WIPPPS Pilot Project

Multi-Model Integrated Forecasting and Application (MMIFA)

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Motivation of MMIFA

- **GDPFS Symposium 2022**

- Recommendation under "Coordination Mechanism Among WMCs"

  - ***Visualization of products from WMCs in uniform graphical presentation, which will have great benefit for users to compare products from different centres.***

  - LC-LRFMME visualizes the GPCs-LRF products in the same format. The same coordination could be possible for medium-range products if the products are limited. The possibility of a lead centre on medium-range forecast multi-model ensemble can be explored.

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Concept of MMIFA

Multi-Model Integrated Forecasting and Application (MMIFA)

- Period: Four years (2023-2026)

- Goals:

  - To enhance accessibility and effective application of WIPPS core data and products from WMCs for short- to medium-range weather predictions.

  - To enhance capacity of NMHSs especially the Least Developing Countries (LDCs) for interpreting and utilizing the forecasts of global deterministic models, multi-model ensemble and integrated forecast products in support of severe weather prediction.

Implementation Plan of MMIFA

- **Paticipating Members (8 as of June 2025):**
  China Meteorological Adminstration, Hong Kong Observatory, Thai Metorological Department, Pakistan Meteorological Department, South Africa Weather Service, Department of Meteorology and Hydrology of Lao DPR, Department of Meteorology of Sri Lanka, Nambia Meteorological Service ...

2024

Develop a dedicated webportal for MMIFA to visualize NWP products with uniform presentation to enhance better access to WMCs' proudcts for RAII Members

2025

Develop integrated forecast products and experimental post-processing products to improve quality and usefullness of NWP;
Set up an international desk on severe/high impact waether forecasting demonstration for junior operational forecaster trainging.

2026

Explore to use available global ensemble forecast data to develop products for users to better understand the risk and uncertainty of high-impact weather; Application in use-cases and receive feedback from users on the application of MMIFA products

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Implementation Plan of MMIFA

- **Planned products for multi-model integration and inter-model comparison with uniform formats**

  - Variables from global deterministic NWPs to support severe weather forecast
    - Heavy rain — 6h/12h/24h total precipitation …
    - Strong winds — 10m-wind, wind at 925/850 hPa …
    - Heat/cold wave — maxT, minT, relative humidity, temperature at 850/700 hPa …

  Phase 1~2

  - Explore to expand to ensemble forecast products with available global EPS data
    - Heavy rain — Probability of precipitation above thresholds (e.g. 25/50/100 mm)
    - Strong winds — Probability of wind above thresholds (e.g. 10/15/25 m/s)
    - Heat/cold wave — Probability of temperature above/below uniform thresholds

  Phase 3

Expected Outcomes of MMIFA

- A dedicated web-portal for visualizing multi-model products
- Experimental Multi-model integrated (post-processing) forecast products
- International desk in support of forecasting and early warning

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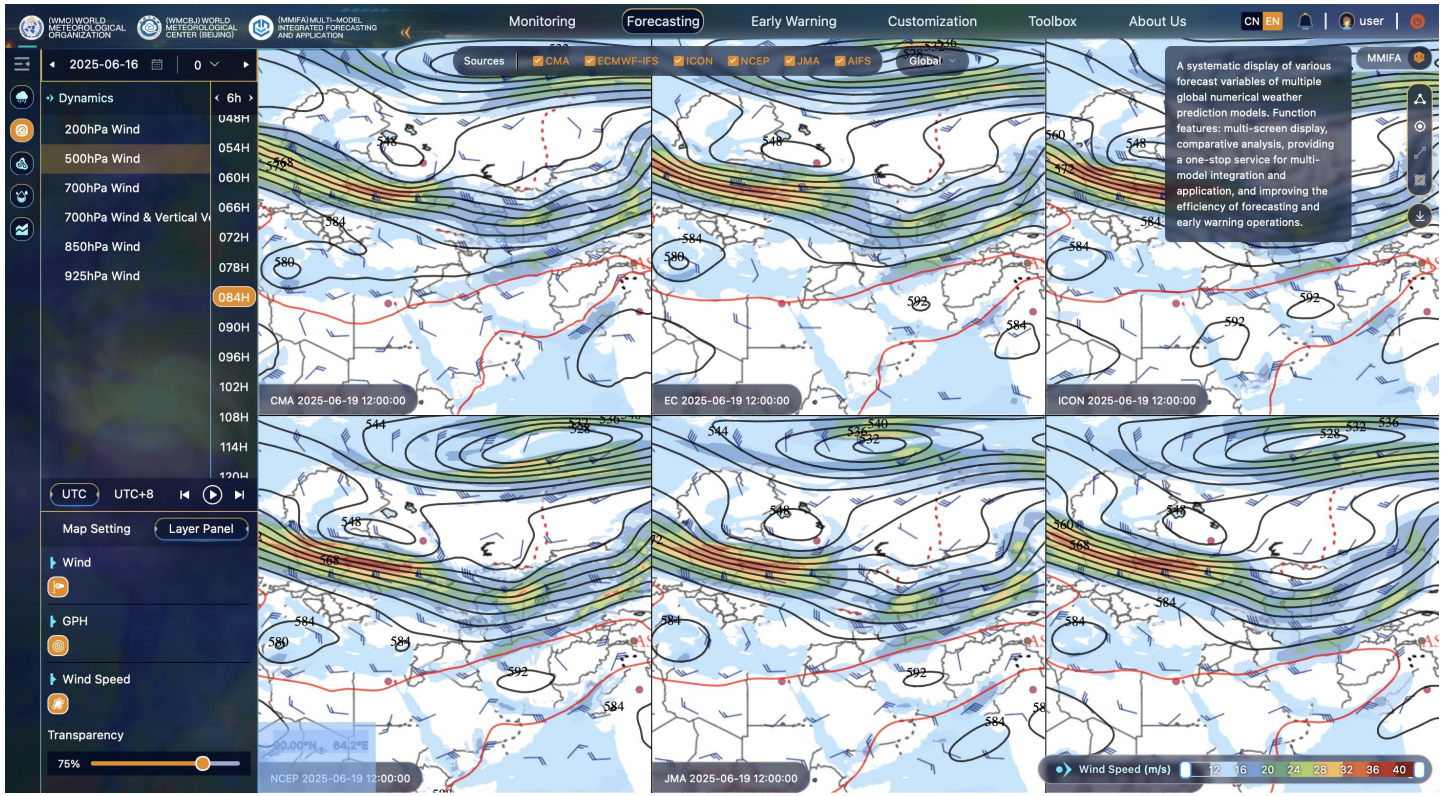
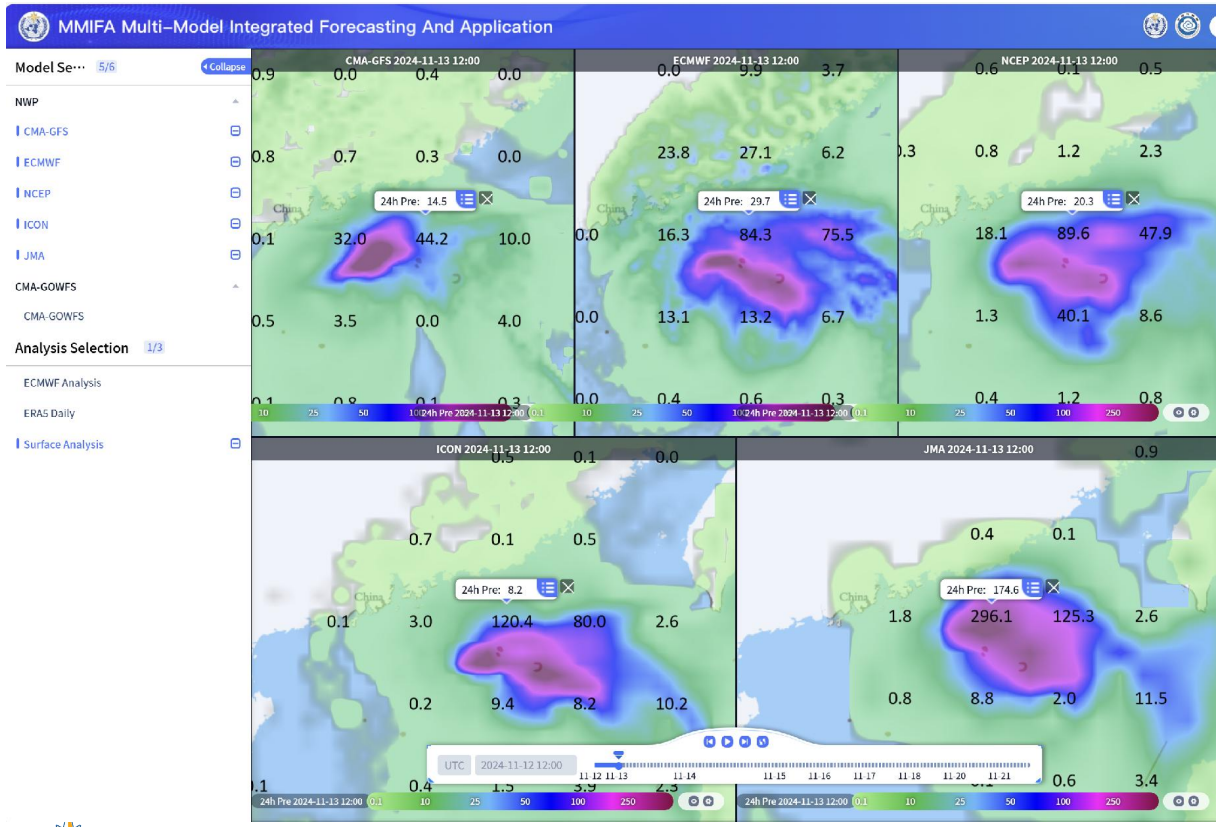
Progress of Implementation (1)

- The prototype MMIFA platform has been developed
  - Five global deterministic NWP products available (CMA, ECMWF, NCEP, JMA, DWD)
  - Data are visualized in uniform style / format and in an interactive way

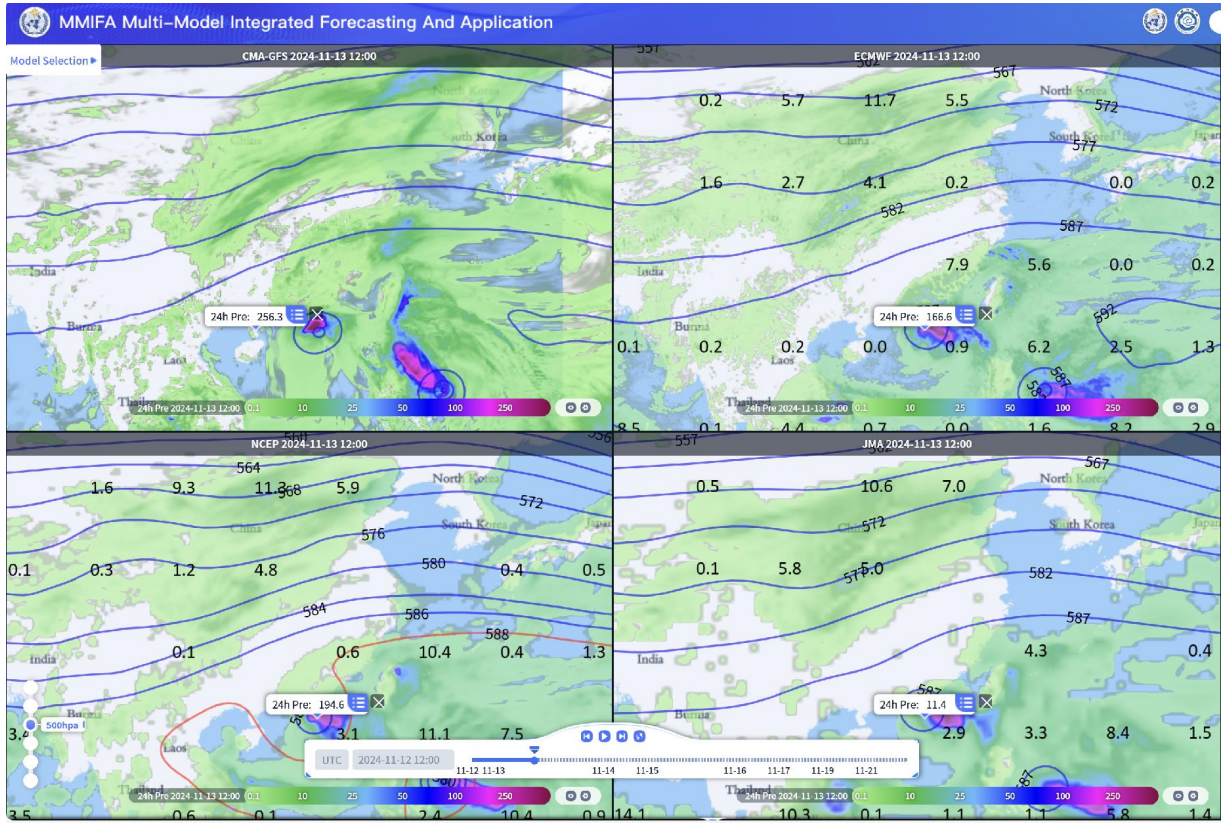


Progress of Implementation (2)

- Zoom in/out in multiple screens on the same page
- Gridded values on the same location can be displayed for comparison

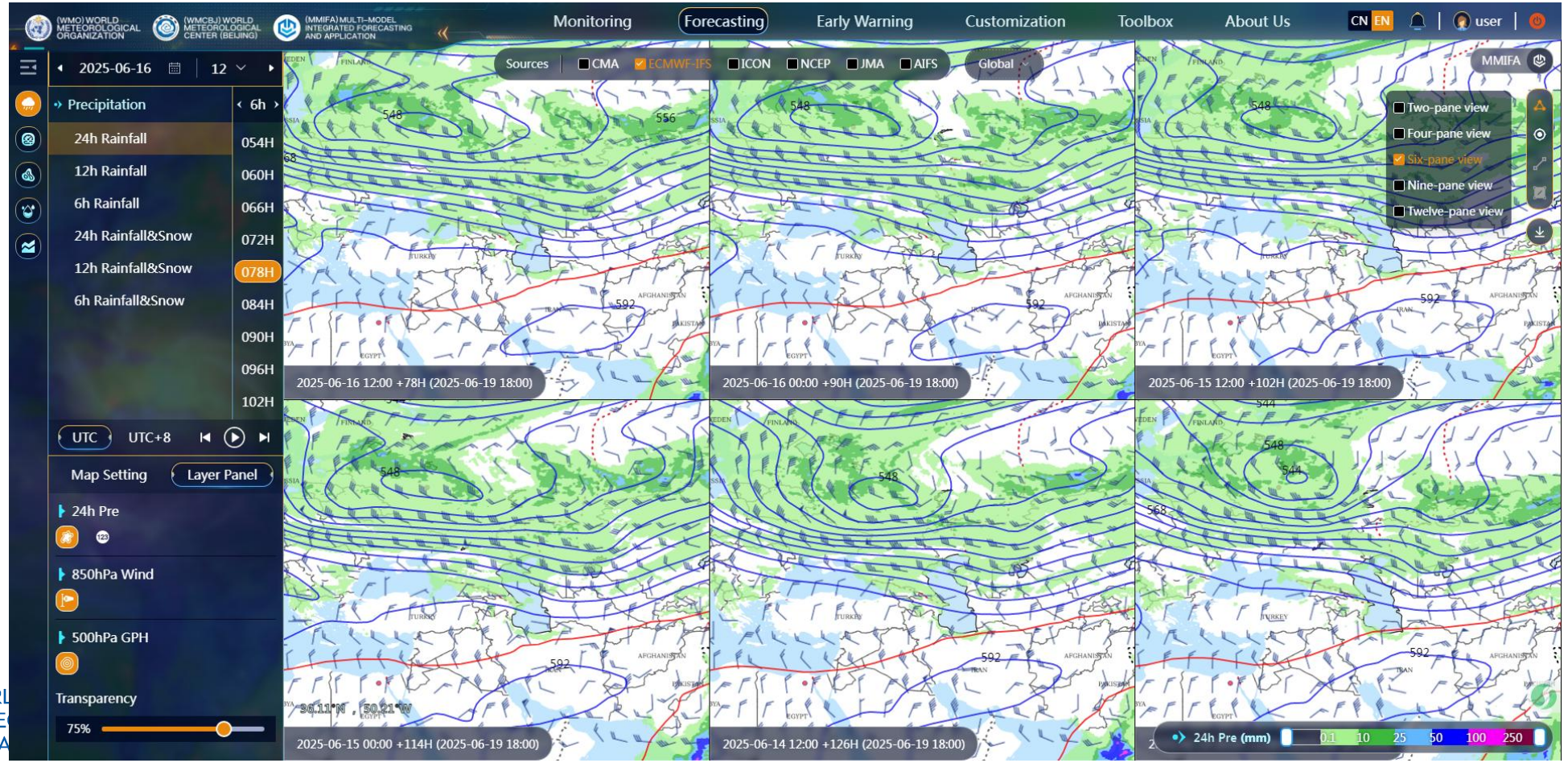


- Other variables can be overlaid for intercomparison



Progress of Implementation (3)

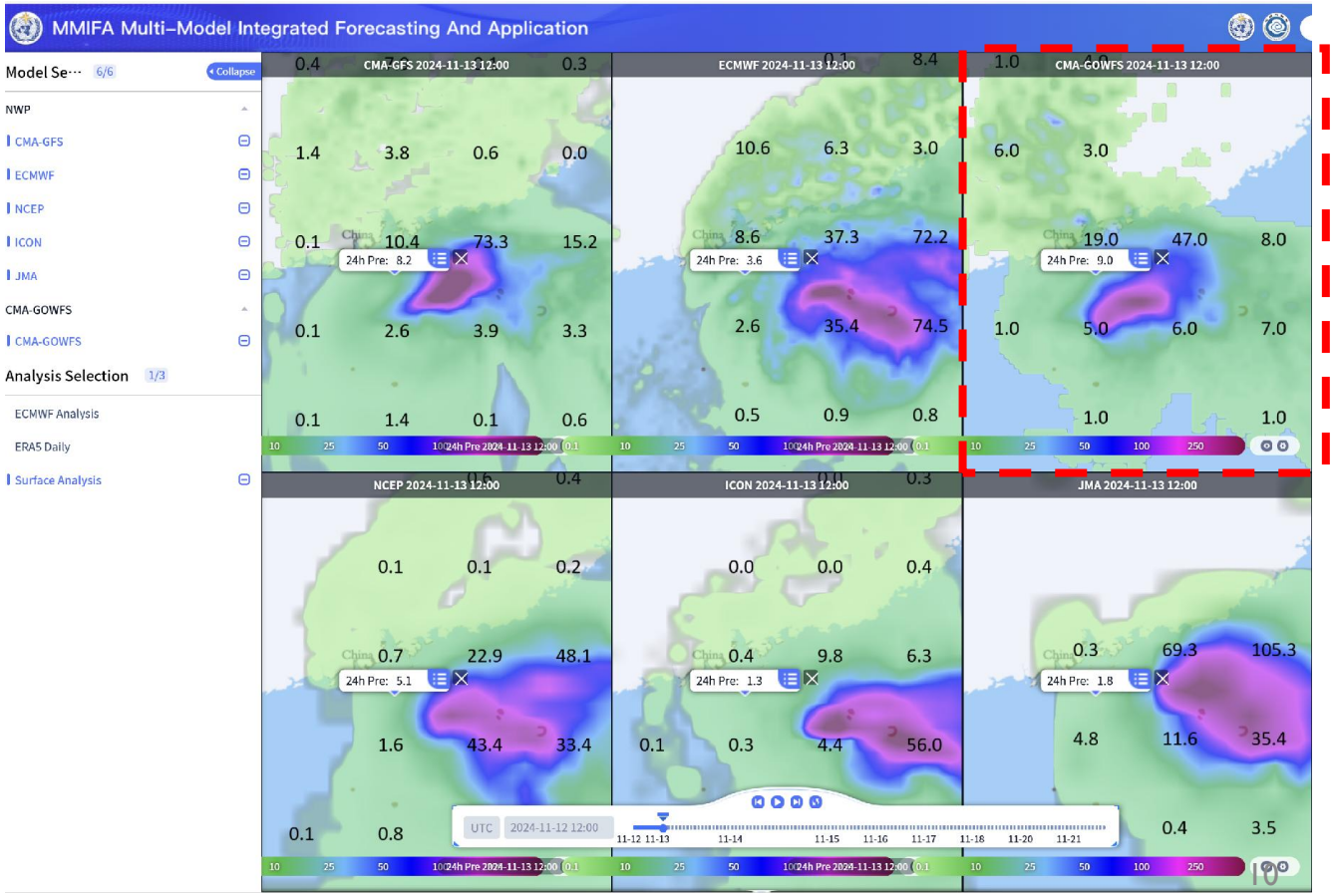
- Forecast across different initialization times can be compared at same page to track the model forecast stability



Progress of Implementation (4)

- Multi-model integrated post-processing techniques are developed in NMC/CMA to improve the quality of raw global model forecasts

- Examples:
  - QPF in short to medium range
  - Tropical cyclone track forecast
  - Sand and dust storm forecast



Progress of Implementation (5)

- The MMIFA Project website is established

  https://www.wmc-bj.net/pilot-project-MMIFA/

Progress of Implementation (6)

- The MMIFA Project Advisory Working Group (AWG) is established

  (more experts with relevant expertise are encouraged to join)

- The MMIFA Project Task Team (TT) is developing

  (Liu shuang will introduce later)

Next steps

- Optimize the MMIFA platform and add more WIPPS core data from global centres which needs cloud-based environment for fast visualization.
- Promote application of MMIFA and collect requirements and feedbacks from participating members for effective visualization
- Conduct trainings on the MMIFA platform and products for forecasters (Oct June)
- Promote to WMO's Members in joining the MMIFA to bring relevant experience, knowledge or further co-develop the customized tools to support the EW4All

WIPPS Pilot Project

WMO Integrated Processing and Prediction System

Thank you very much

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