Ocean and Climate Change Dialogue 2024

The Importance of Systematic Observation

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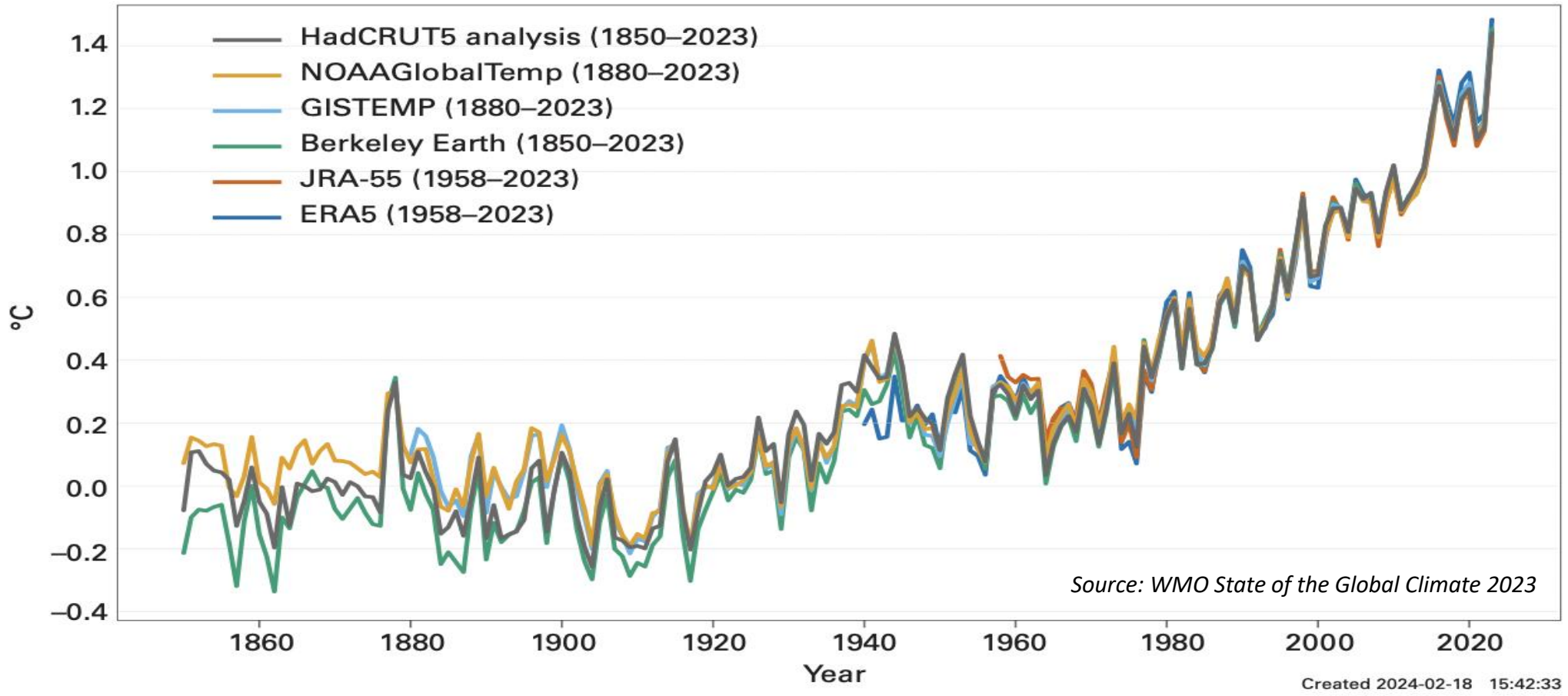
Executive Council – World Meteorological Organization (WMO)

Steering Committee – Global Ocean Observing System (GOOS)

12 Juni 2024

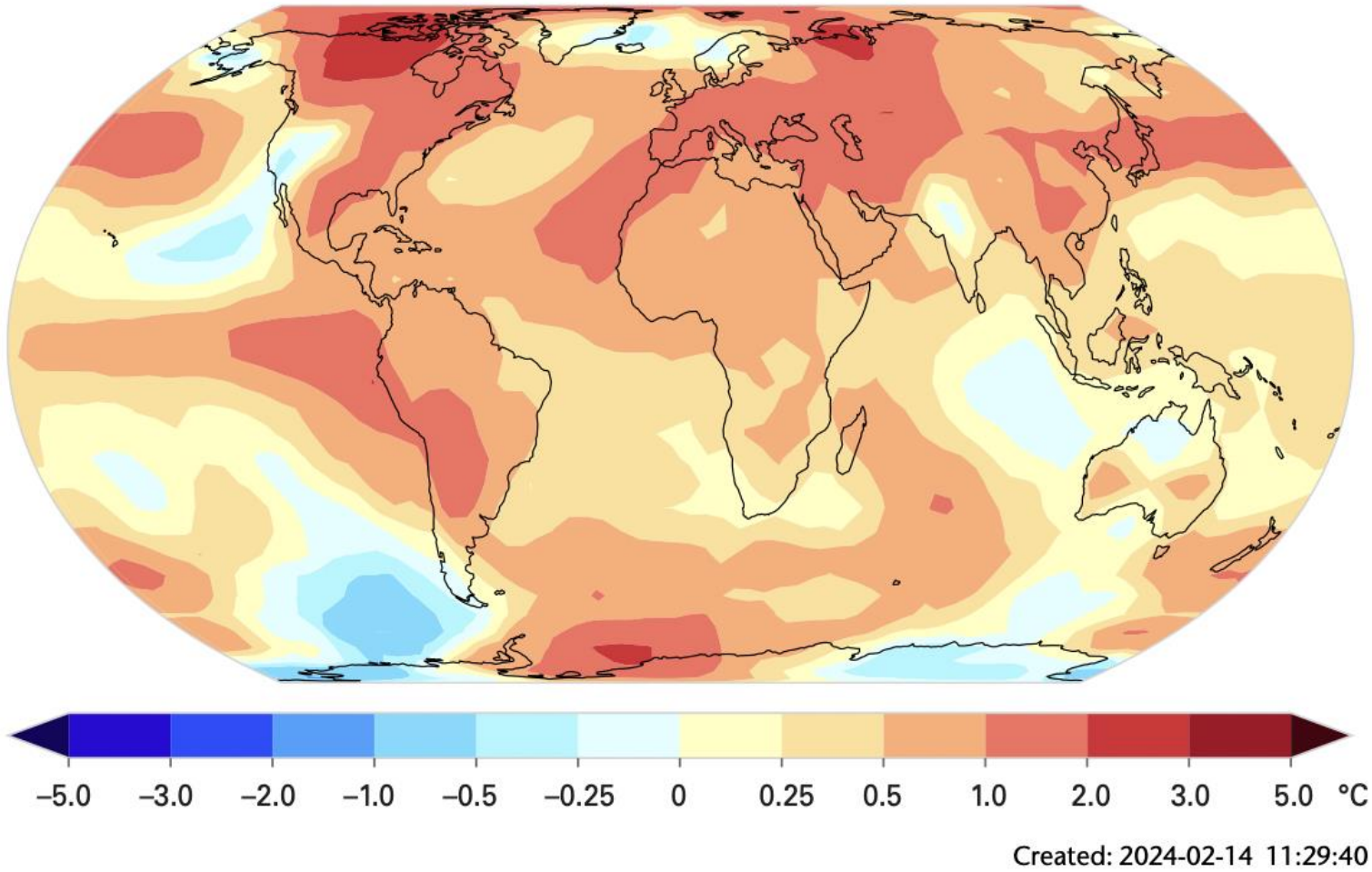
Annual global mean temperature anomalies (relative to 1850–1900)



The past 9 years, 2015-2023, were the nine warmest on record.

In 2023, the planet was 1.45 ± 0.12 °C warmer than the pre-industrial (1850-1900) average.

Mean near-surface temperature anomalies (difference from the 1991–2020 average) for 2023

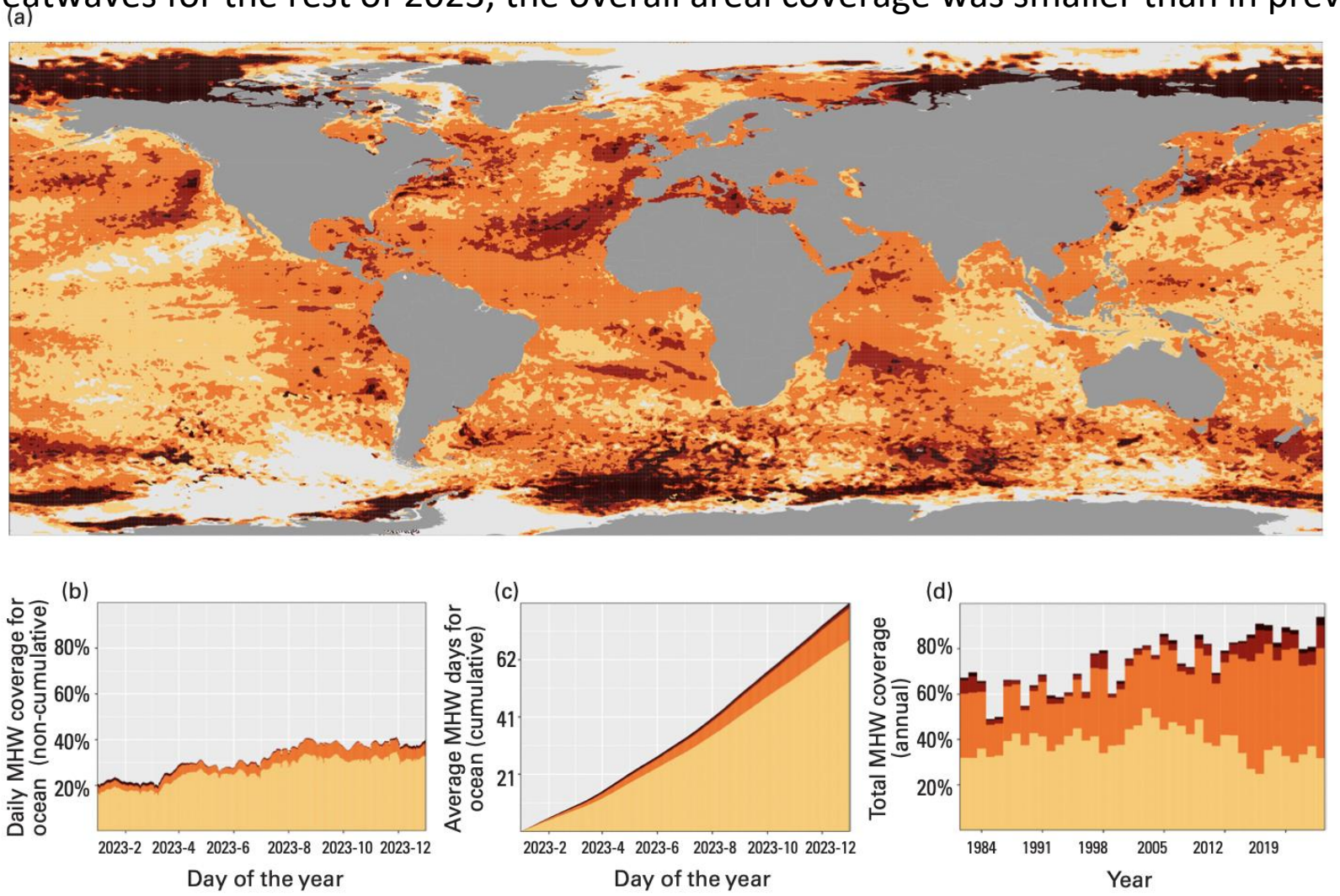


The year 2023 is the warmest year on record

Source: WMO State of the Global Climate 2023

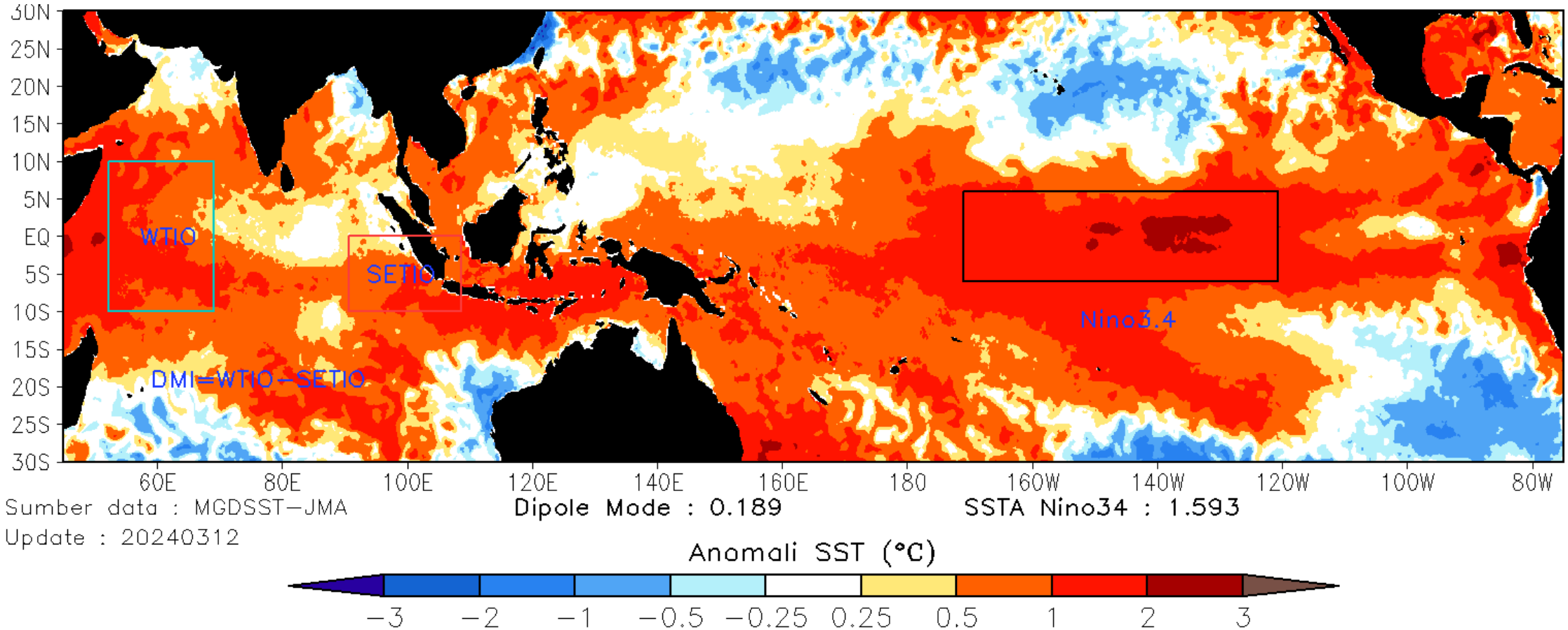
MARINE HEATWAVES AND COLD SPELLS

El Niño events tend to cause widespread marine heatwaves in the eastern tropical Pacific. While this region did experience strong marine heatwaves in 2023 until late October, and moderate marine heatwaves for the rest of 2023, the overall areal coverage was smaller than in previous El Niño events.



As with heatwaves and cold spells on land, marine heatwaves and cold spells are prolonged periods of extreme high or low temperatures in the seas and ocean that can have a range of consequences for marine life and dependent communities.27 Marine heatwaves have become more frequent, intense and longer lasting since the late twentieth century, while marine cold spells have been decreasing by those same measures. Satellite retrievals of sea-surface temperature (SST) are used to monitor marine heatwaves and cold spells globally, categorized in the present publication as “moderate”, “strong”, “severe”, “extreme” or “ice”

SEA SURFACE TEMPERATURE (SST)



WMO State of the Global Climate for 2022

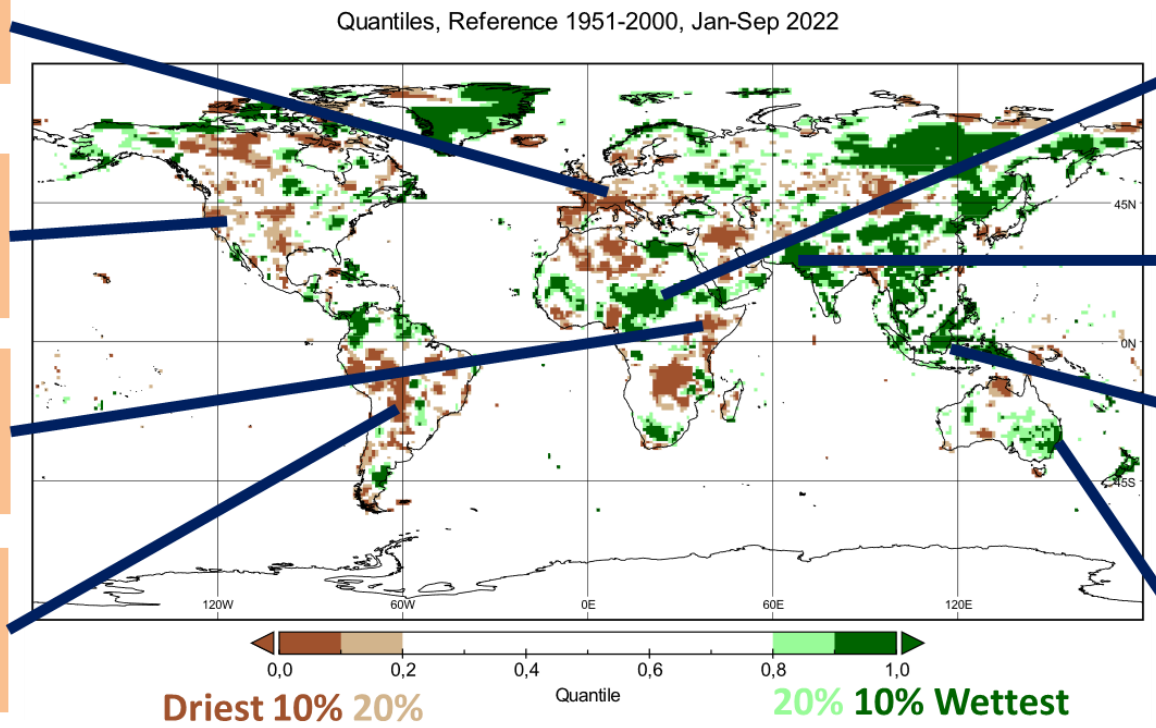
Global rainfall anomaly in 2022

Drought Europe

Drought Western US

Drought in East Africa

Drought in South America



Floods eastern Sahel

Floods Pakistan

Floods Indonesia

Floods East Australia

- **Drought and floods**, are the same facets of climate change, both **will increase in severity**.
- This trend **continues every year**.

Source: WMO Annual Climate Statement 2022

What this means to water

Global Water Hotspots

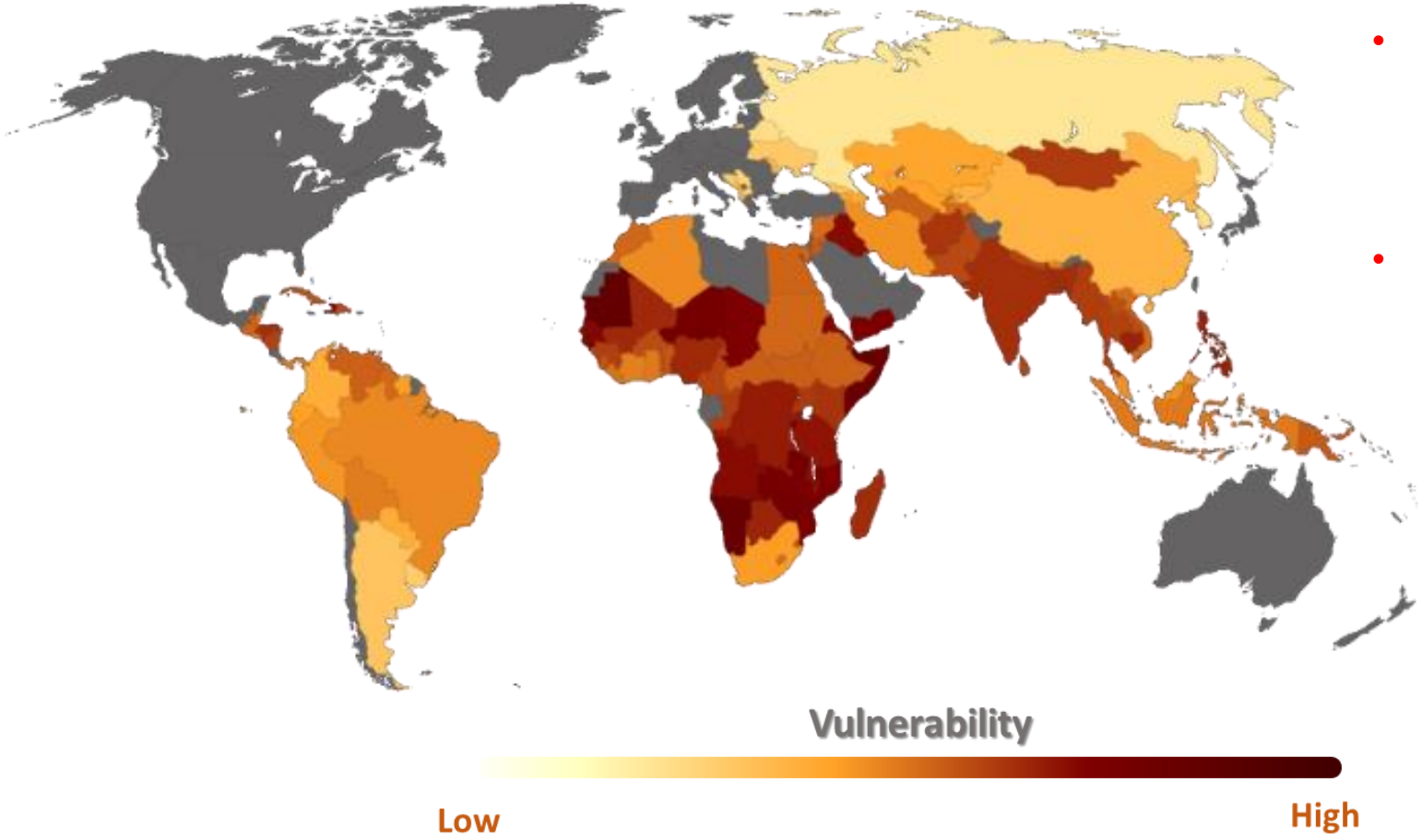
Climate change puts pressure on the already scarce water resources, resulting in **water hotspots**.

Source: WMO Climate Services Report

What this means to food security

Pressure on Food Security

Mid-century period (2050s)

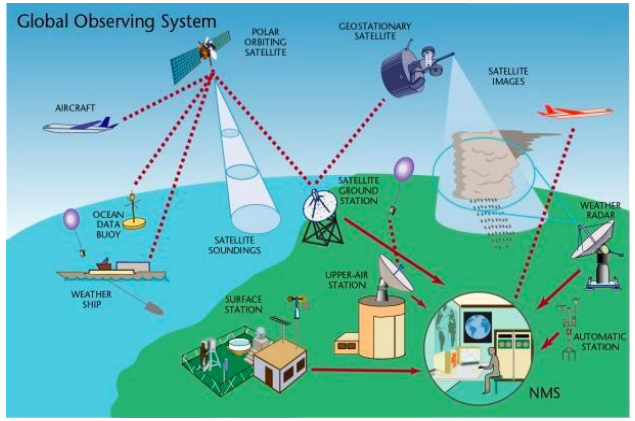


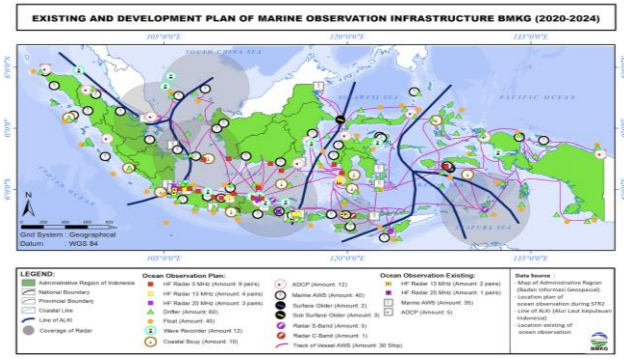
- **Increased vulnerability** on the World's food basket.
- **FAO:** more than **500 million small holder farmers**, which produce 80% of the World's food source, is the **most vulnerable to climate change**.

Source: WMO Climate Services Report

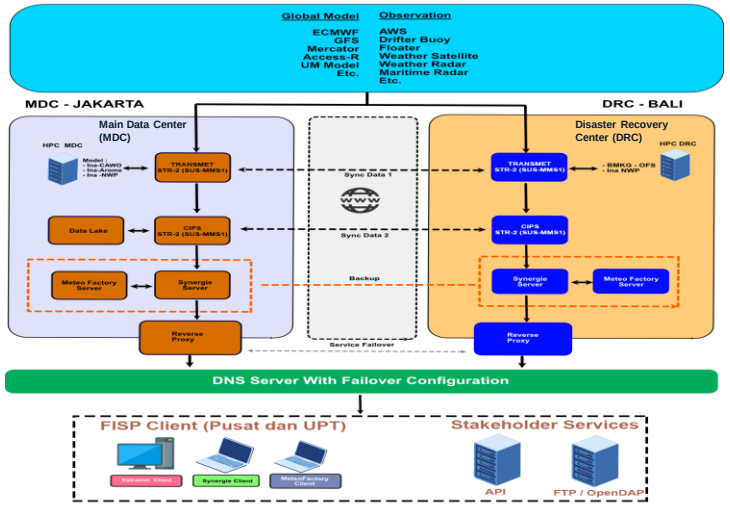
Digital Twin to Strengthen Value Chain Services

Enhance observation Network





Strengthen Data Processing Capacity



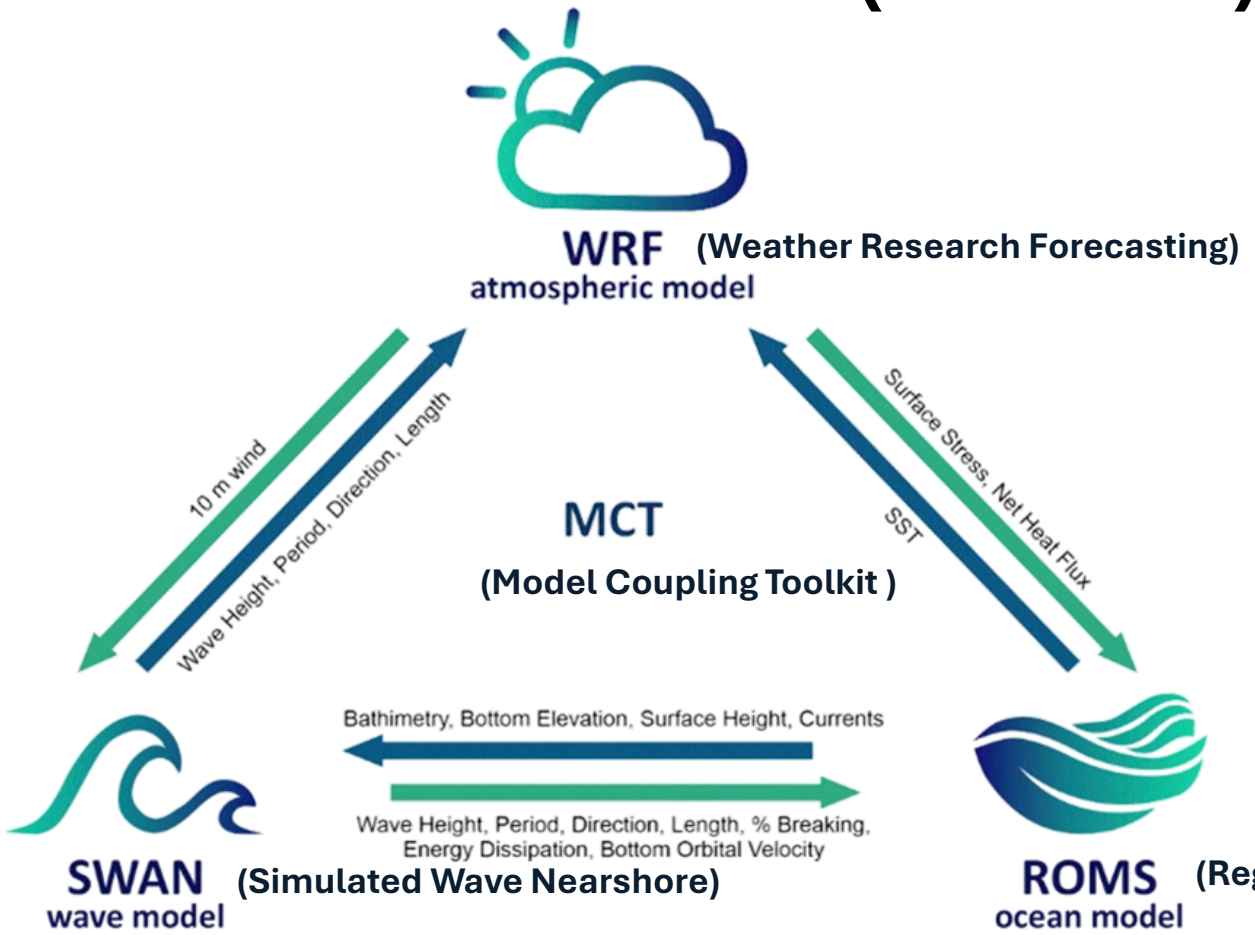
PROCESSING SYSTEM

METEOROLOGY EARLY WARNING SYSTEM	CLIMATE EARLY WARNING SYSTEM

Improve Dissémination of Information to Public and User Sectors

Strengthening Forecast Capacity

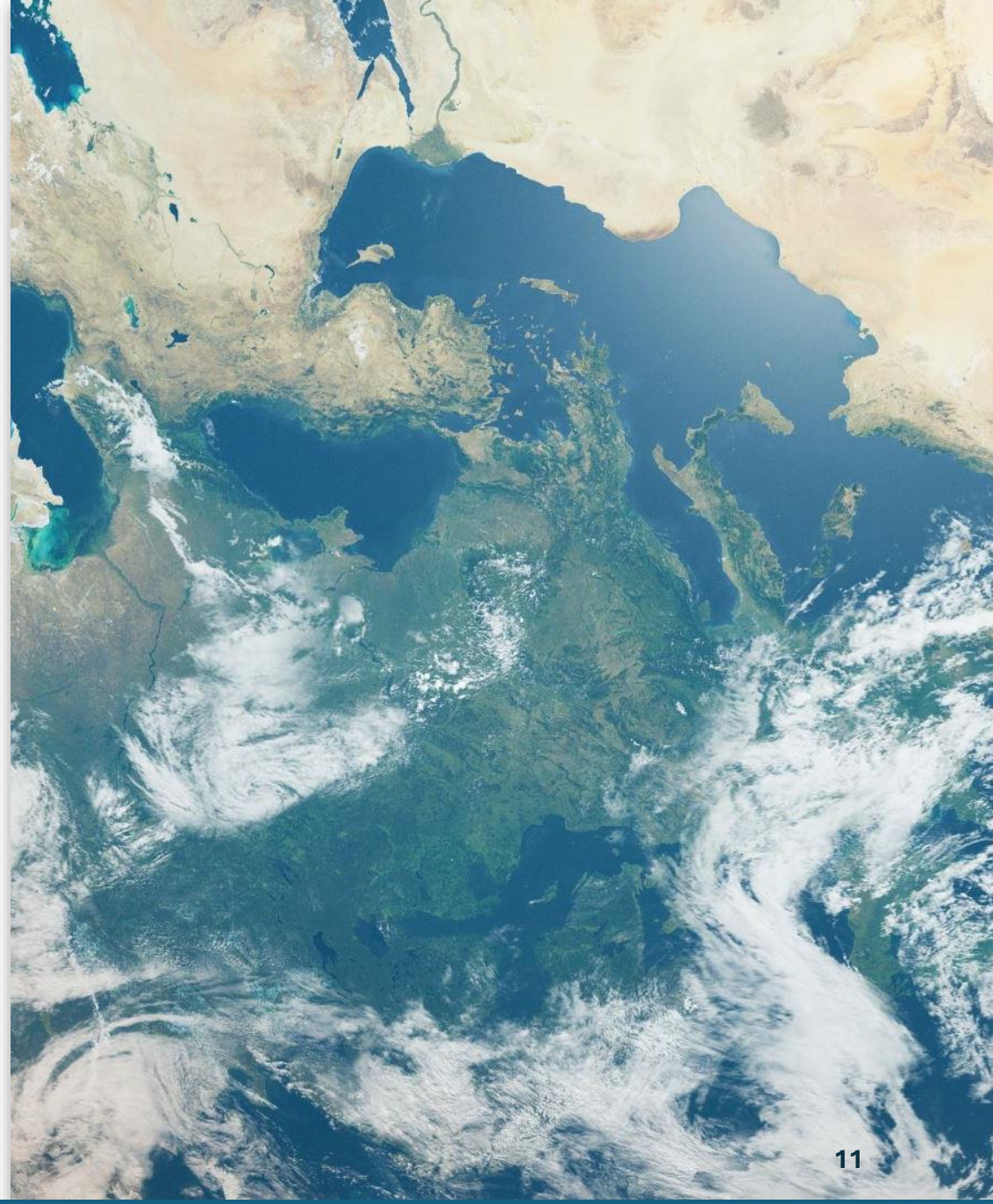
Development of Indonesia Coupled Atmosphere Wave Ocean Model **(InaCAWO)**



- Improvement the forecast accuracy through the implementation of coupling model with data assimilation
- Improving prediction accuracy through the implementation of high-resolution coupled air-sea models based on data assimilation.

Pathway to Integration of Automation and Satellite Technologies

- Ocean plays **critical role in regulating the overall climate of the Earth** and holding the key to the Earth's future climate;
- It is crucial to accelerate climate action through, among others, **systematic observation of the ocean component of the Earth system**;
- It is imperative that **the UNFCCC process to embrace and adopt the results of science as the key core of the negotiation process**



Innovate Financial Approach

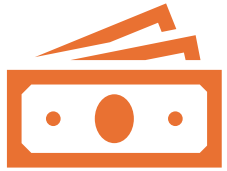
THE NEEDS

Research and Development

Capacity Building

Deployment/Campaign

FUNDING MECHANISMS

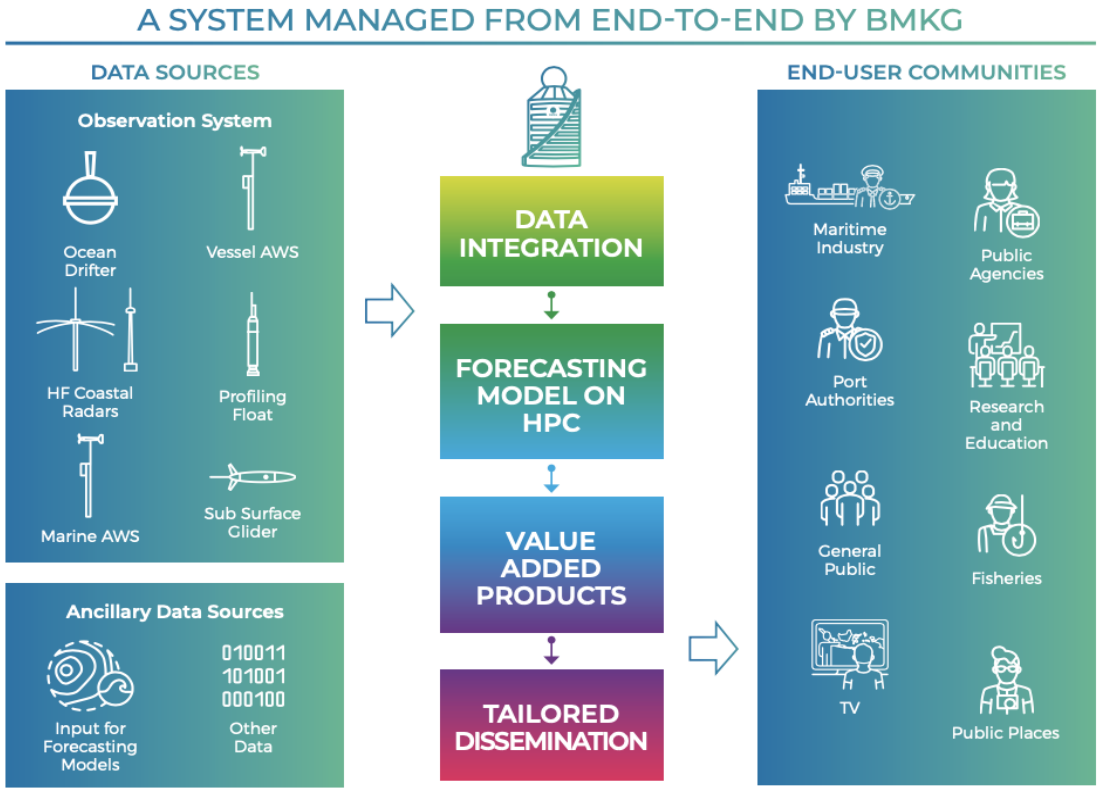


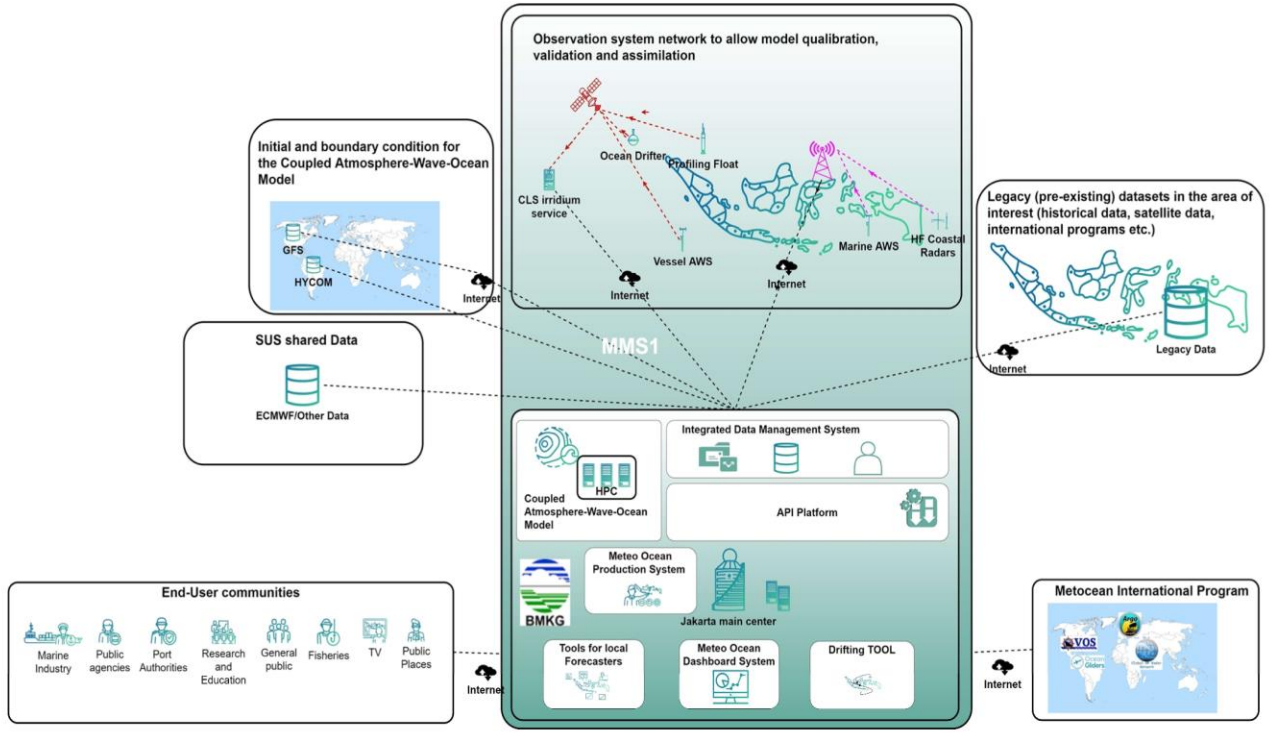
Relying funding from the national government poses a challenge due to different priorities

Encouraging and inviting investment for the technology from **international donors/organizations**

THANK YOU

Integrated Forecasting and Anaysis System





Enhancing the Accuracy of Weather and Climate in Indonesia

Innovation Technology and Research

MMS 1 & MMS 2 PROJECT

Indonesia PRIMA

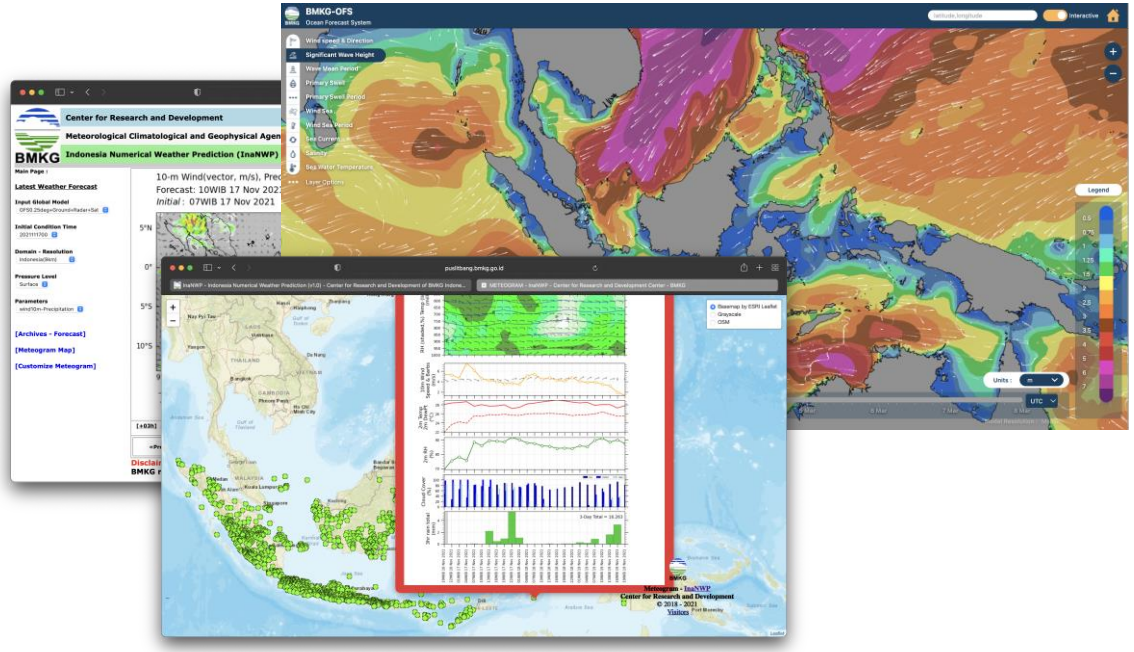
MINTIE PROGRAM*

INA-TEWS

YMC

ELO*

To enhance the Accuracy for Weather and Climate Services



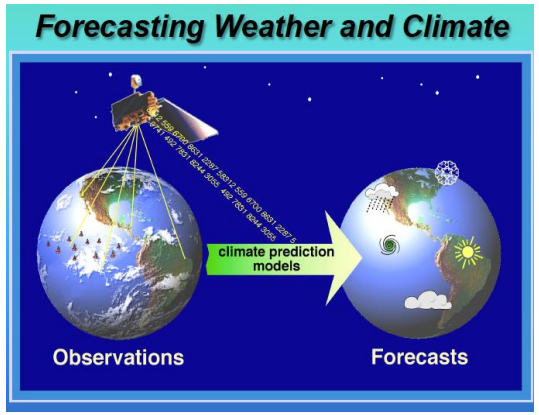
*) MINTIE: Measurements and Modelling of the Indonesian Throughflow International Experiment

*) ELO: Equatorial Line Observations

Join Collaboration for Supporting Ocean Observation

Indonesia PRIMA Program to support the government priority program in "OCEAN OBSERVATION "

1. Collecting marine meteorology Observation data
2. Maintaining Buoy RAMA
3. Validating the model of *ËHĤĢÌ ÆÉÎ ĨĤHĢJ ĴÆĖĹJ ĴĤỊ* developed by Marine Meteorology Center



- Cooperation between NOAA and BMKG starting with the signing of Letter of Intent (LoI) in meteorology, climatology, and geophysics in February 2011.
- Follow-up the cooperation between Indonesia (BMKG) with America (NOAA) related to maritime
- Center of Marine Meteorology's activity to support ***Global Ocean Observing System*** **(GOOS).**