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The Operational Use of GSMaP and Himawari 8 Data at BMKG Indonesia

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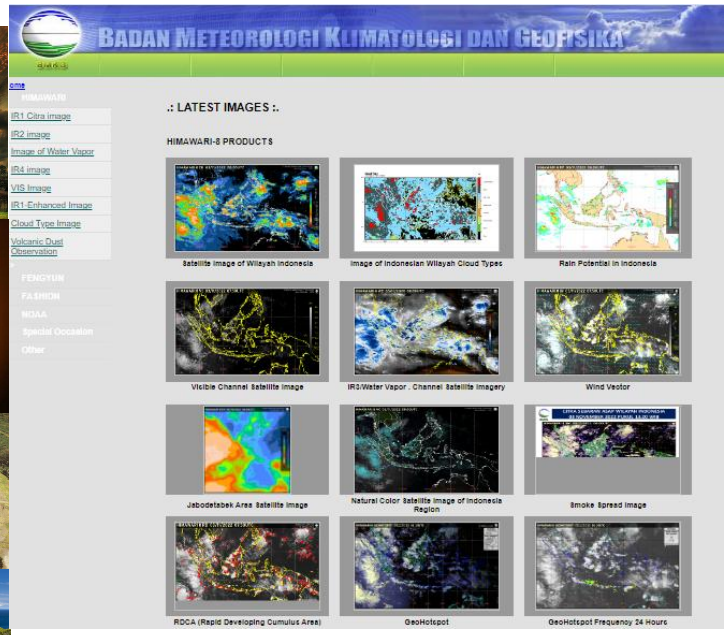
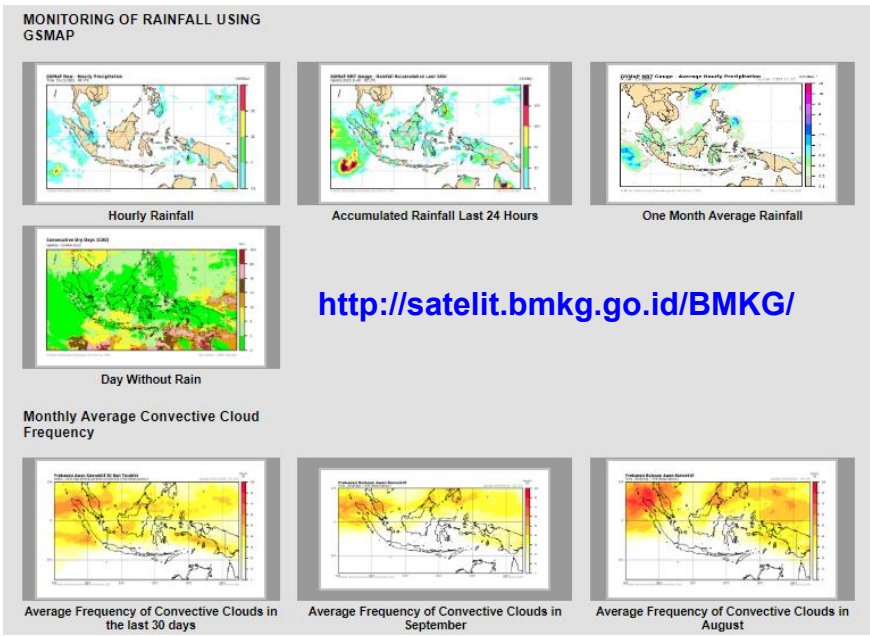
Tackling Extreme Precipitation Events Workshop
Online, March 1-3, 2023

OUTLINE

I. Recent Satellite Products in BMKG
II. The Purpose of Utilization of the satellite
III. Case Study of Satellite's Utilization for wet hydrometeorological disasters/phenomena
IV. Case Study of Satellite's Utilization for Dry hydrometeorological disasters/phenomena

RECENT SATELLITE PRODUCTS IN BMKG





- BMKG has some satellite products as weather forecaster's guidance for weather analysis and forecast
- 2 Main missions to tackle:
  - ✓ Wet hydrometeorological disasters/phenomena
  - ✓ Dry hydrometeorological disasters/phenomena

THE PURPOSE OF UTILIZATION OF THE SATELLITE

- For wet hydrometeorological disasters/phenomena:
  - ✓ Himawari 8/9 Infrared Enhanced images
  - ✓ Himawari 8/9 Visible Enhanced images
  - ✓ Himawari 8/9 Water Vapour Enhanced images
  - ✓ Himawari 8/9 Natural Colour Enhanced images
  - ✓ Himawari 8/9 HCAI cloud type images
  - ✓ Himawari 8/9 Rainfall Potential (Hydro-estimator) images
  - ✓ Himawari 8/9 Infrared overlayed with NWP 850 wind images
  - ✓ Himawari 8/9 RDCA (Rapid Developing Cumulus Area) images
  - ✓ GSMAP hourly, daily, and monthly Precipitation images

- For Dry hydrometeorological disasters/phenomena:
  - ✓ GSMAP daily, and monthly Precipitation image
  - ✓ GSMAP Consecutive Dry Days (CDD) image
  - ✓ Himawari 8/9 Geo-Hotspot images

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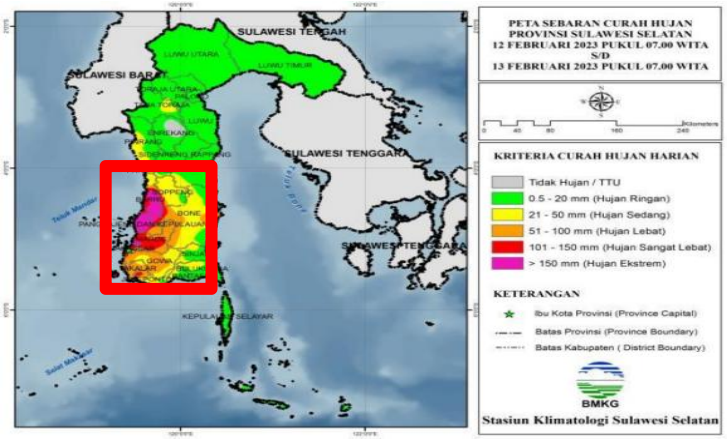
UTILIZATION SATELLITE PRODUCTS IN BMKG FOR WET HYDROMETEOROLOGICAL DISASTERS/PHENOMENA

UTILIZATION SATELLITE PRODUCTS IN BMKG FOR WET HYDROMETEOROLOGICAL DISASTERS/PHENOMENA

The flood and strong wind event in the South Sulawesi on February 13th, 2023

24 hrs Gauge Rainfall accumulation
13 feb 2023 at 00 UTC



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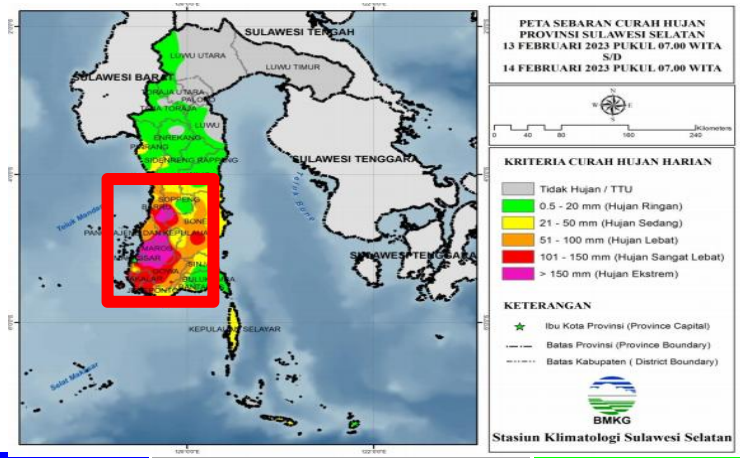

Observation Station	24 hrs Rainfall 13 Feb 2023 at 00 UTC	24 hrs Rainfall 14 Feb 2023 at 00 UTC
Maritime Met. Station of Paotere, Makassar	206.2	183
Met. Station of Hasanuddin, Makassar	166.8	163.2
Climate Station of Sulawesi Selatan, Maros	145.5	167
Balai Besar MKG 4, Makassar	123	223.5
Geophysics Station of Gowa	78.7	117

Observation Station	Prevailing wind	Maximum wind speed
Maritime Met. Station of Paotere, Makassar	West	30 Knots
Met. Station of Hasanuddin, Makassar	West	19 knots

THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- Some early warning information were issued before 12 February 2023
- Forecasters increase their awareness to prepare nowcasting information every day in warning period based on some data including remote sensing data, especially satellite data

Dikeluarkan pada tanggal 06 Februari 2023

Weekly early warning information for 07 – 13 February 2023. Issued on 6 February 2023

Dikeluarkan pada tanggal 10 Februari 2023

3 days early warning information for 11 – 13 February 2023. Issued on 10 February 2023

BADAN METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA
BALAI BESAR METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA WILAYAH IV
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PRESS RELEASE

PERINGATAN DINI CUACA SULAWESI SELATAN
12 FEBRUARI 2023 – 16 FEBRUARI 2023
Nomor: B/ME.02.04/026/KBB4/II/2023

Monitoring dinamika atmosfer terkini menunjukkan adanya potensi peningkatan curah hujan di wilayah Sulawesi Selatan. Terpantau adanya Tekanan Rendah (*Low Pressure Area*) di wilayah Australia bagian utara yang menginduksi peningkatan kecepatan angin dan membentuk daerah konvergensi. *Madden Julian Oscillation* (**MJO**) berada pada kuadran 4 (*Maritime Continent*) yang berkontribusi terhadap proses pembentukan awan hujan. Model cuaca menunjukkan **kelembapan udara** lapisan atas hingga ketinggian 700 mb dalam **kondisi basah** (70 - 90 %).

Prakiraan tanggal 12 – 16 Februari 2023, hujan dengan **Intensitas Lebat - Sangat Lebat** berpotensi terjadi di wilayah Sulawesi Selatan bagian barat meliputi **Kab/Kota. Pinrang, Pare-Pare, Barru, Pangkajene dan Kepulauan, Maros, Makassar, Takalar.** Wilayah Sulawesi Selatan bagian tengah meliputi **Kab. Sidrap, Soppeng, Gowa.** Wilayah Sulawesi Selatan bagian selatan meliputi **Kab. Jeneponto, Bantaeng, Bulukumba, Kepulauan Selayar.** Wilayah Sulawesi Selatan bagian timur meliputi **Kab. Bone, Sinjai.** Serta **Potensi Angin Kencang** di Sulawesi Selatan bagian barat dan selatan.

Selain itu masyarakat dihimbau agar mewaspadai gelombang tinggi di perairan sekitar Sulawesi Selatan. **Gelombang dengan kategori Sedang** (Gel. 1,25 – 2,5 m) terjadi di Perairan Pare-pare, Perairan Spermonde Pangkep, Perairan barat Kep. Selayar, Perairan Sabalana, Teluk Bone bagian utara, Teluk Bone bagian selatan, Perairan timur Kep. Selayar, Laut Flores bagian utara, Laut Flores bagian barat, Perairan P. Bonerate – Kalaotoa bagian utara, dan Perairan P. Bonerate – Kalaotoa bagian selatan. **Gelombang dengan kategori Tinggi** (Gel. 2,5 – 4,0 m) di Selat Makassar bagian selatan, Perairan Spermonde Pangkep bagian barat, Perairan Spermonde Makassar bagian barat, dan Laut Flores bagian timur.

Peringatan Dinir Kota/Kab. Pinrang, Pare-Pare, Sidrap, Soppeng, Barru, Pangkajene dan Kepulauan, Maros, Makassar, Gowa, Takalar, Bone, Sinjai, Bulukumba, Bantaeng, Jeneponto, dan Kepulauan Selayar.

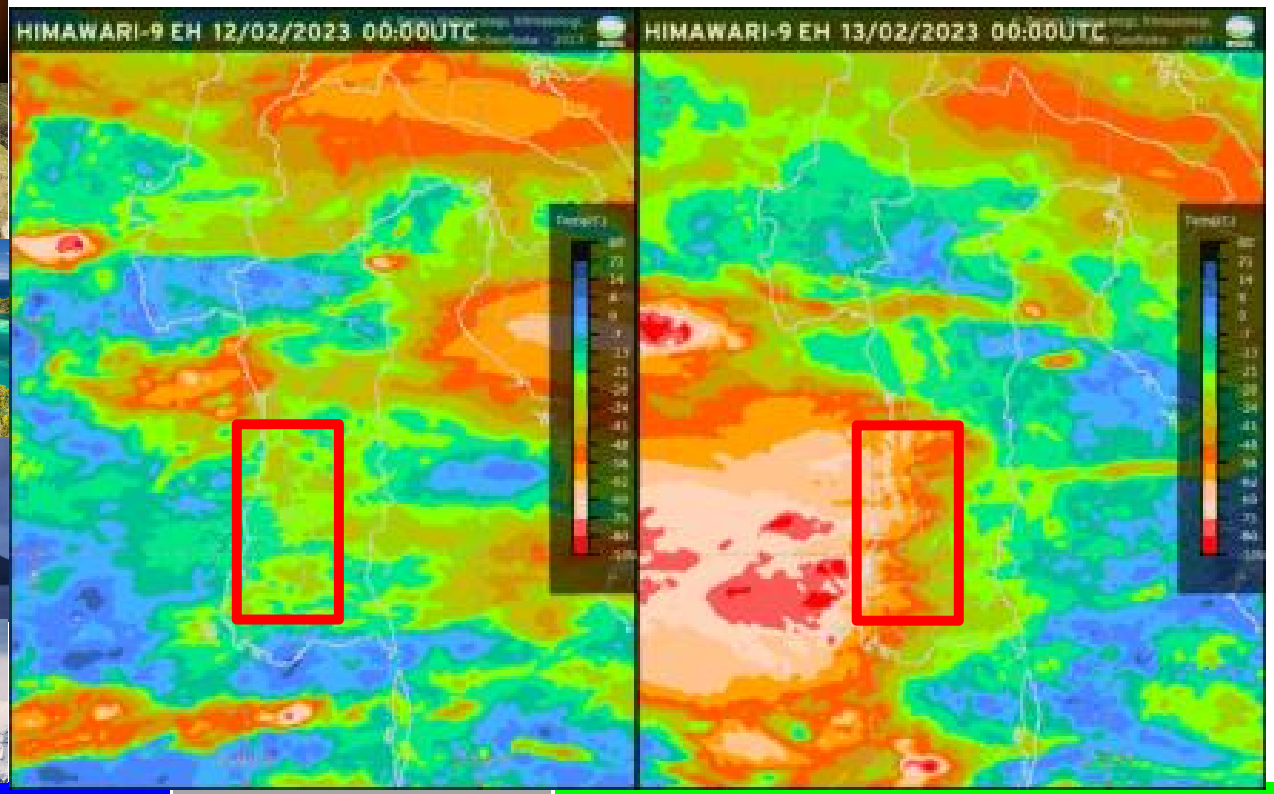
Menyikapi kondisi di atas diharapkan para pemangku kepentingan dan seluruh masyarakat dapat meningkatkan kesiapsiagaan terhadap potensi terjadinya bencana hidrometeorologi. Dampak tersebut antara lain genangan/banjir, tanah longsor, angin kencang, pohon tumbang, dan keterlambatan jadwal penerbangan/pelayaran. Masyarakat diharapkan selalu mengikuti informasi dari BMKG serta instansi terkait untuk memastikan mitigasi bencana hidrometeorologi dapat dilakukan dengan baik.

BMKG Sulawesi Selatan memberikan layanan informasi cuaca 24 jam, masyarakat dapat menghubungi melalui:
- call center 0411-455019/449286 ; 0811 4614 350 (MEWS) ; 0821 8815 8985 (WA Otomatis)
- http://www.bmkg.go.id ; http://www.bbmkg4.com ; http://web.meteo.bmkg.go.id/
- Media sosial twitter, FB, IG @BMKG Sulsel, playstore: Info BMKG

Extreme weather warning information for 12 – 16 February 2023. Issued on 10 February 2023

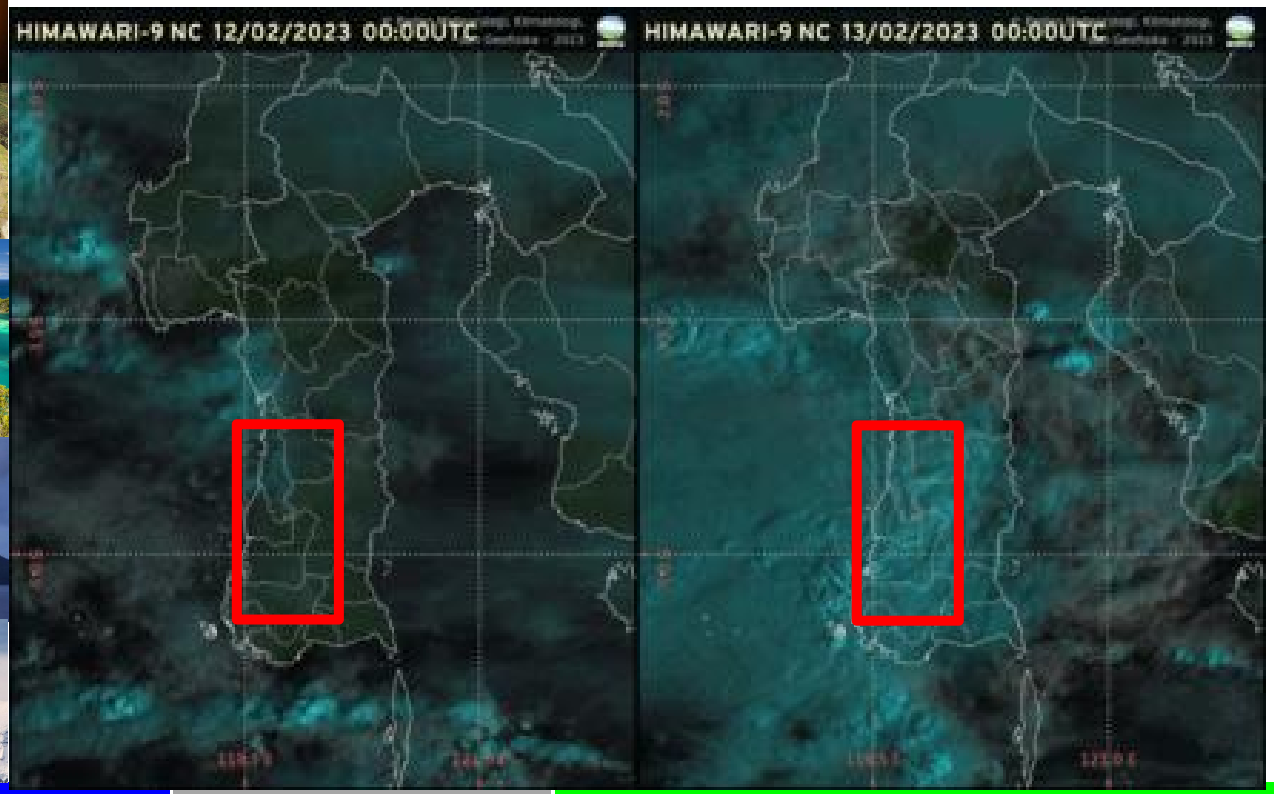
THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- Forecasters use Infrared enhanced image as the first step to find the location of the significant convective cloud related to extreme weather event
- Colder IR cluster over red rectangle indicates potential significant convective cloud



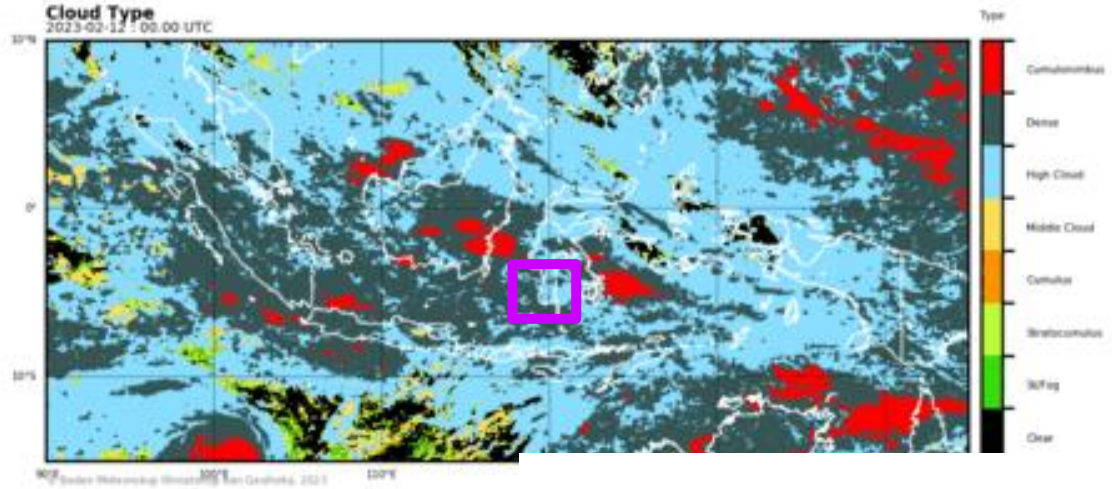
THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

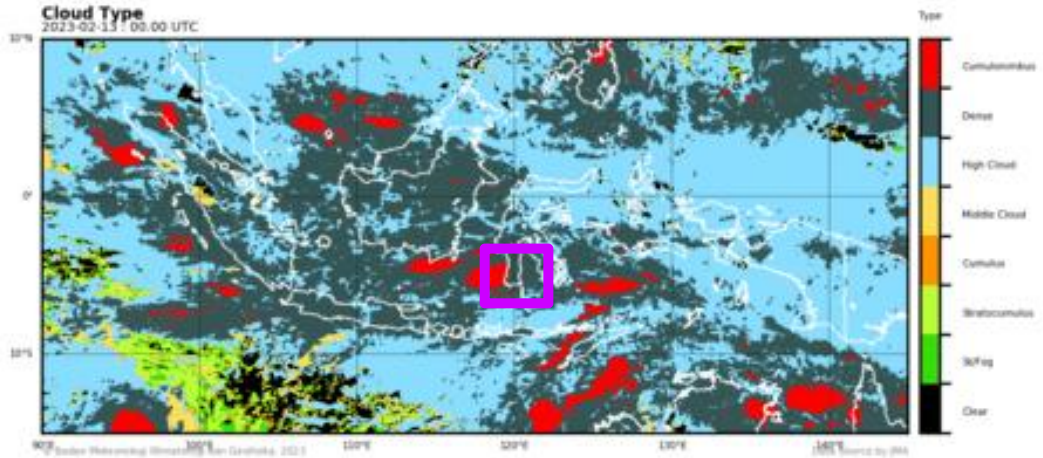
- forecasters use natural color product to monitor clouds that have a rough texture as an indication of significant areas in convective clouds during the daytime period



THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

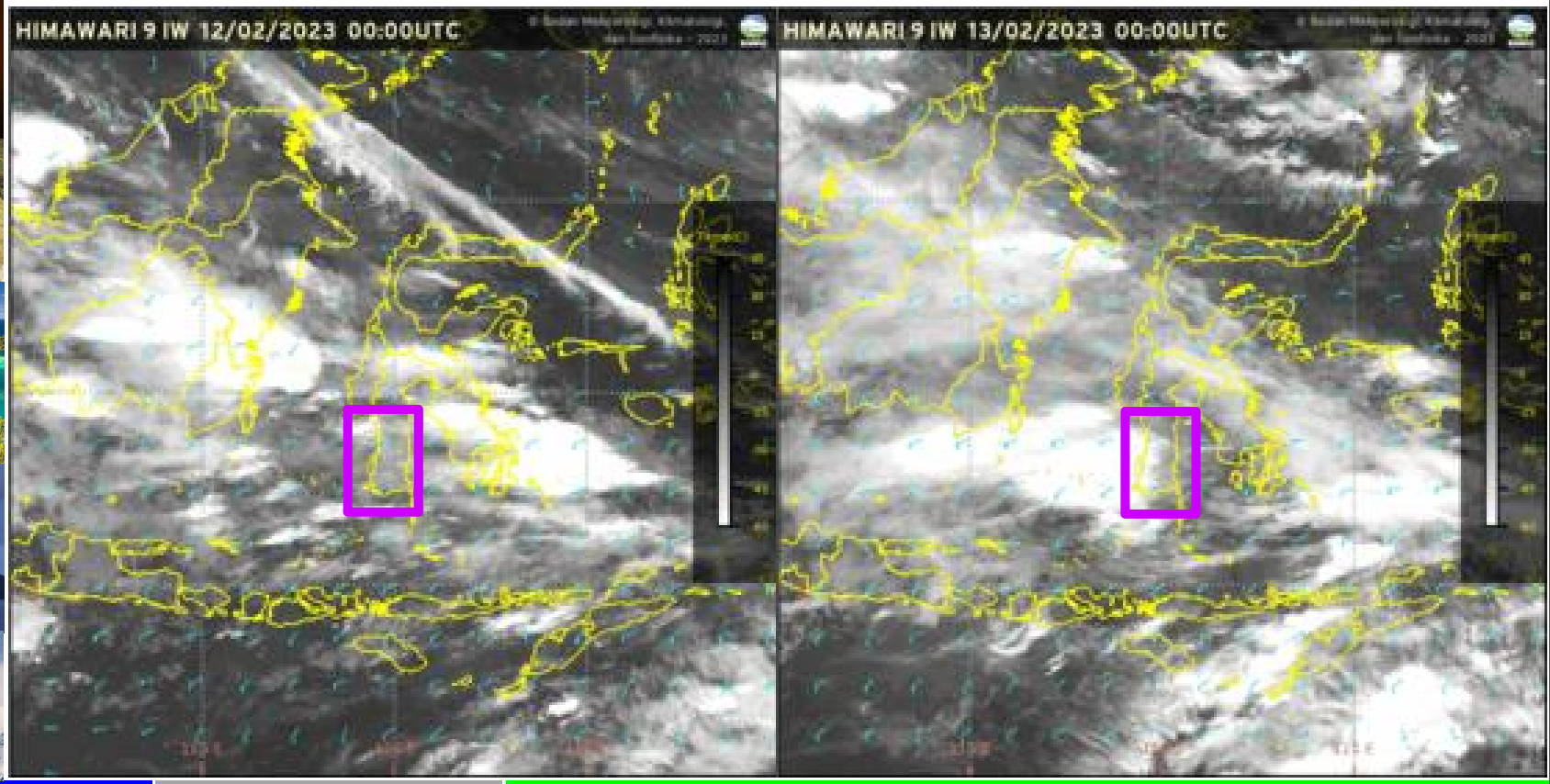
- forecasters use HCAI product to monitor cloud type in responsibility area, especially for cumulonimbous cloud





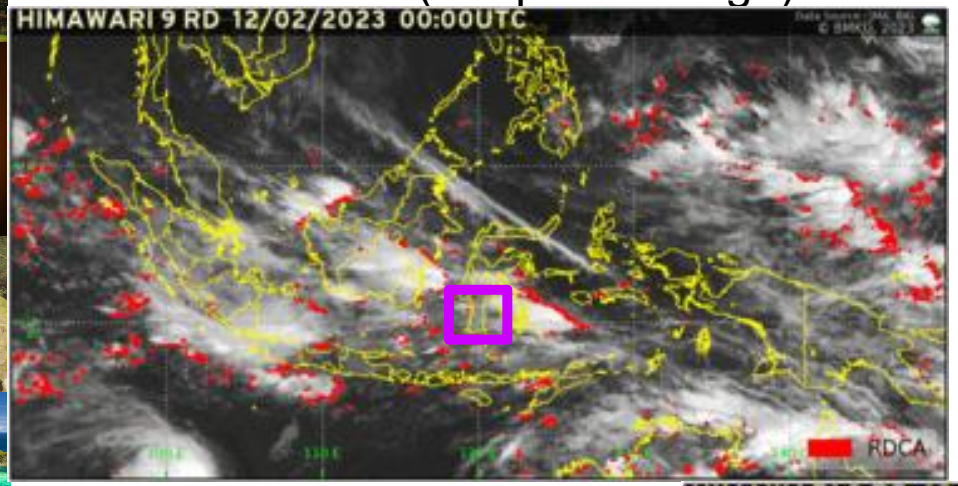
THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

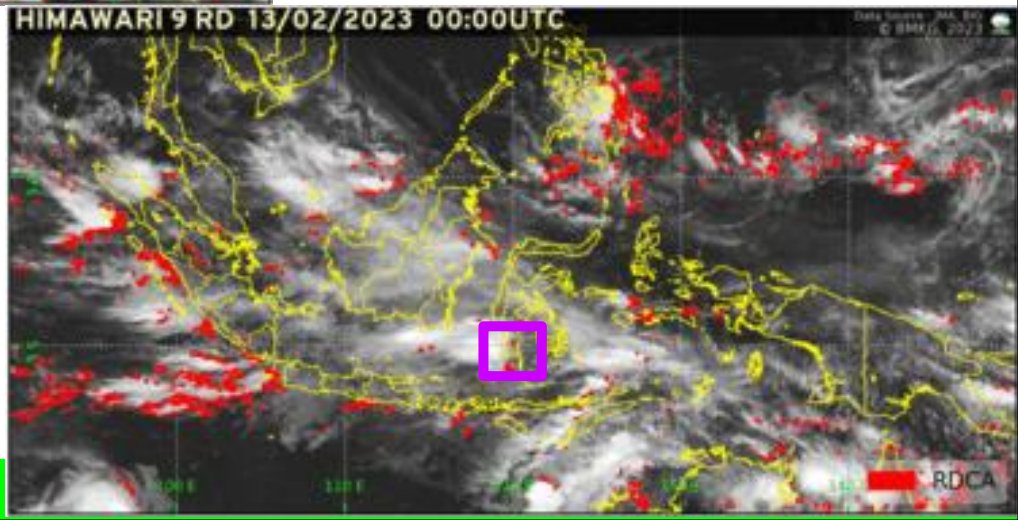
- forecasters use Infrared overlayed with NWP 850 wind product to analyze the wind pattern which affect the movement / propagation of convective cloud in responsibility area



THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- forecasters use RDCA (Rapid Developing Cumulus Area) product to determine Cumulus clouds that have the potential to become Cumulonimbus (red positive sign) in the next 1 hour





THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- Nowcasting warning issued after analyzing lots of data including satellite data

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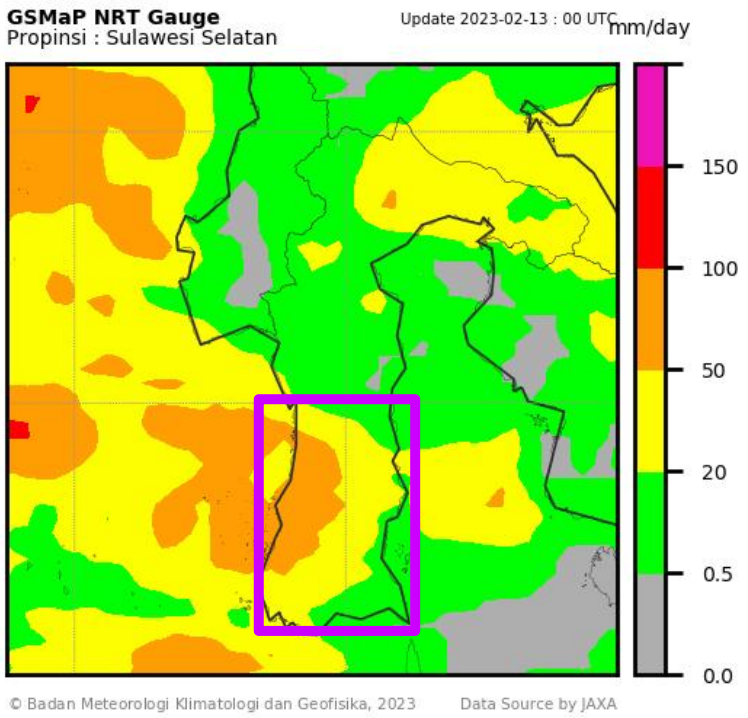
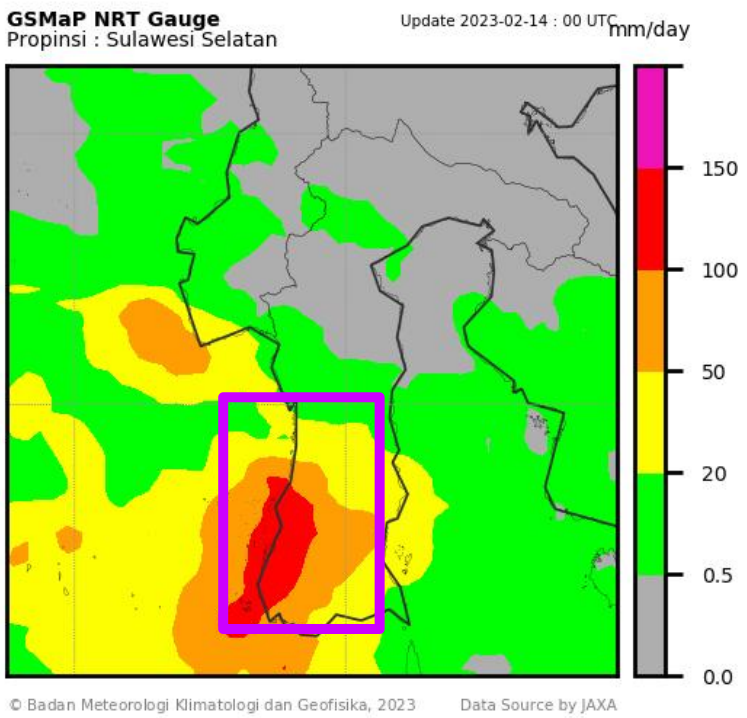
THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- forecasters use GSMAP daily precipitation accumulation product to evaluate the rainfall accumulation resulting from convective clouds during extreme weather





THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

- Satellite product from JAXA which may be potential used in operational rainfall analysis related to climate perspective for extreme weather events (extreme rain events) is **GSMAP Climate products**
- https://sharaku.eorc.jaxa.jp/GSMaP_CLM/index.htm

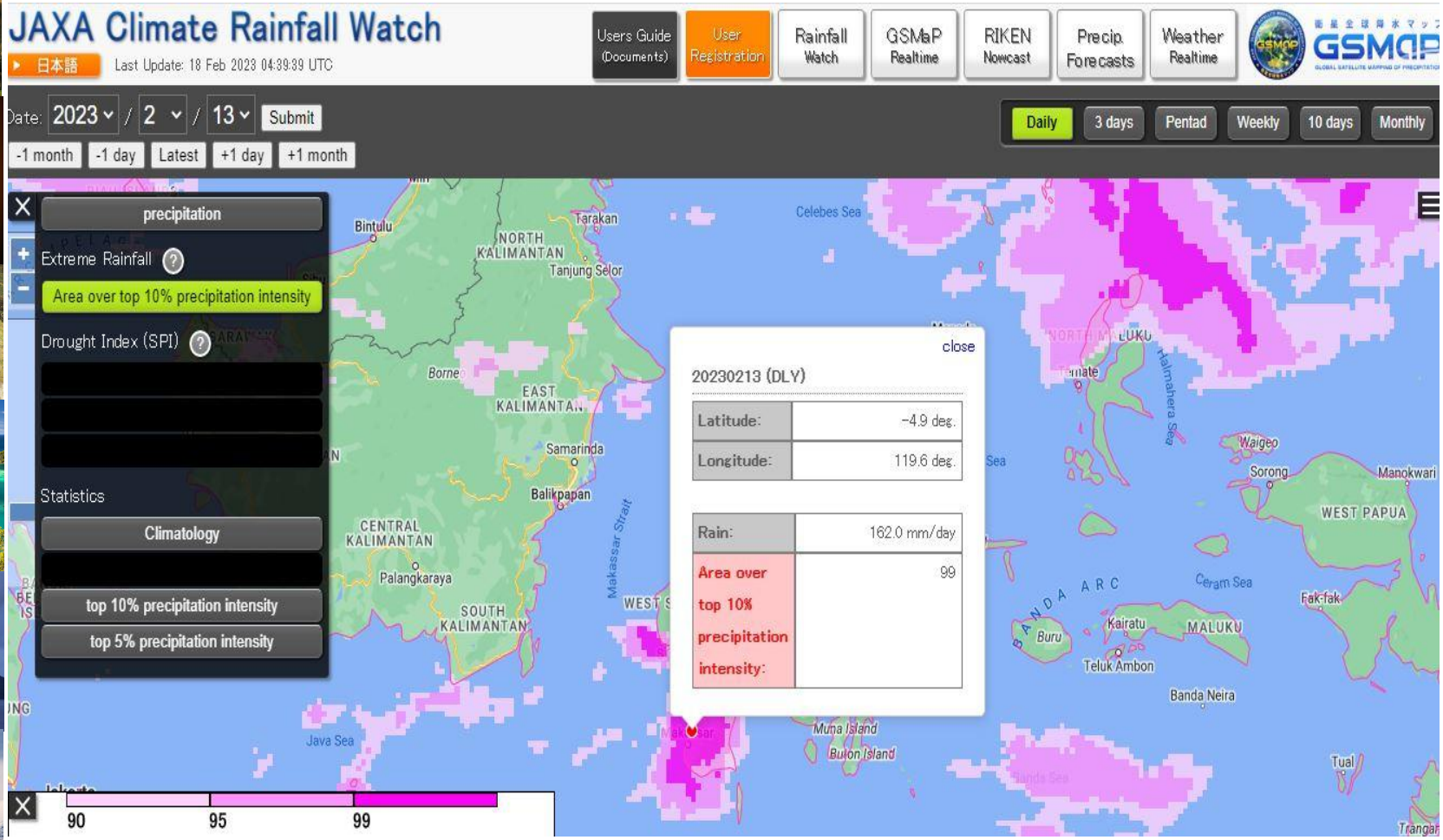
Extreme Rainfall

- Heavy Rainfall Criterion
  The heavy rainfall criterion is the top 10% precipitation intensity (90th percentile) over the 22 years (April 2000 to March 2022).

- Extreme Rainfall
  An area where "mean rainfall amount exceeds the criterion" and "the heavy rainfall criterion is 1 mm/day or more" is colored as an area of extreme rainfall. The value is the corresponding from 90th to 99th percentile values.

THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

Location: Maros



THE FLOOD AND STRONG WIND EVENT IN THE SOUTH SULAWESI ON FEBRUARY 13TH, 2023.

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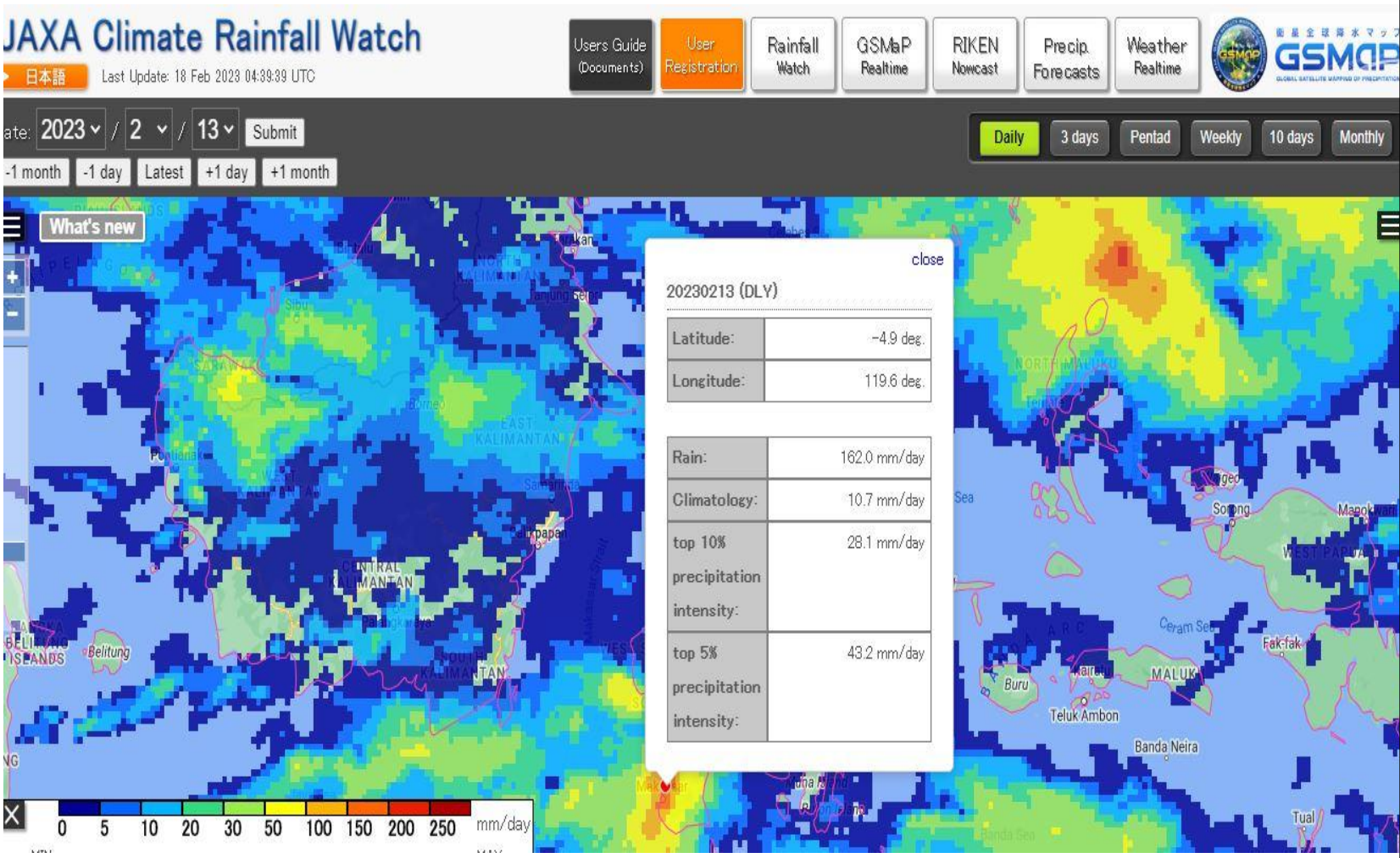

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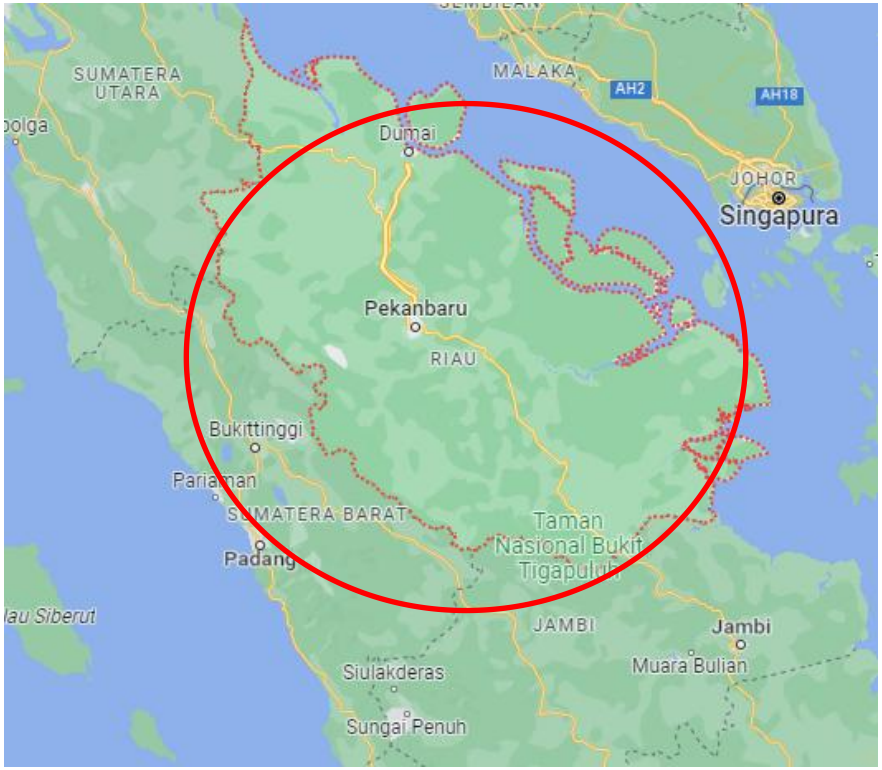
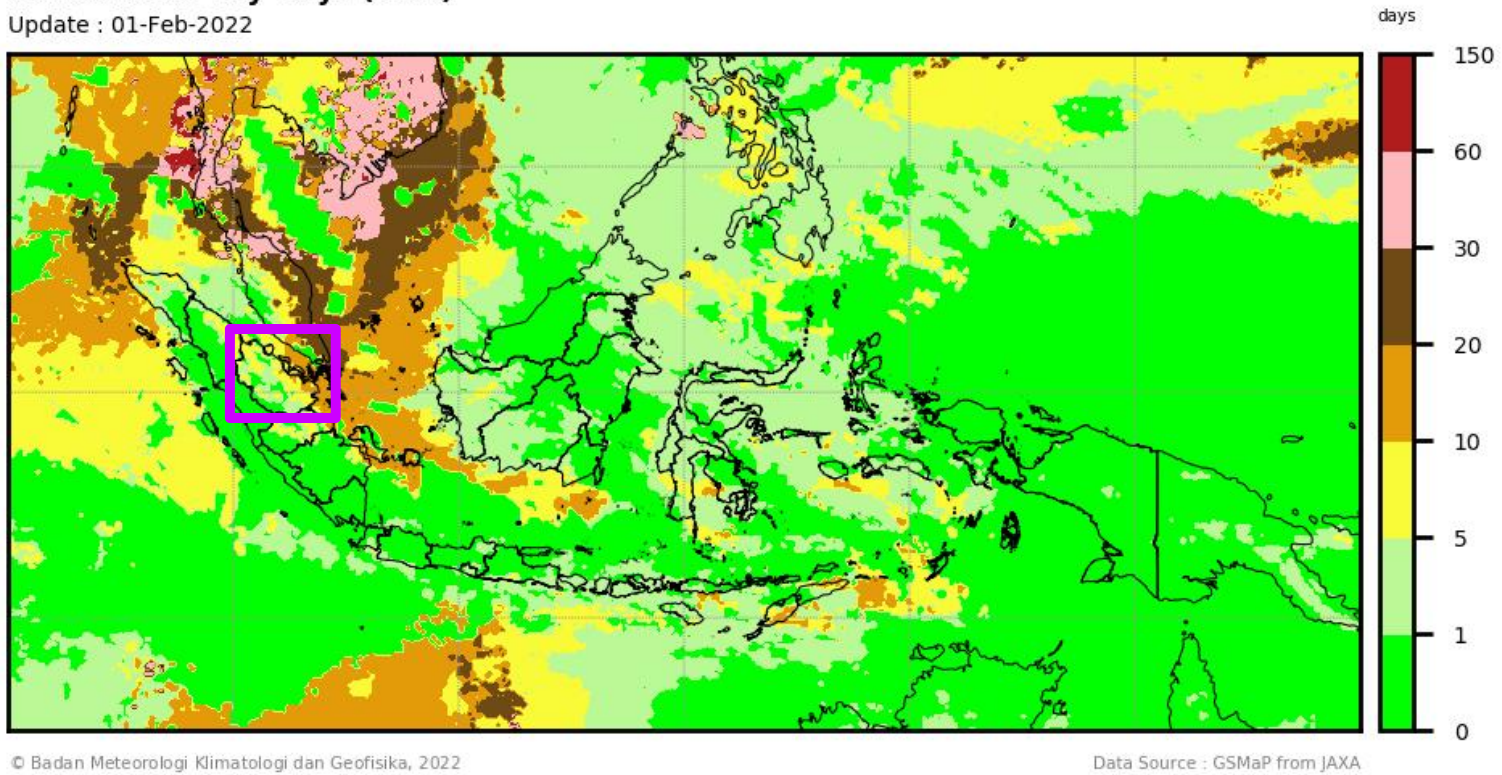
UTILIZATION SATELLITE PRODUCTS IN BMKG FOR DRY HYDROMETEOROLOGICAL DISASTERS/PHENOMENA

UTILIZATION SATELLITE PRODUCTS IN BMKG FOR DRY HYDROMETEOROLOGICAL DISASTERS/PHENOMENA

- Forest fire events on February 2022 in province of Riau
- Forecasters use Geohotspot product for monitoring hotspot as an indicator in forest fire events.
- Forecasters use GSMAP Consecutive Dry Days (CDD) product for monitoring the region which has number of days without rain events as an indicator for dry region with the potential for forest fires to occur



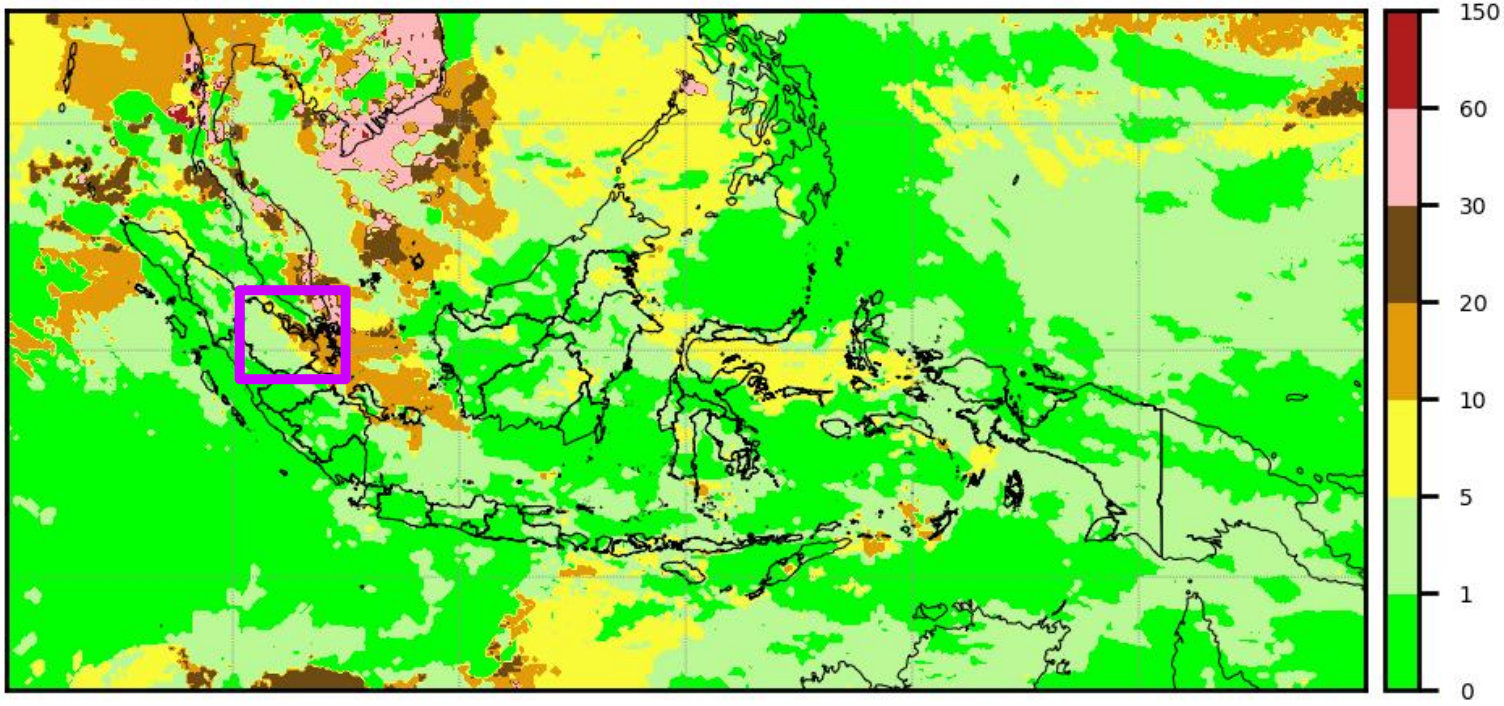
FOREST FIRE EVENTS ON FEBRUARY 2022 IN PROVINCE OF RIAU



FOREST FIRE EVENTS ON FEBRUARY 2022 IN PROVINCE OF RIAU

Consecutive Dry Days (CDD)

Update : 04-Feb-2022



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Data Source : GSMaP from JAXA

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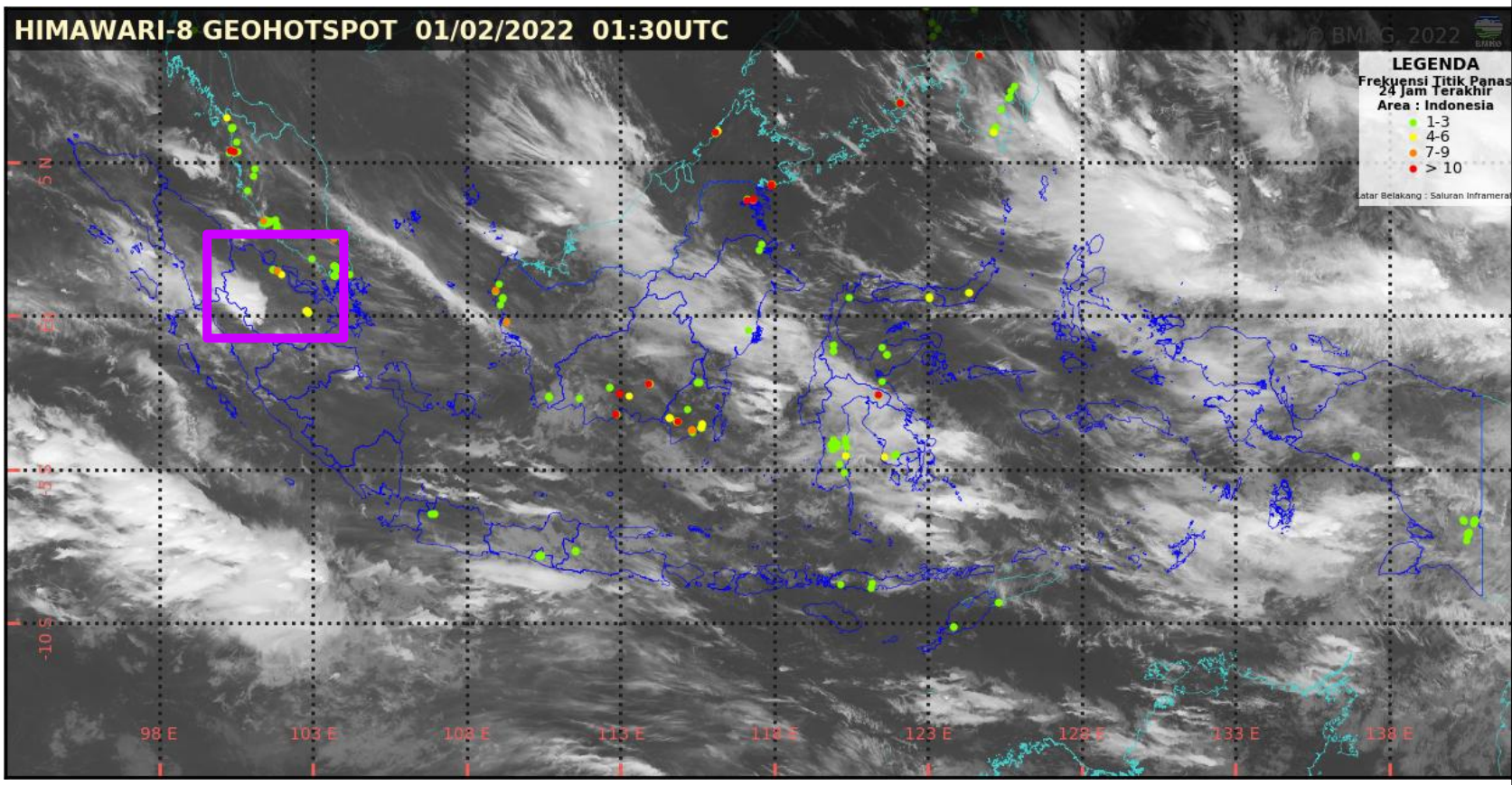

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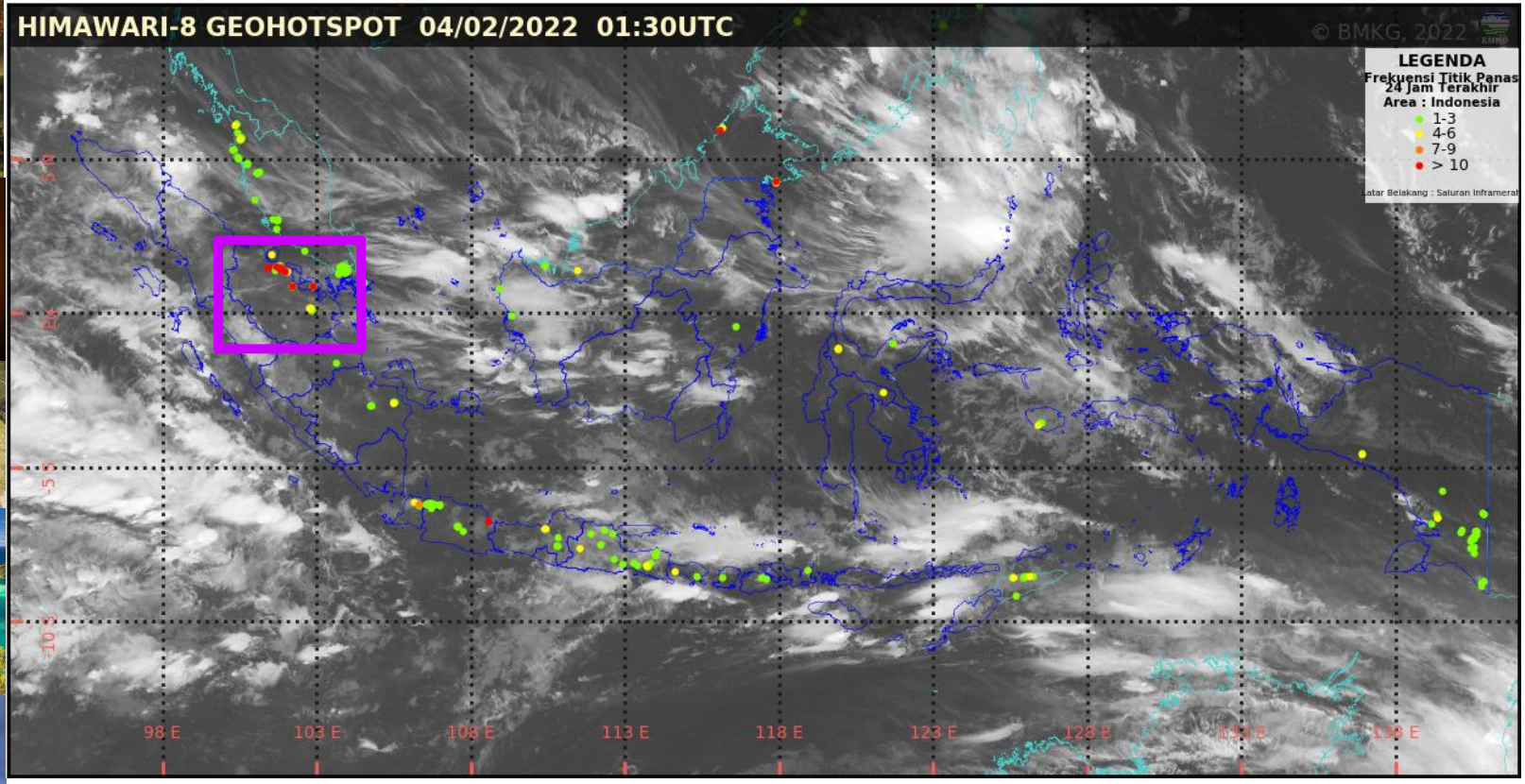

CONCLUSION

- There are many satellite derived products such as from Himawari 8 and GSMAP which are operationally used at BMKG
- Those products are used to monitor wet and dry hydrometeorological and phenomena
- We are interested in using JAXA's GSMAP CLIMATE product to analyze rainfall for climate purposes
- Satellite products (Himawari 8 and GSMAP) are very useful as the guidance for preparing nowcasting information before extreme rains and for evaluating rainfall after extreme rains.
- And also useful for determining and monitoring the potential region of forest fire events

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UTILIZATION SATELLITE PRODUCTS IN BMKG FOR WET HYDROMETEOROLOGICAL DISASTERS/PHENOMENA

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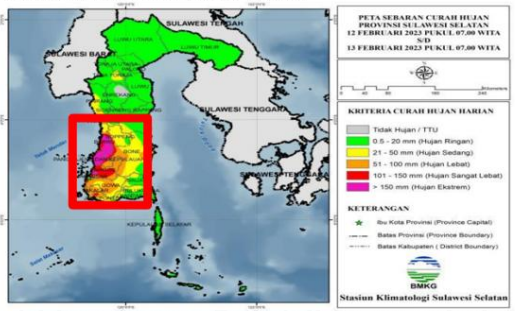

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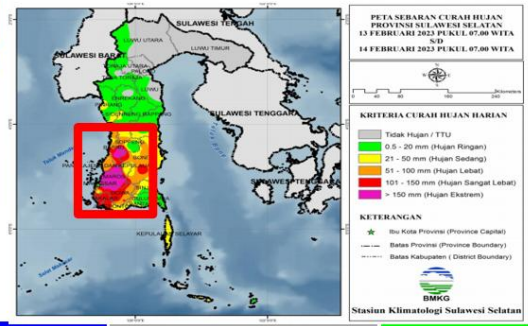

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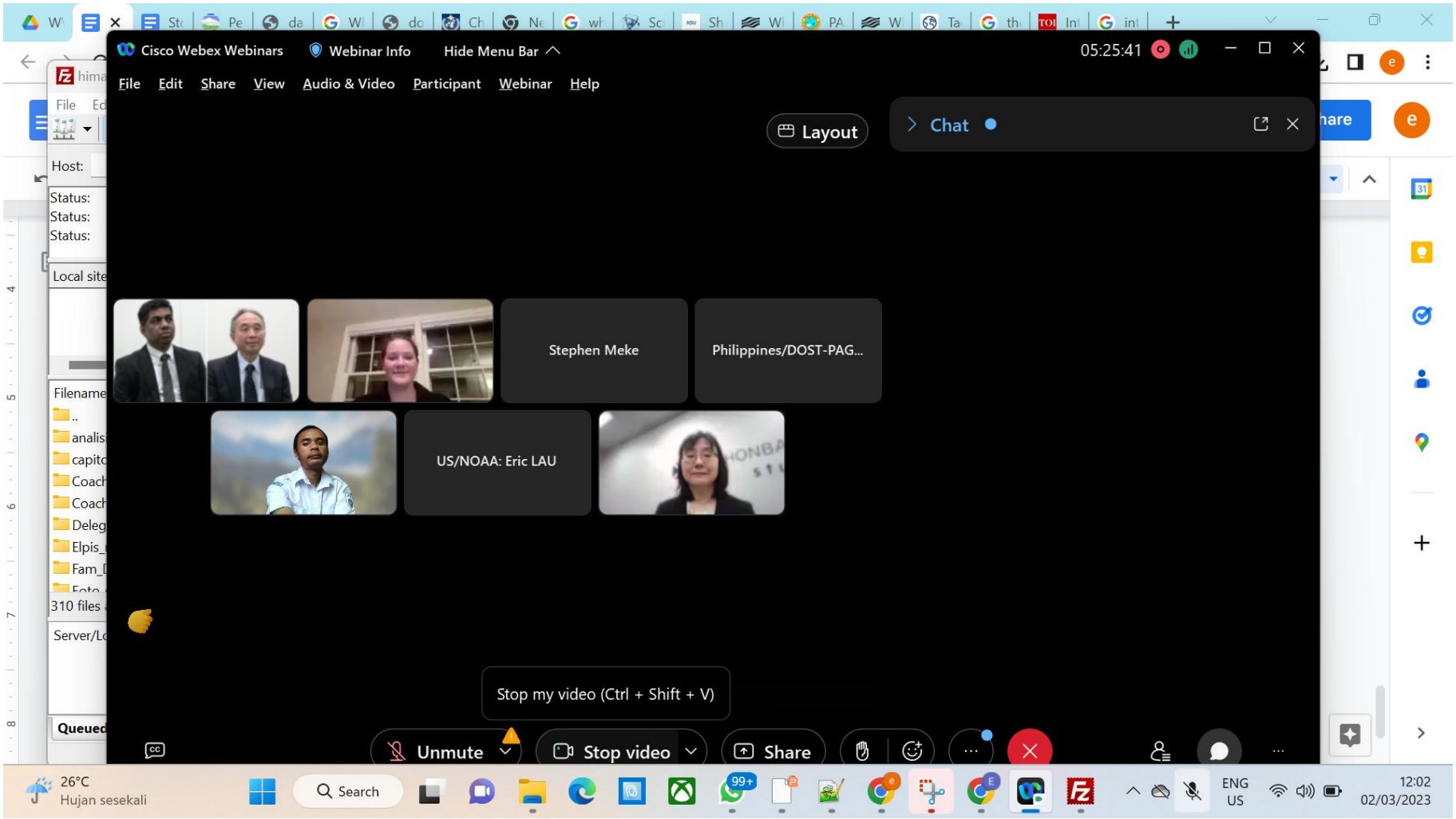
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