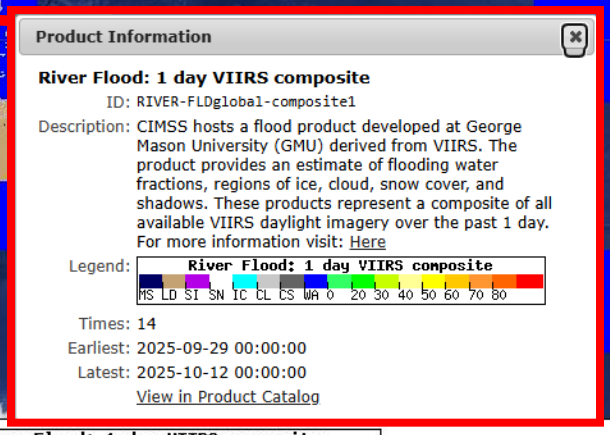
Note that the Japan area is covered in cloud

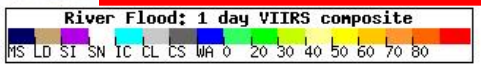


2: Click on the "i" button for information about the layer







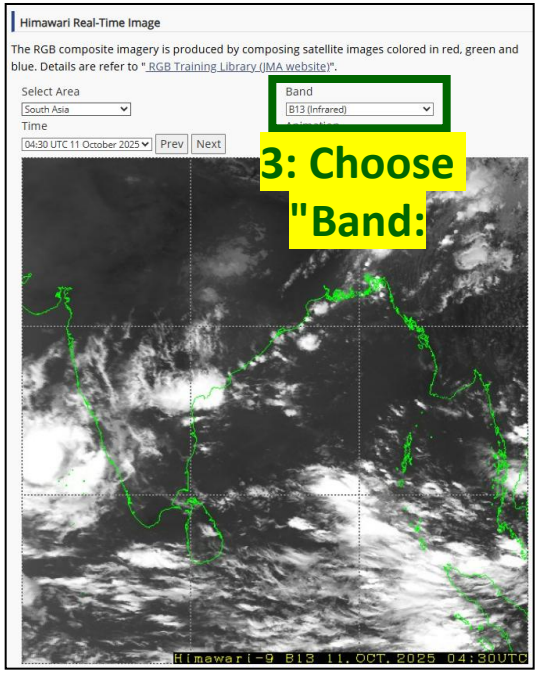


Exercise 7

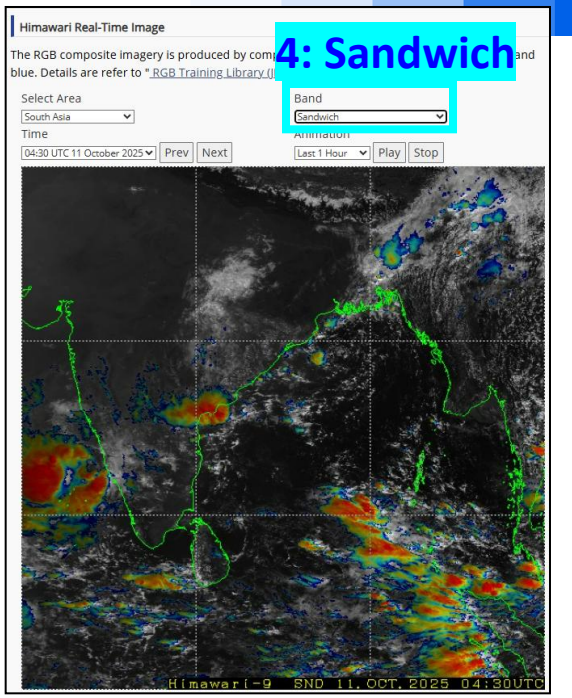
1: Open the JMA AHI Real-Time image website

https://www.data.jma.go.jp/mscweb/data/himawari/

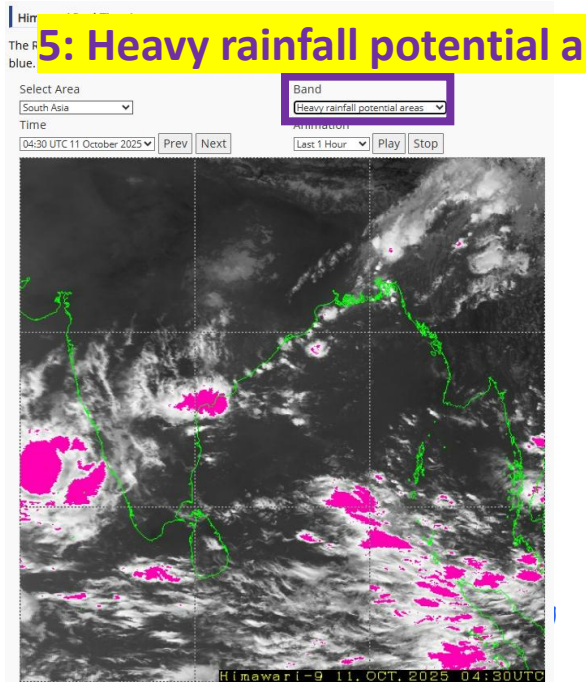
2: Choose area of interest



3: Choose "Band:



4: Sandwich



5: Heavy rainfall potential area

6: Open in separate windows to compare

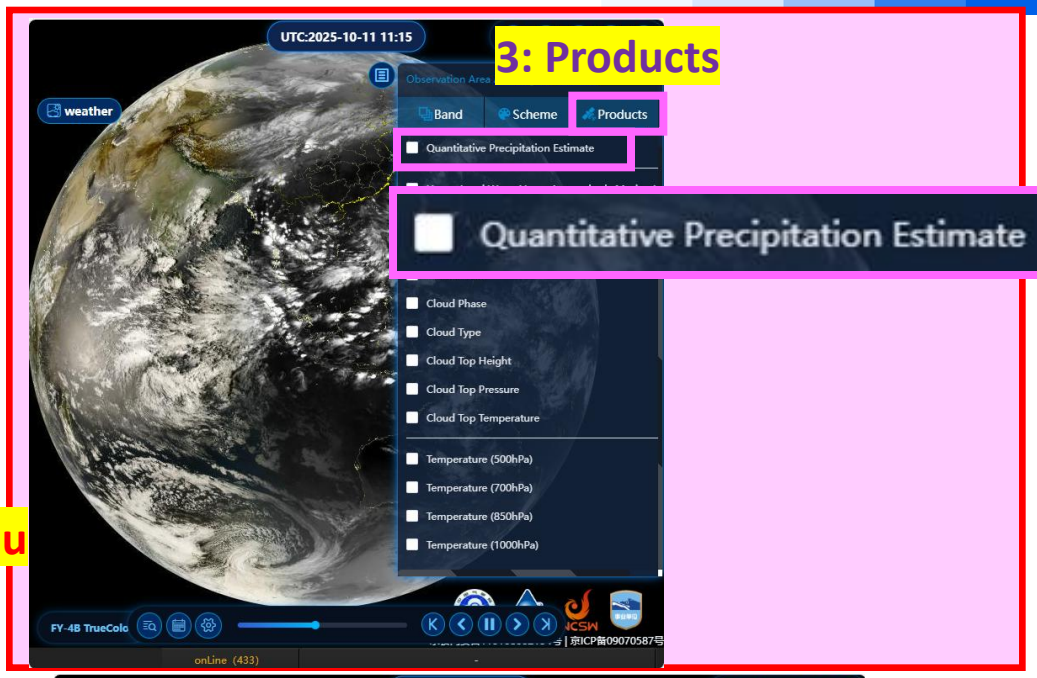
images courtesy Japan Meteorological Agency (JMA)

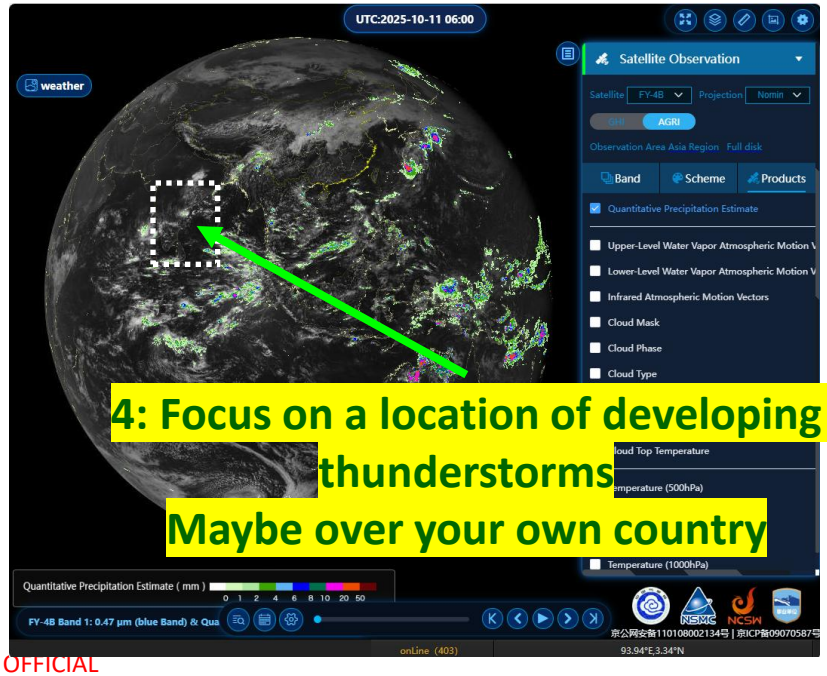
Exercise 8a

1: Open the CMA SWAP website

http://rsapp.nsmc.org.cn/geofy/

2: Menu



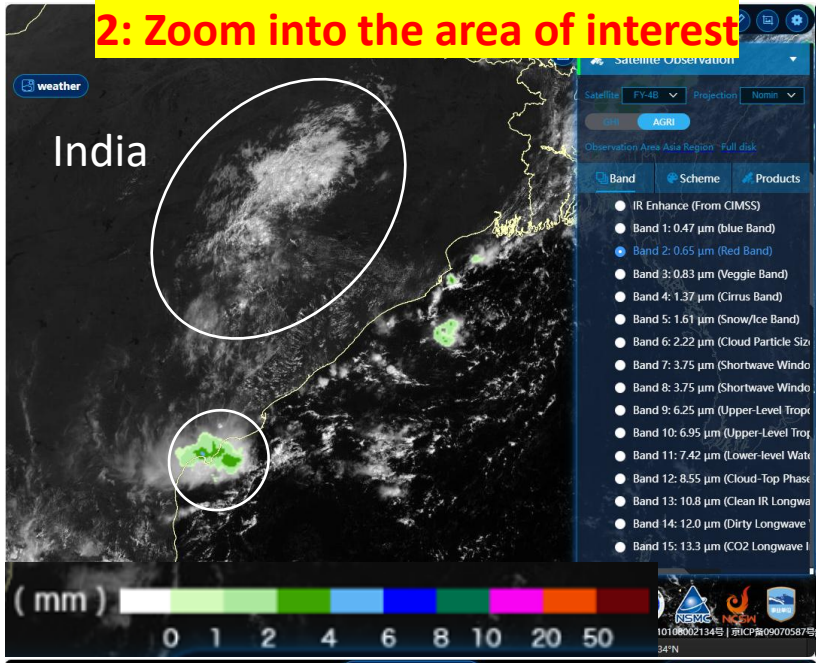


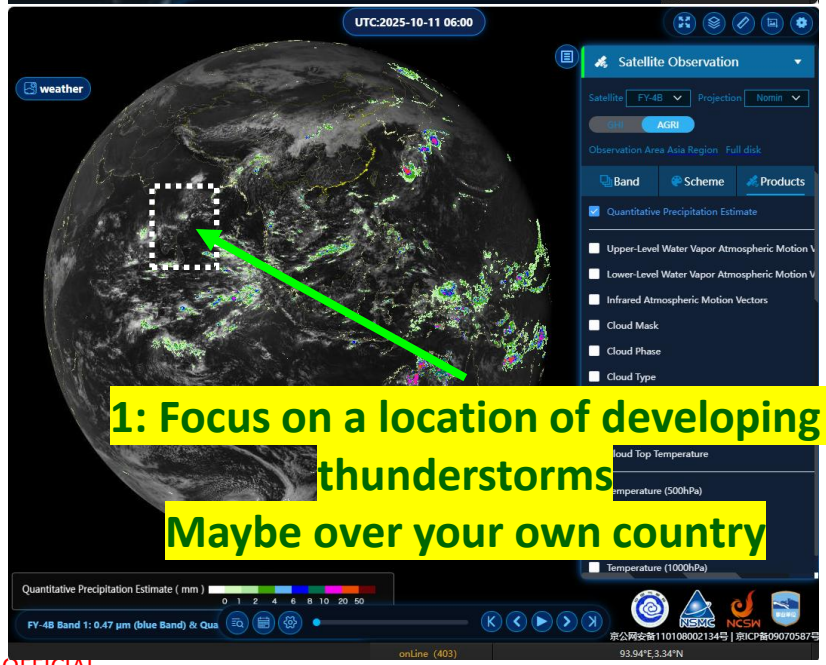
images courtesy China Meteorological Administration (CMA)

Exercise 8b

Exploring the Quantitative Precipitation Estimate on the CMA SWAP website

http://rsapp.nsmc.org.cn/geofy/





images courtesy China Meteorological Administration (CMA)

Contents

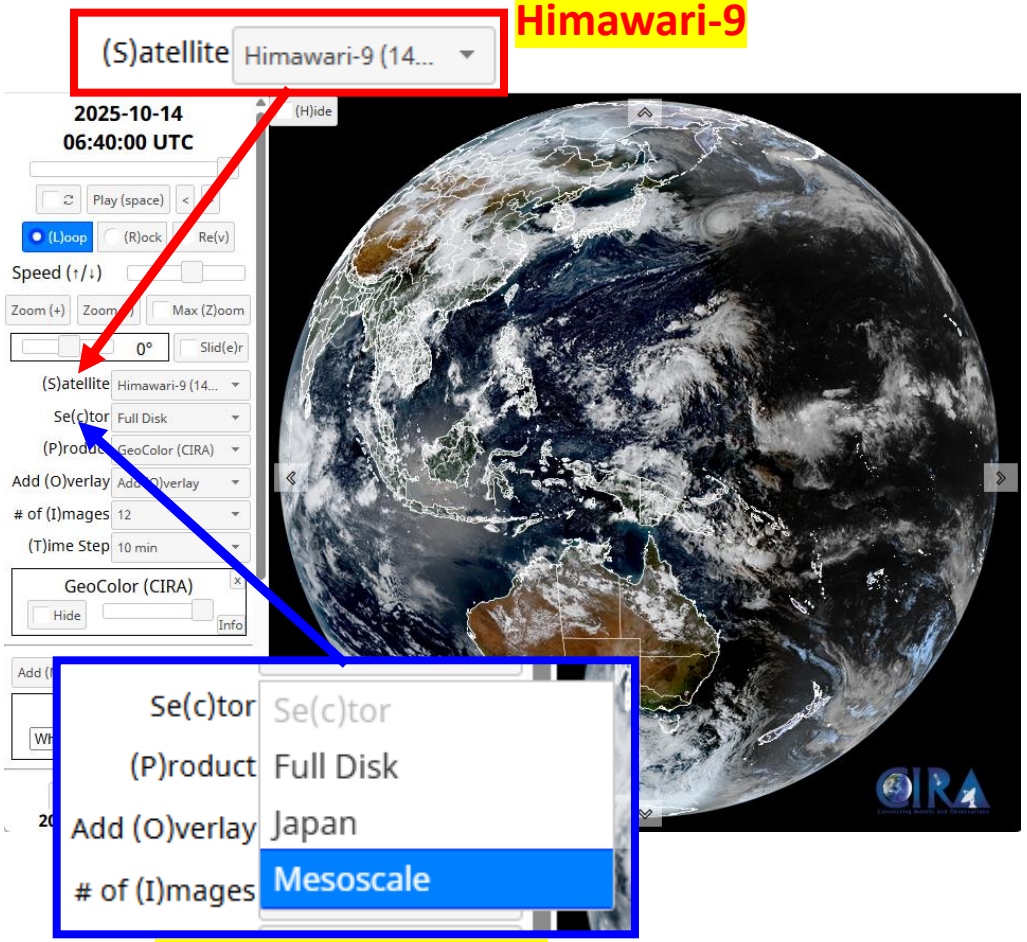
Case studies, and associated exercises in the context of WMO Early Warning For All (EW4ALL) Initiative Priority Hazards. (Gap analysis).

- **Main topics examined here:**
  - Thunderstorms
  - Heavy Rainfall and Flooding
  - **Rapid Scan Imagery**
  - Tropical Cyclones
- **Within each topic:**
  - Resources available on the Australian VLab CoE RFG archive.
  - One case study introduced, with associated satellite data.
  - Socrative questions.
  - **Follow up activities. Exploring web pages.**

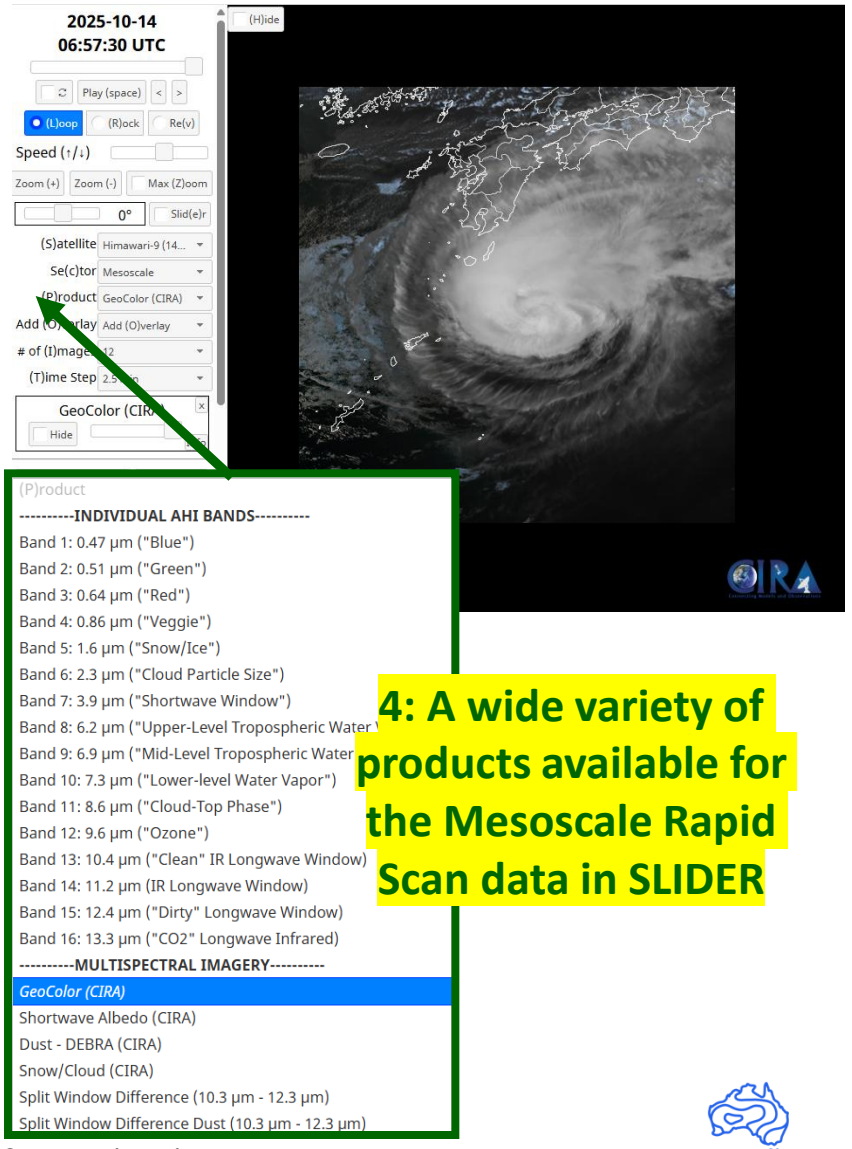
Exercise 9

1: Open the CIRA SLIDER viewer at https://rammb-slider.cira.colostate.edu/

2: For "Satellite" choose Himawari-9



3: For the "Sector", choose Mesoscale



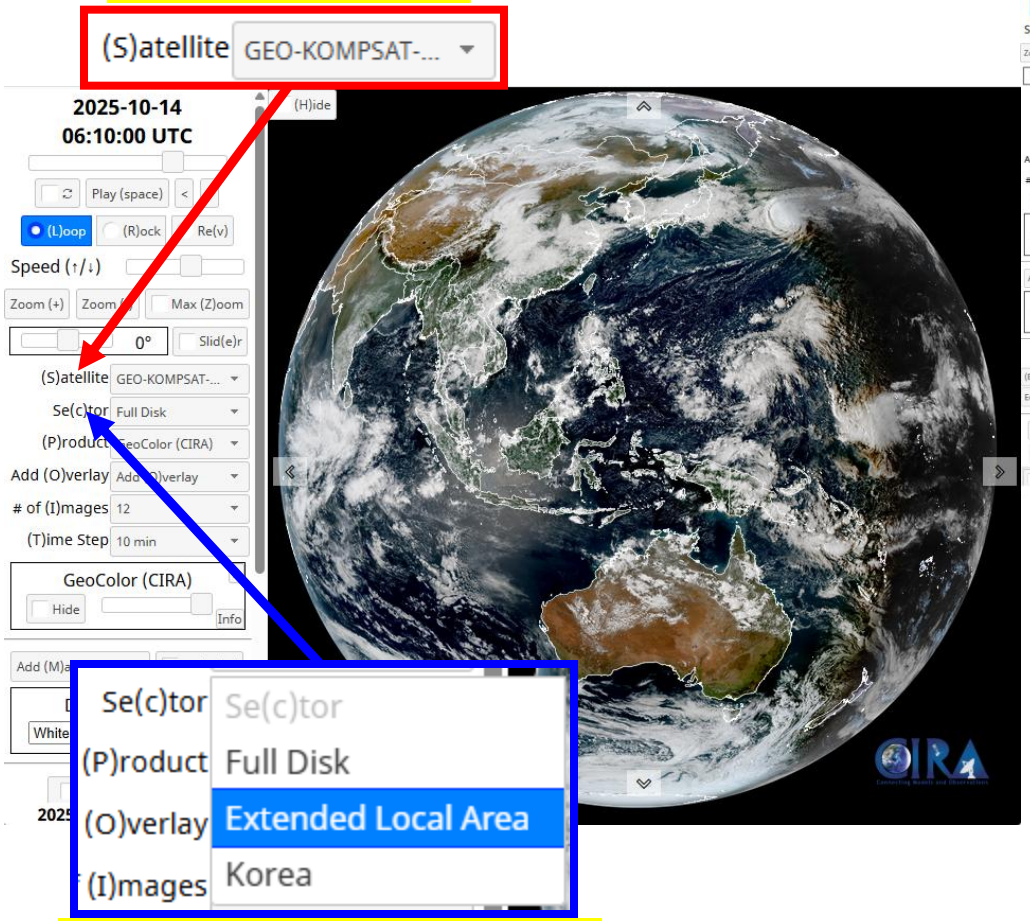
4: A wide variety of products available for the Mesoscale Rapid Scan data in SLIDER

images courtesy CIRA Colorado State University

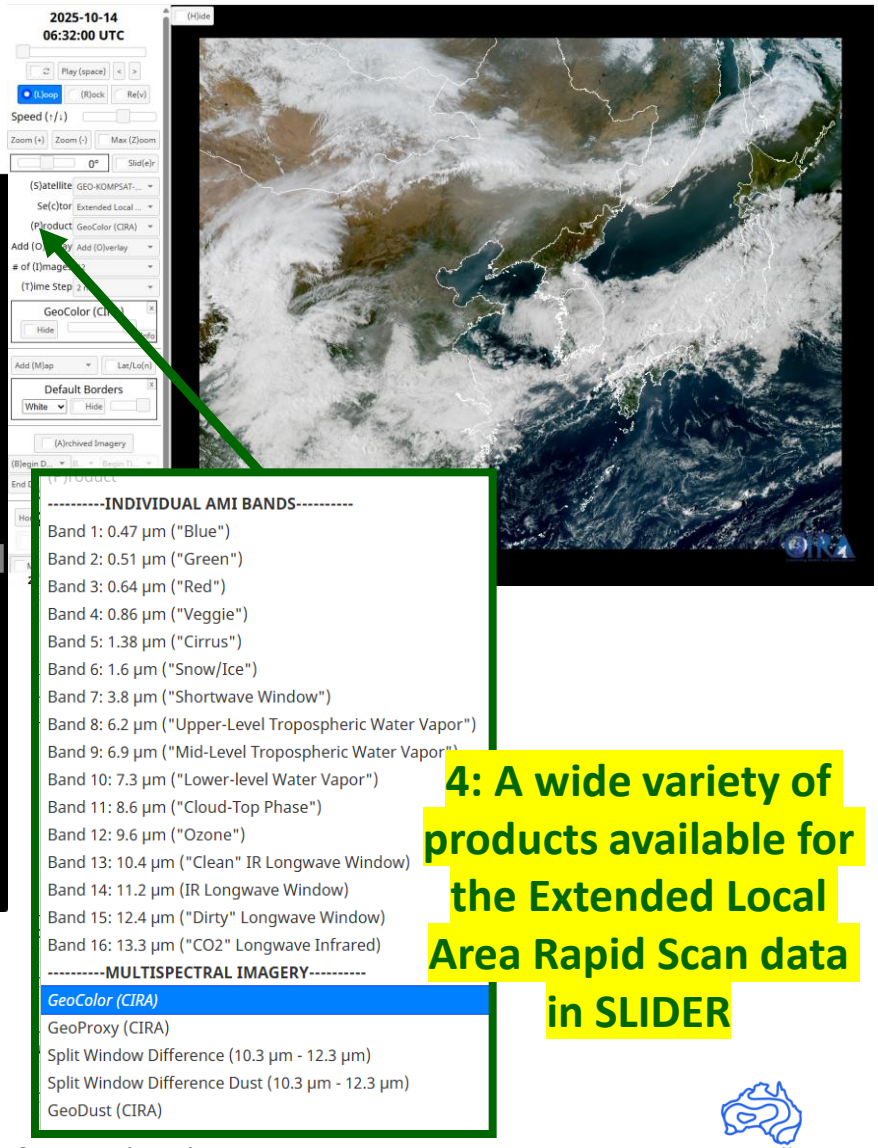
Exercise 10

1: Open the CIRA SLIDER viewer at https://rammb-slider.cira.colostate.edu/

2: For "Satellite" choose GEO-KOMPSAT-2A



3: For the "Sector", choose Extended Local Area



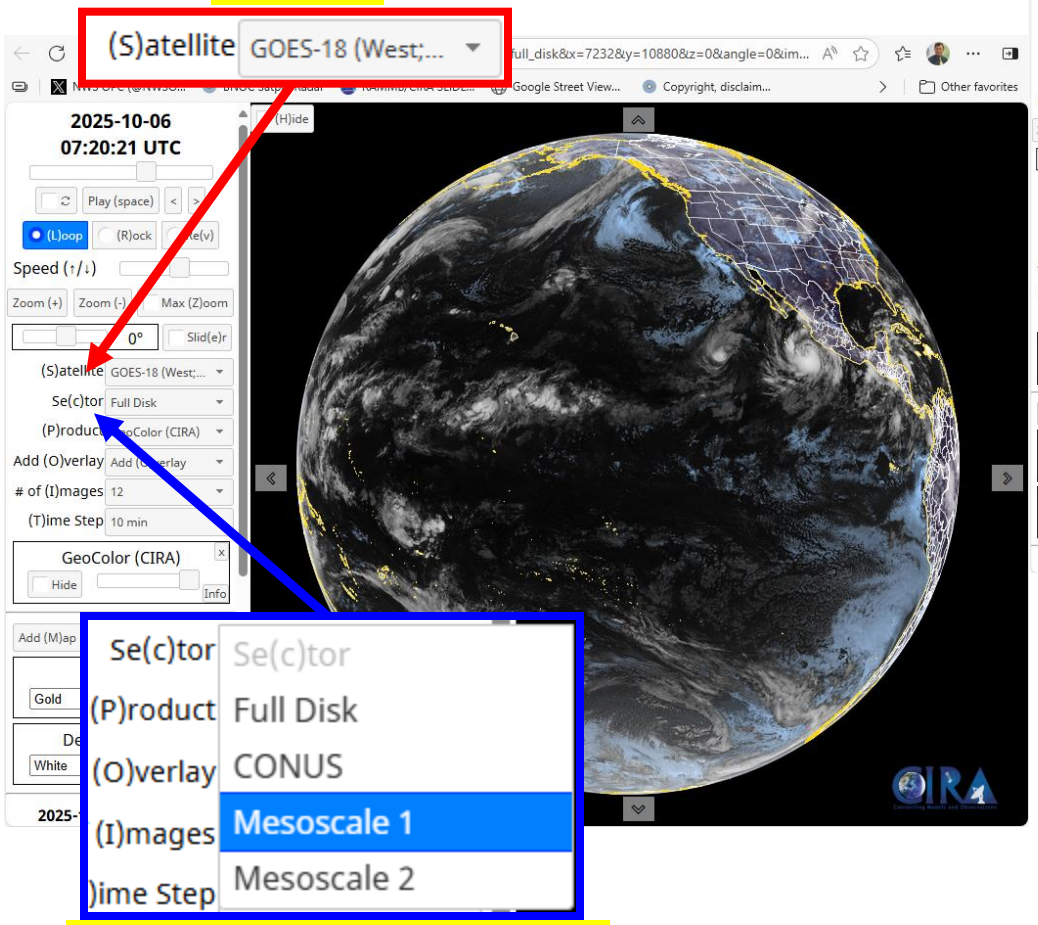
4: A wide variety of products available for the Extended Local Area Rapid Scan data in SLIDER

images courtesy CIRA Colorado State University

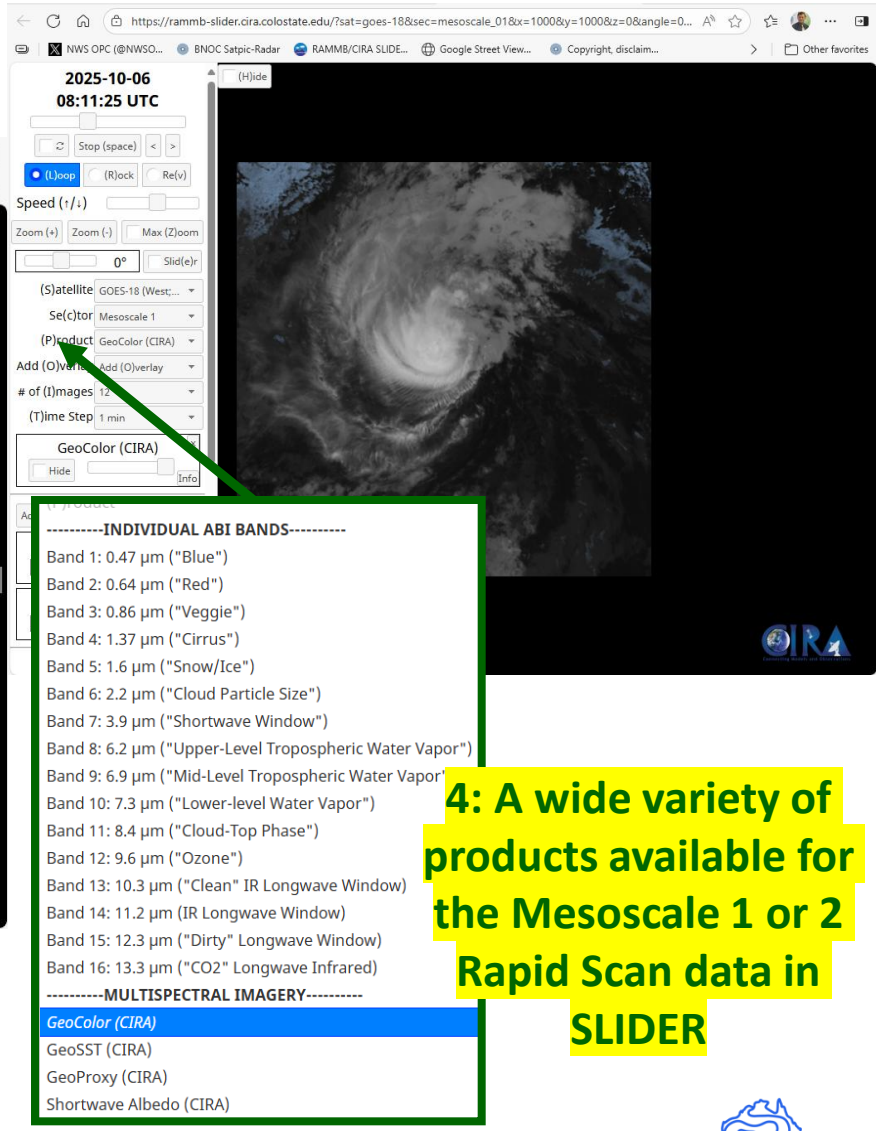
Exercise 11

1: Open the CIRA SLIDER viewer at https://rammb-slider.cira.colostate.edu/

2: For "Satellite" choose GOES-18



3: For the "Sector", choose Mesoscale 1 or Mesoscale 2

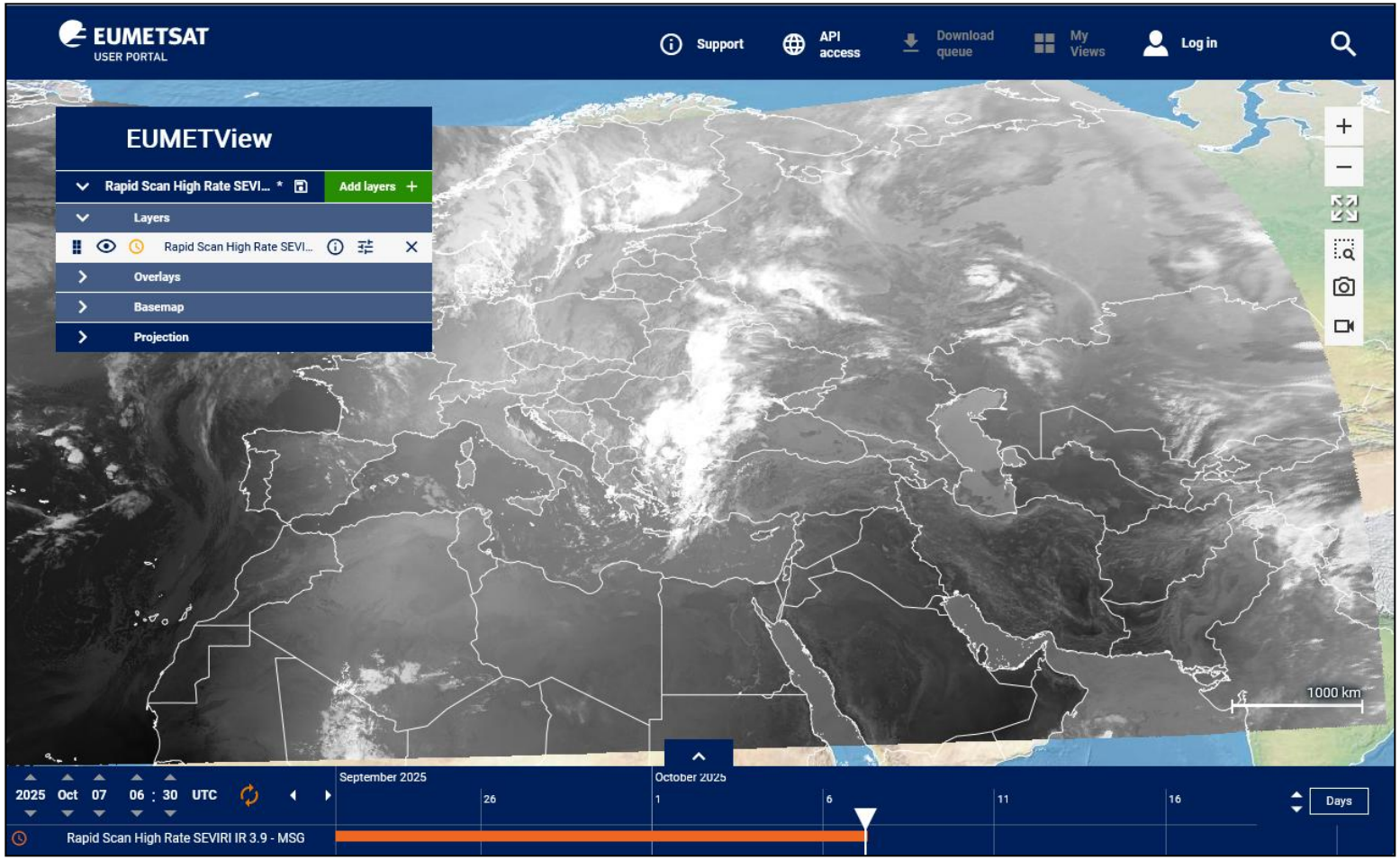


4: A wide variety of products available for the Mesoscale 1 or 2 Rapid Scan data in SLIDER

images courtesy CIRA Colorado State University

Exercise 12

1: Render the METEOSAT 5-minute data from the EUMETView viewer https://view.eumetsat.int/productviewer?v=msg_rss:ir039_nrt



Rapid Scan High Rate SEVIRI data

image courtesy EUMETSAT

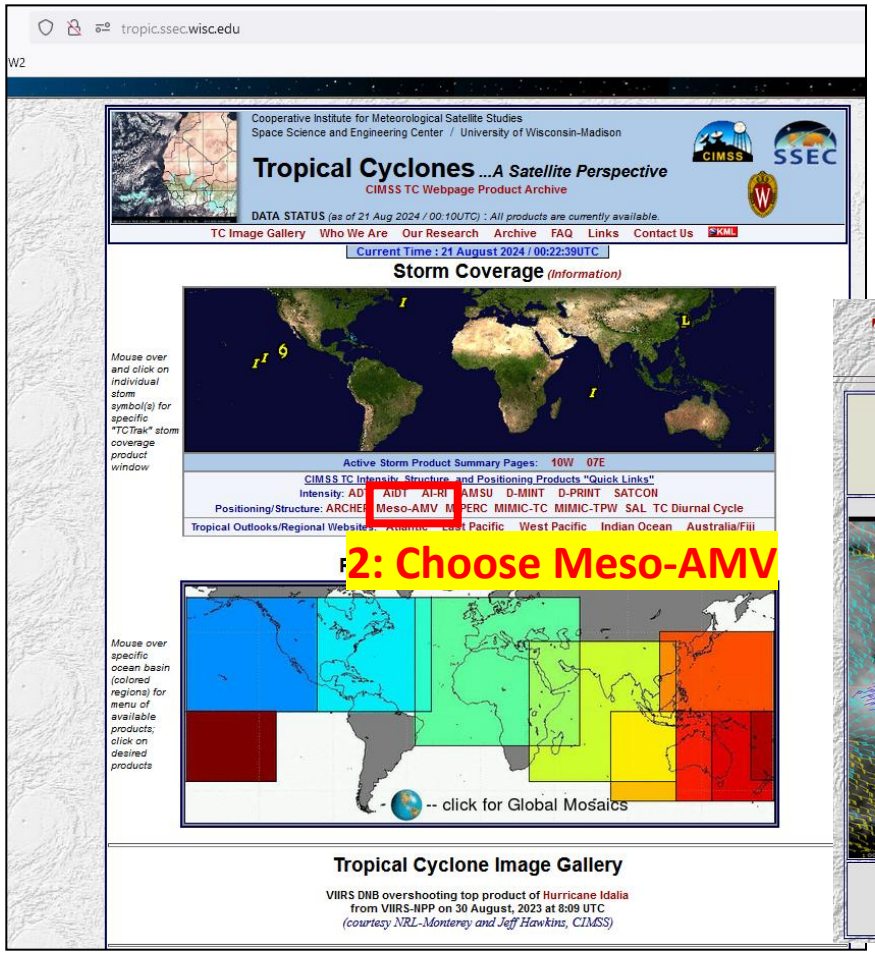
Contents

Case studies, and associated exercises in the context of WMO Early Warning For All (EW4ALL) Initiative Priority Hazards. (Gap analysis).

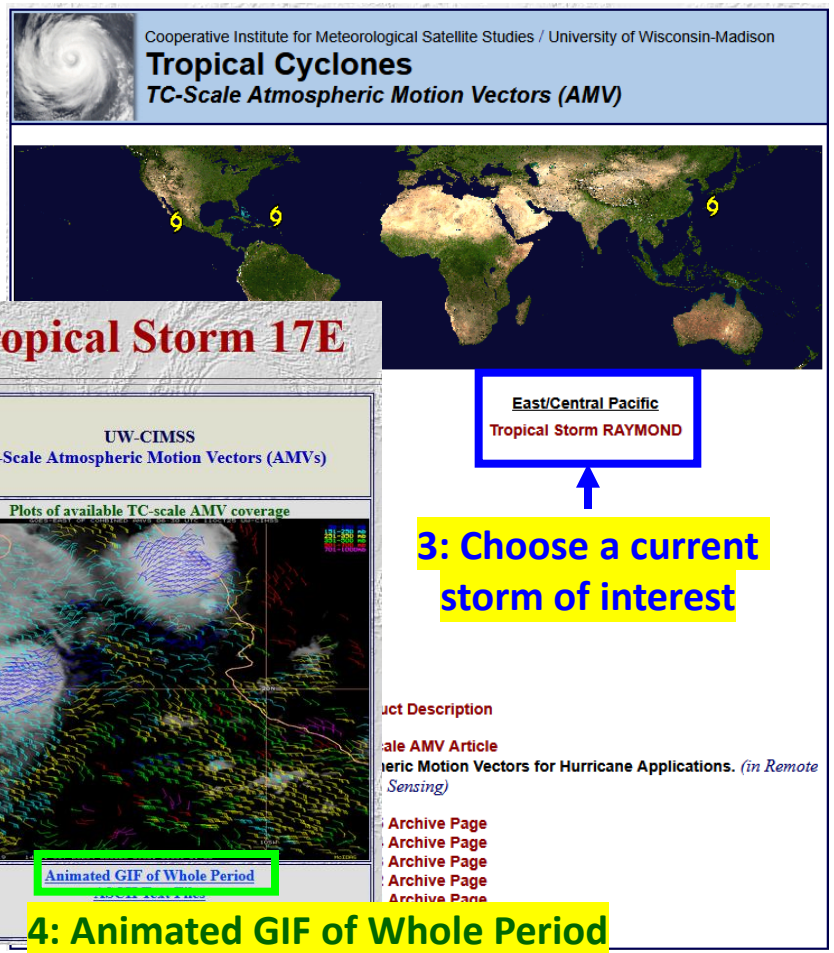
- **Main topics examined here:**
  - Thunderstorms
  - Heavy Rainfall and Flooding
  - Rapid Scan Imagery
  - **Tropical Cyclones**
- **Within each topic:**
  - Resources available on the Australian VLab CoE RFG archive.
  - One case study introduced, with associated satellite data.
  - Socrative questions.
  - **Follow up activities. Exploring web pages.**

Exercise 13

1: Open the CIMSS/SSEC Tropical Cyclone page at http://tropic.ssec.wisc.edu/



2: Choose Meso-AMV



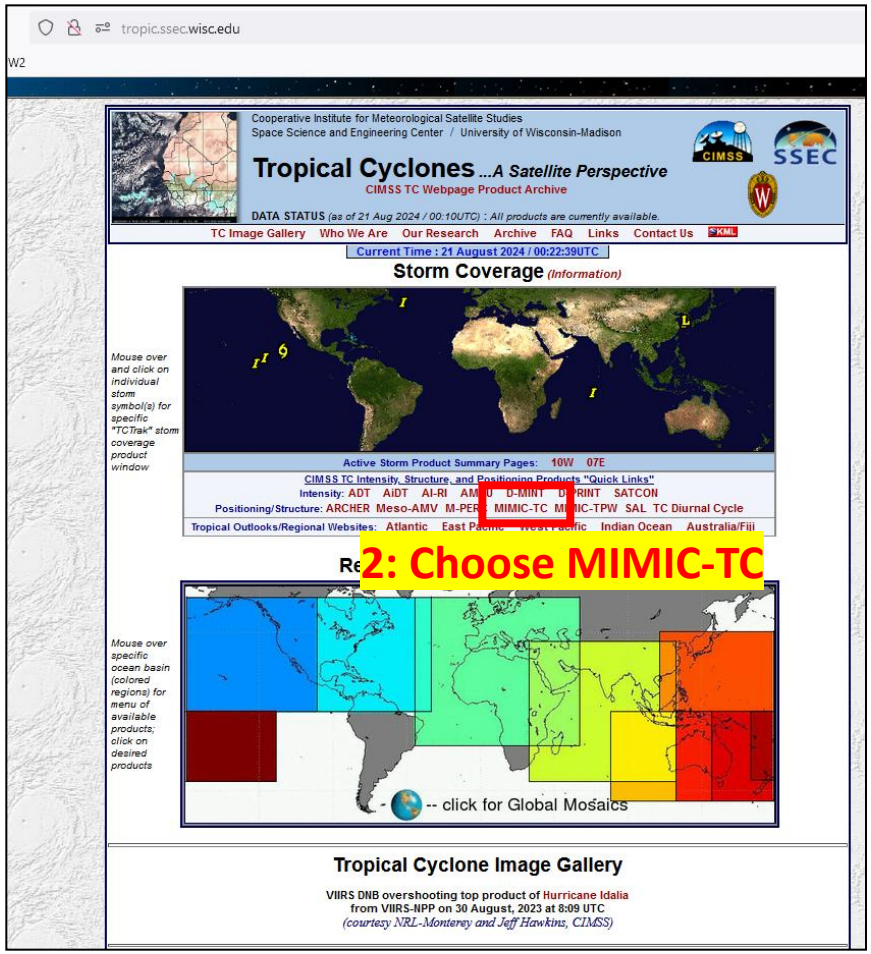
3: Choose a current storm of interest

4: Animated GIF of Whole Period

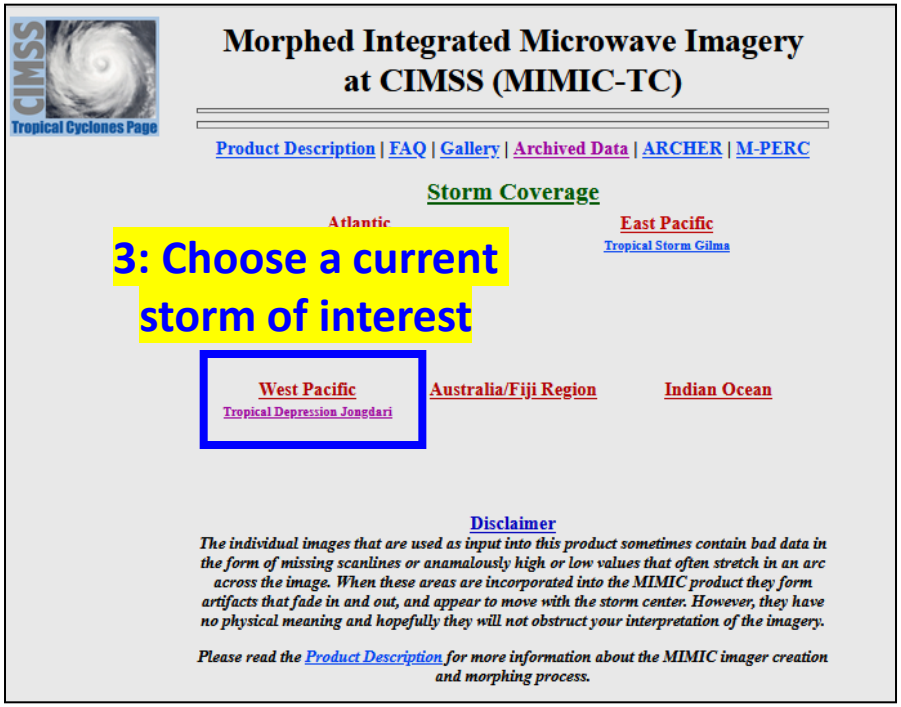
images courtesy CIMSS/SSEC

Exercise 14a

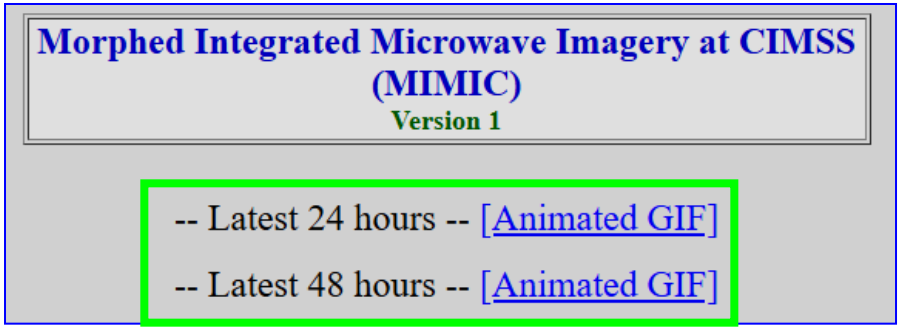
1: Open the CIMSS/SSEC Tropical Cyclone page at http://tropic.ssec.wisc.edu/



2: Choose MIMIC-TC



3: Choose a current storm of interest

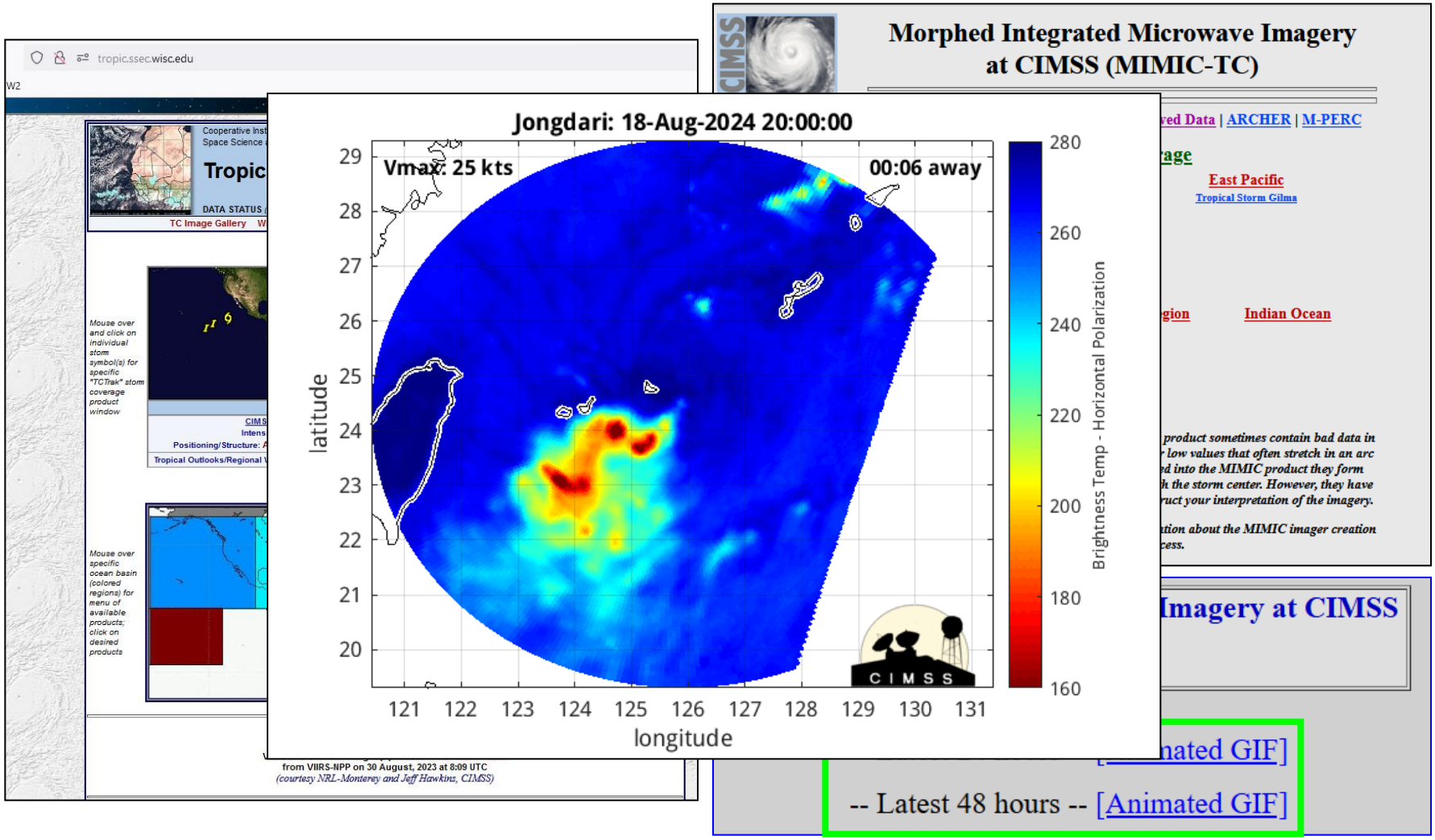


4: Animated loop of the last 24 or 48 hours

images courtesy CIMSS/SSEC

Exercise 14b

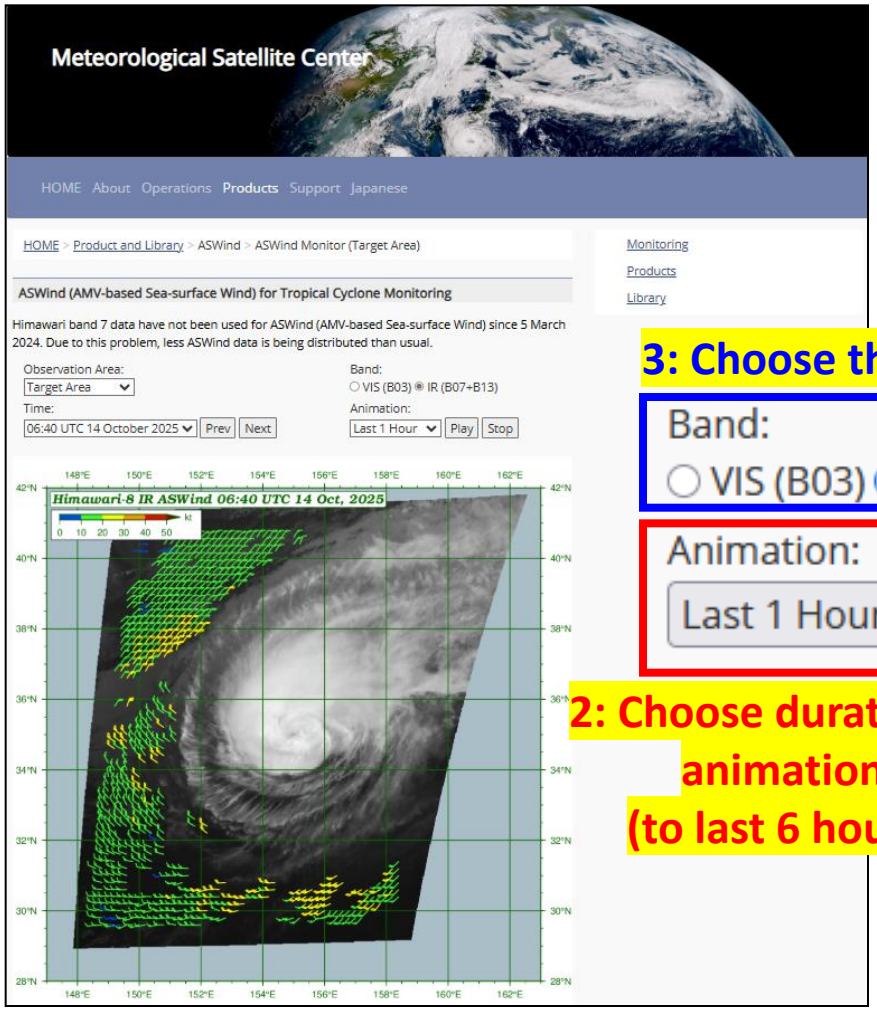
Exploring the MIMIC TC website on the CIMSS/SSEC Tropical Cyclone page at http://tropic.ssec.wisc.edu/



images courtesy CIMSS/SSEC

Exercise 15

1: Open the JMA Target Area high resolution Sea-Surface Winds page at https://www.data.jma.go.jp/mscweb/en/product/aswind.php

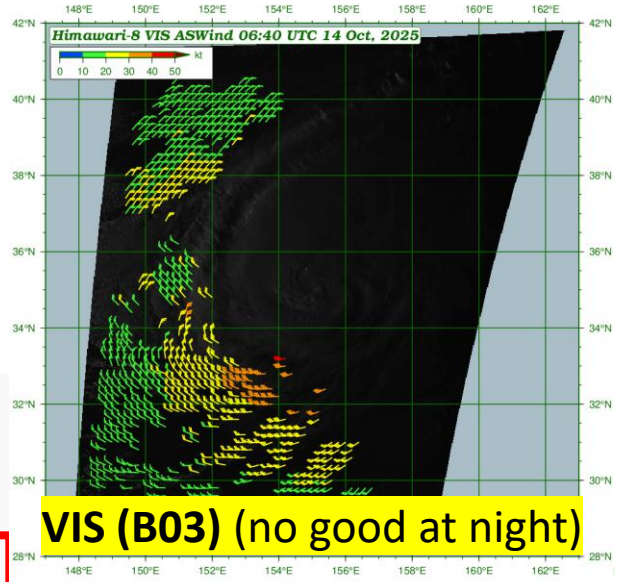


3: Choose the bands.

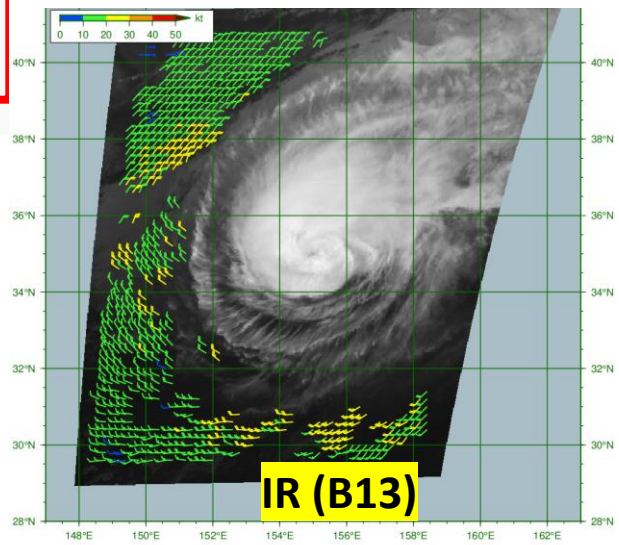
Band:
○ VIS (B03) ◉ IR (B07+B13)

Animation:
Last 1 Hour | Play | Stop

2: Choose duration of animation (to last 6 hours)



VIS (B03) (no good at night)



IR (B13)

images courtesy Japan Meteorological Agency

The Bureau of Meteorology

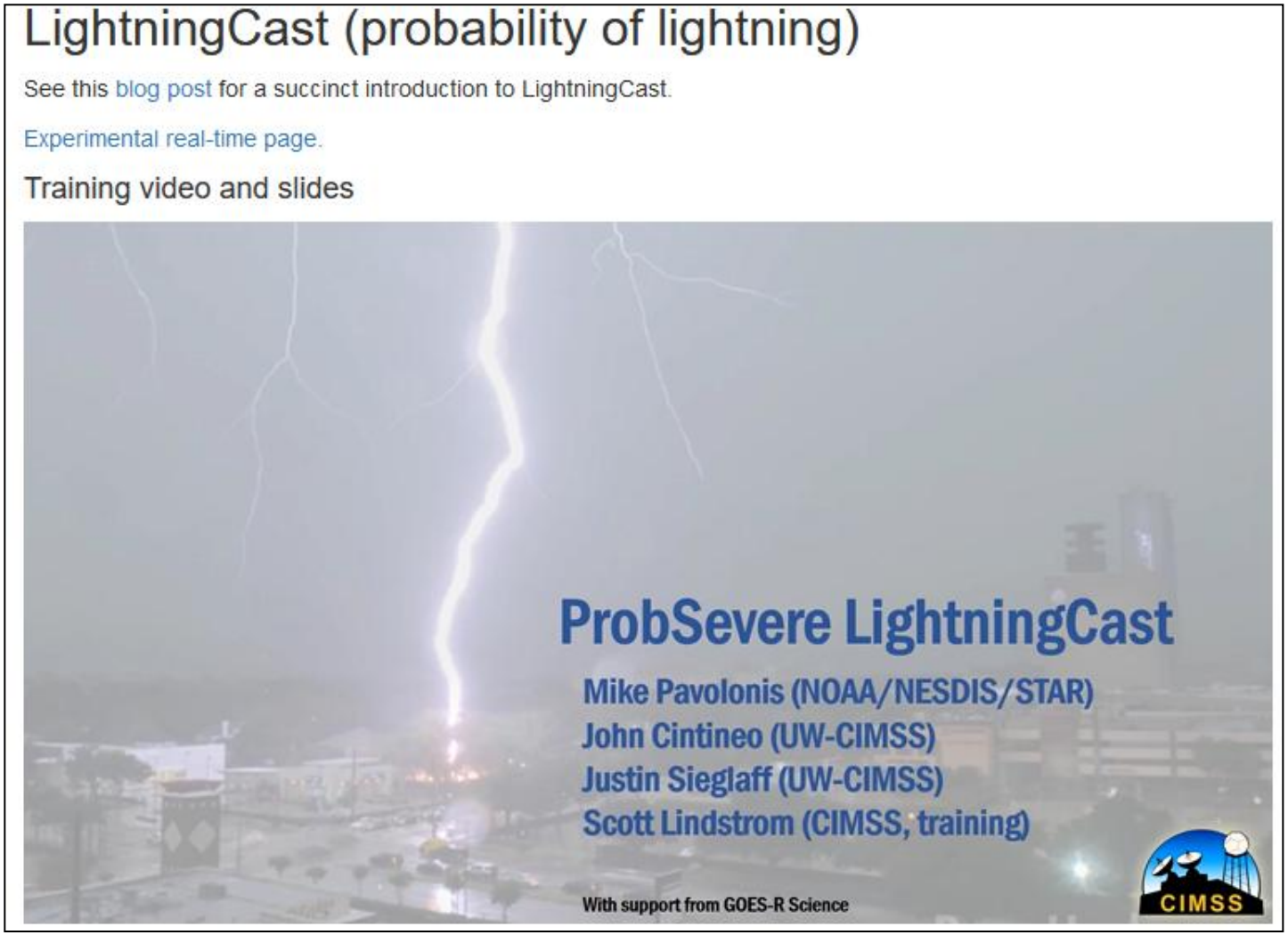
Thank you

Bodo Zeschke

Bodo.Zeschke@bom.gov.au

A short 10-minute video explaining ProbSevere LightningCast

at https://cimss.ssec.wisc.edu/severe_conv/training/training.html#pltg



Geostationary Lightning Mapper

https://rammb.cira.colostate.edu/training/visit/quick_guides/GLM_Quick_Guide_Detection_Methods_June_2018.pdf

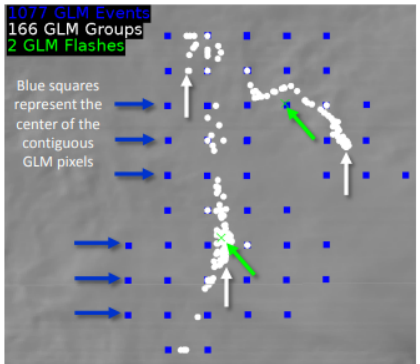
Geostationary Lightning Mapper: Definitions and Detection Methods Quick Guide

GLM Detection Methods

- The GLM creates background images every 2.5 minutes, then images 500 frames per second to detect changes in brightness relative to the background image
- Individual pixels that are illuminated above the background threshold during a 2 ms frame are termed GLM events, filters then determine the likelihood that these events are real lightning
- Lightning Cluster Filter Algorithm combines events into groups and groups into flashes

GLM Definitions

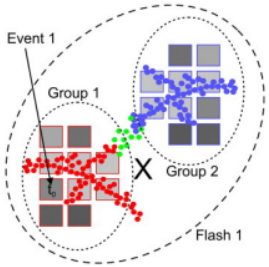
- Event: occurrence of a single pixel exceeding the detection threshold during one ~2 ms frame
- Group: 1+ simultaneous GLM events observed in adjacent (neighboring/diagonal) pixels
- Flash: 1 or more sequential groups separated by less than 330 ms and 16.5 km
- GLM flash rates are most closely tied to updraft and storm evolution, and GLM event locations best depict the spatial extent



- Green X's depict the location of two GLM flashes
- GLM groups appear as white dots (which typically do not occur at the center of GLM pixels)
- GLM events are depicted as blue squares on the GLM fixed grid – there were >1000 GLM events during these 2 GLM flashes, only 50 pixels were illuminated, so most pixels were illuminated for multiple 2 ms frames

Event, Group, and Flash Locations

- While GLM events are reported as the center points of GLM pixels, the group and flash locations represent radiance weighted centroids
- In this image the red, green, and blue dots represent a lightning mapping array depiction of a lightning flash; the red squares with grey shades indicate GLM events with lighter shades being brighter
- The GLM flash location considers the brightness of all events from both groups to locate the brightest part of the flash, or radiance weighted centroid, indicated by the black X in this image
- Note that the flash location may not always fall along the lightning channel, but will always fall within the flash footprint



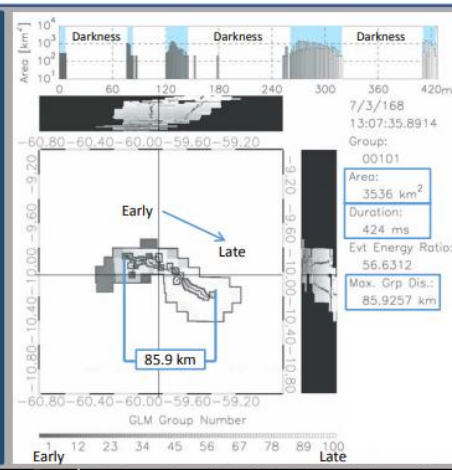
Author: Dr. Scott Rudlosky
NOAA/NESDIS/STAR (CICS-MD)

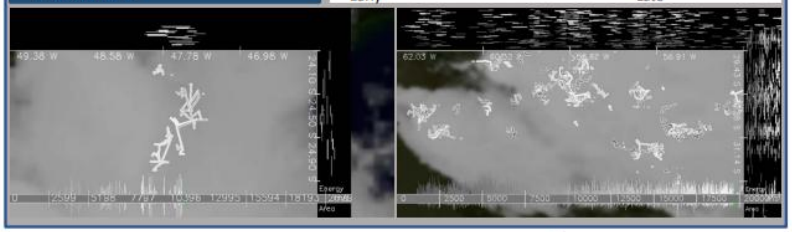
Version 2 – June 11, 2018

NESDIS SPORT CIMMS

Geostationary Lightning Mapper: Definitions and Detection Methods Quick Guide

- The GLM maps the extent of the cloud illuminated by individual lightning flashes
- Despite a relatively coarse spatial resolution, the GLM provides rapid temporal updates, allowing it to map flash structure
- Groups within individual flashes are connected to create flash skeletons
- This image depicts the evolution of one flash in space and time, the top panel illustrates an important feature of most lightning flashes, this 0.4 second flash produces discrete optical emissions separated by periods of darkness
- This is an example of how optical GLM lightning observations provide helpful insights into the flash structure, these insights can in turn be used to make inferences regarding lightning physics and storm structure





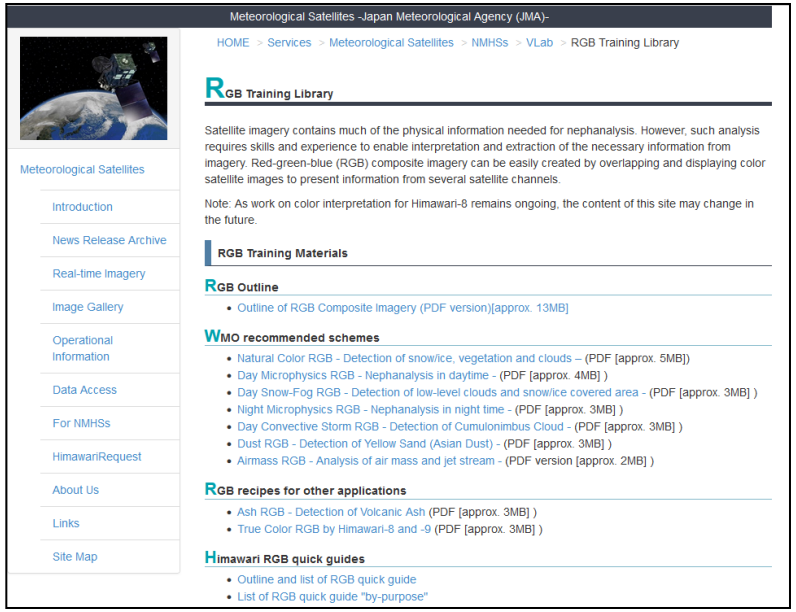
- These examples illustrate that the GLM is an imager rather than a detector
- Flash skeletons illustrate the variety of lightning composition and time evolution, which provides important insights into convective mode and storm structure
- Forecasters cannot be expected to observe lightning at this frequency during severe storm warning operations, so scientists are working to quantify this information into new products, this motivated the gridded GLM products

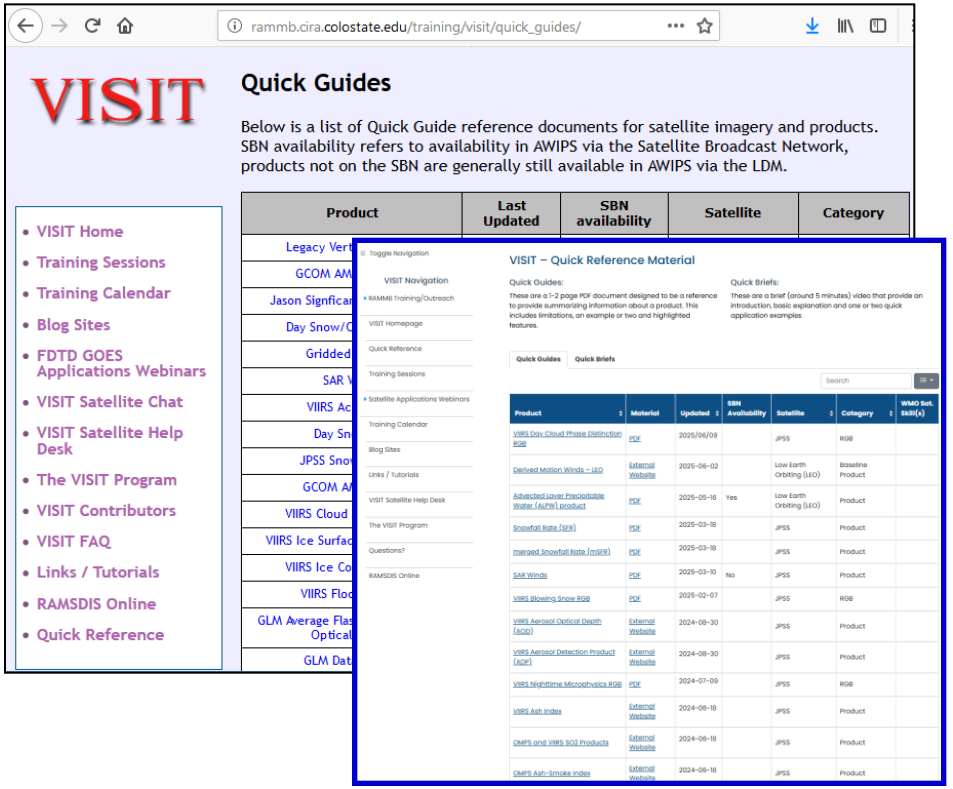
Additional Resources

Virtual Lab for the GLM
GLM Faculty Virtual Course
NESDIS/STAR - CICS-MD
NASA SPoRT Home Page

Hyperlinks not available when viewing material in AIR Tool

RGB Quick Guides





JMA User's Guide to RGB composite imagery

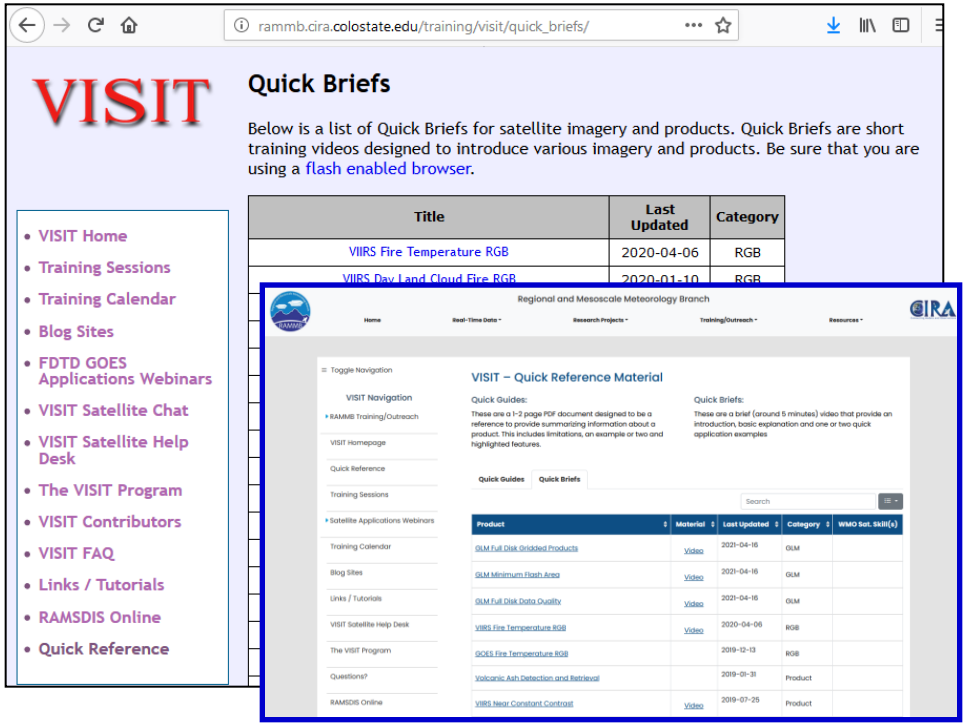
(Himawari RGB Training Library)

http://www.jma.go.jp/jma/jma-eng/satellite/RGB_TL.html

CIRA Quick Guides

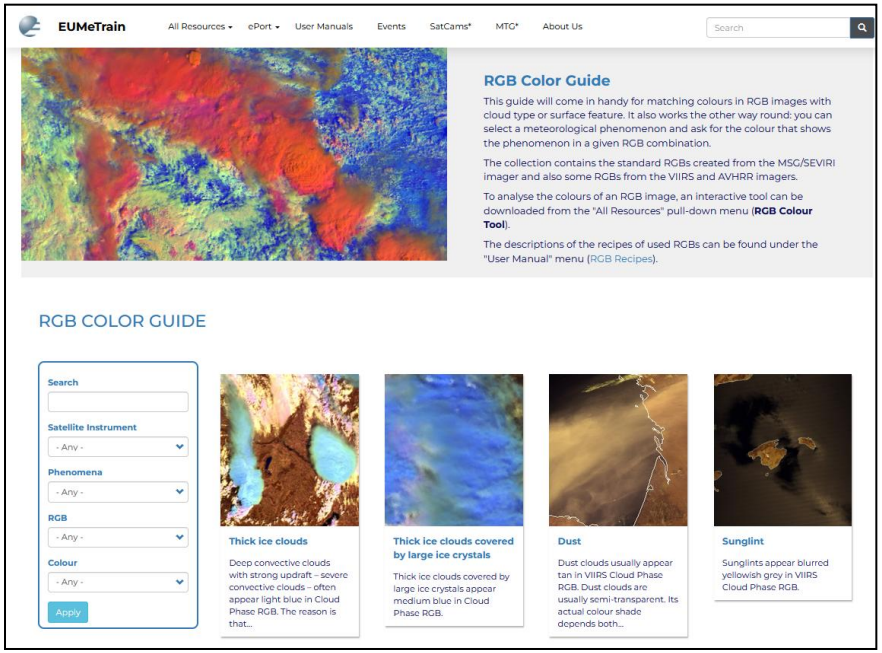
http://rammb.cira.colostate.edu/training/visit/quick_guides/

RGB Quick Briefs and Interpretation Guides



CIRA Quick Briefs

http://rammb.cira.colostate.edu/training/visit/quick_briefs/



EUMETRAIN RGB Colour Interpretation Guide

https://eumetrain.org/rgb-color-guide