WMO Integrated Process and Prediction System (WIPPS)

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WMO

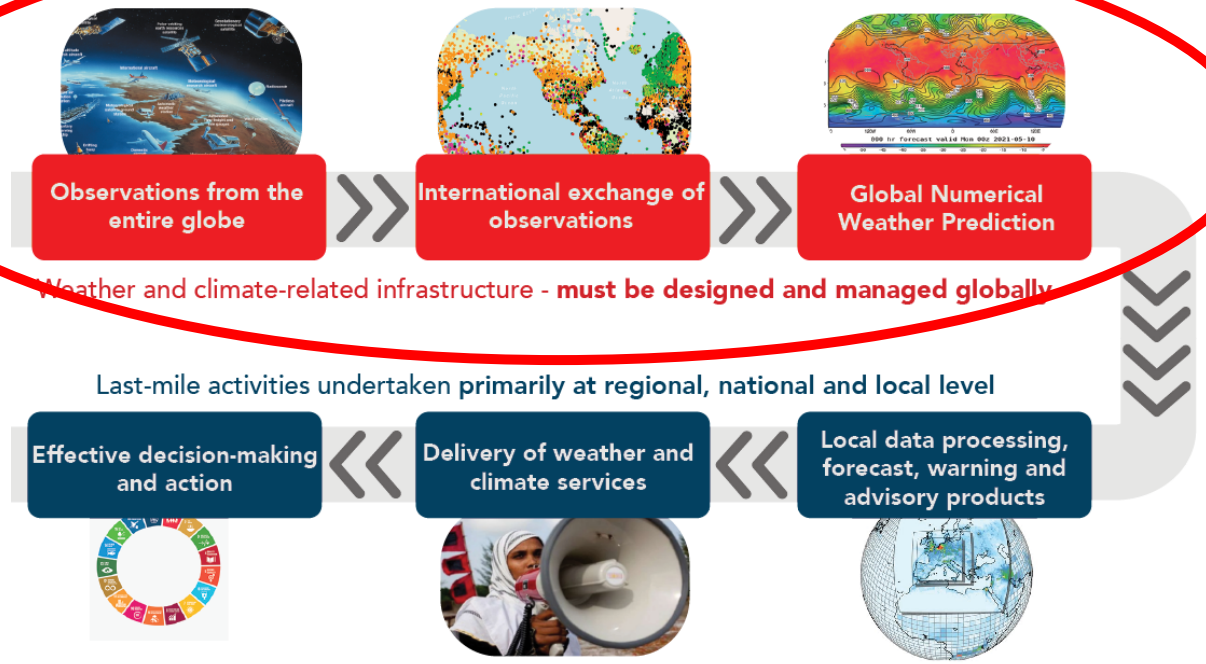
WMO | 150 1873 2023 IMO-WMO

The Value Chain

Successful application of weather and climate services depend on a functioning meteorological value chain

Global Meteorological Infrastructure

- Centralized governance
- Decision making at global level
- Standardization of technologies
  - Instruments, metrology, data format, communication standards
- Regulatory approach through WMO's Technical Regulations
  - What to observe, exchange and how
- Capacity development and training



- Decentralized governance and implementation
- Decision making at local, national and regional levels
- WMO: less regulatory approach with guidelines and sharing of best practices
- WMO: Capacity development and training

Regional, National and Local Early Warning Services

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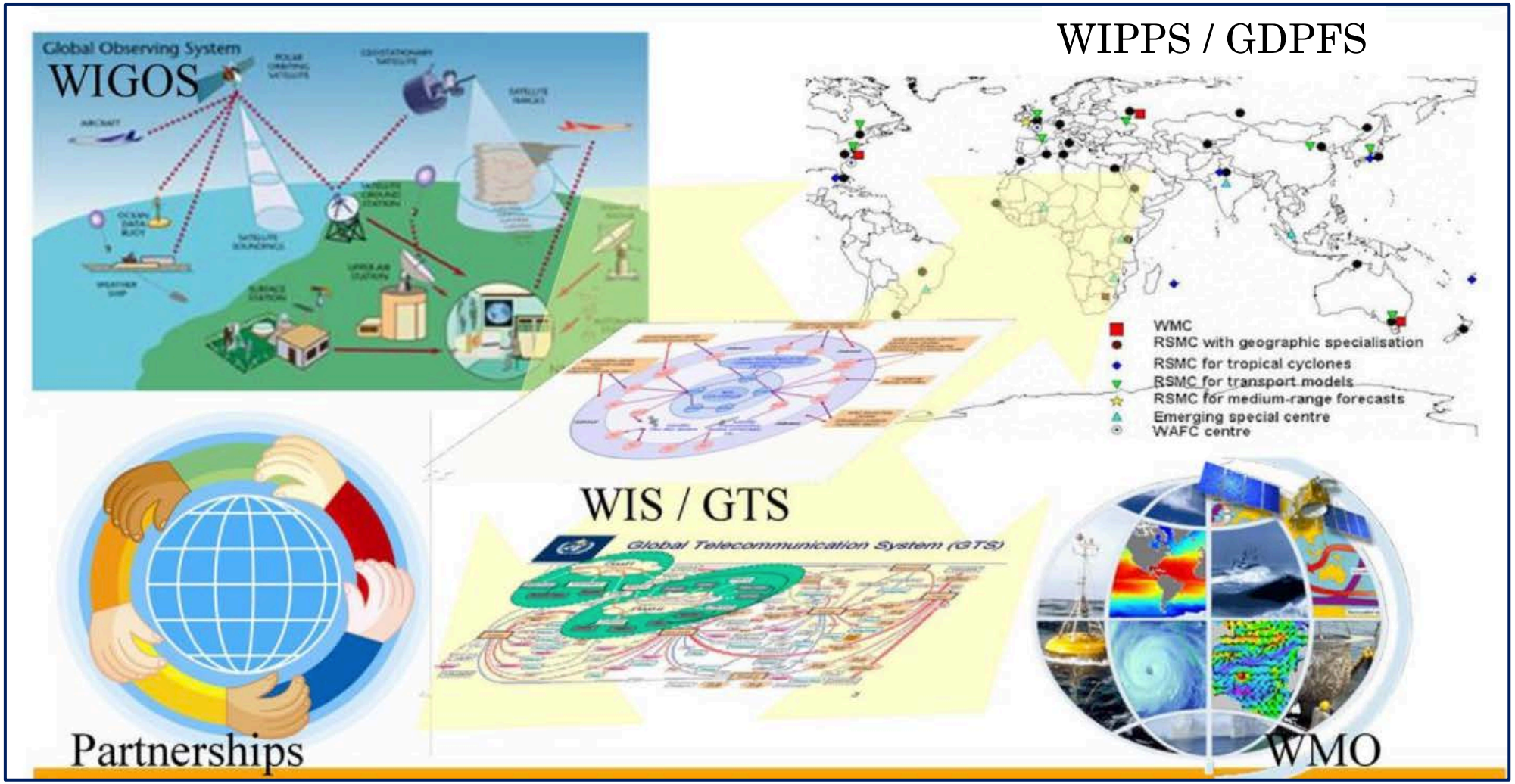
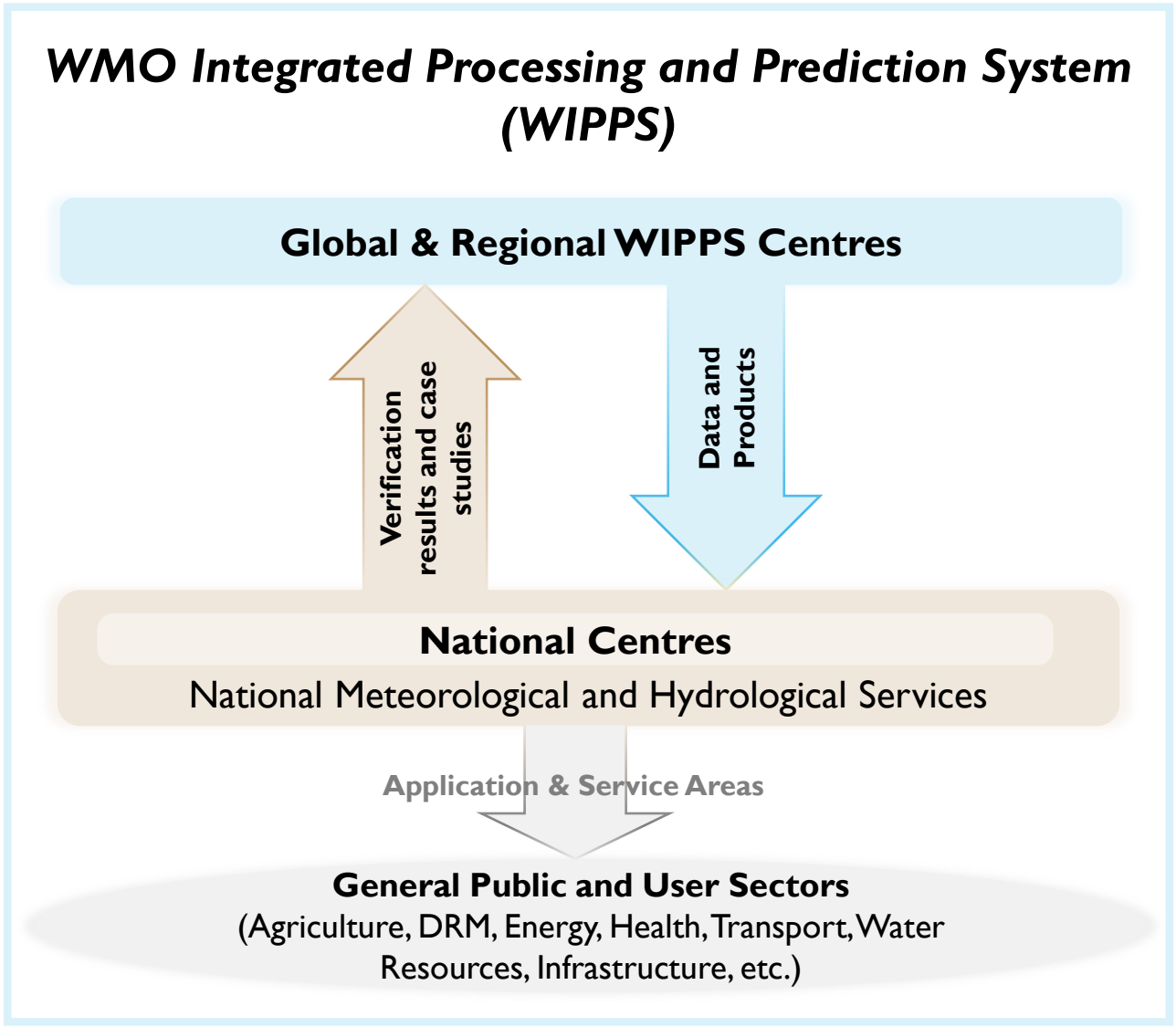
Global Infrastructure
The WMO World Weather Watch architecture



GDPFS/WIPPS Structure - simplified



WIPPS activities

General purpose activities (12)

- Global deterministic numerical weather prediction
- Limited area deterministic numerical weather prediction
- Global ensemble numerical weather prediction
- Limited area ensemble numerical weather prediction
- Global numerical long-range prediction
- Global numerical sub-seasonal forecasts
- Annual to decadal climate prediction
- Numerical ocean wave prediction
- Global numerical ocean prediction
- Nowcasting
- Sub-seasonal to seasonal hydrological prediction
- Snow cover prediction

Specialized activities (13)

- Regional climate prediction and monitoring
- Coordination of multi-model ensemble prediction for long-range forecasts
- Coordination of multi-model ensemble for sub-seasonal forecasts
- Coordination of annual to decadal climate prediction
- Regional severe weather forecasting
- Tropical cyclone forecasting, including marine-related hazards
- Nuclear environmental emergency response
- Non-nuclear environmental emergency response
- Atmospheric sand and dust storm forecasts
- Volcano watch services for international air navigation
- Marine meteorological services
- Marine environmental emergency response
- Flash flood forecasting

Non-real-time activities (5)

- Coordination of deterministic numerical weather prediction (NWP) verification
- Coordination of ensemble prediction system (EPS) verification
- Coordination of wave forecast verification
- Coordination of tropical cyclone forecast verification
- Coordination of observation monitoring

30 activities

MAY 2023 updated

WMO OMM

RSMC for **global deterministic NWP**

Activity specification

a. **Produce global analyses** of the three-dimensional structure of the atmosphere;

b. **Produce global forecast fields** of basic and derived atmospheric parameters;

c. **Make available on WIS a range of these products**; the list of mandatory and highly recommended global deterministic NWP products to be made available is given in Appendix 2.2.1;

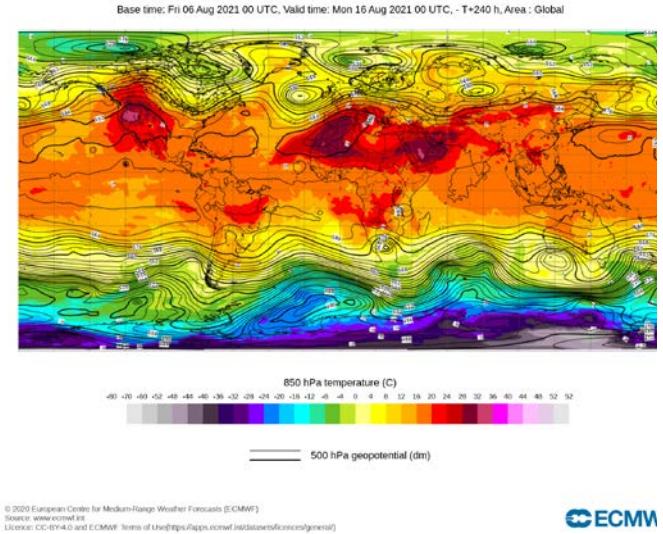
d. **Produce verification statistics** according to the standard defined in Appendix 2.2.34, and make them available to the Lead Centre(s) for DNV;

e. Make available on a website up-to-date information on the characteristics of their global

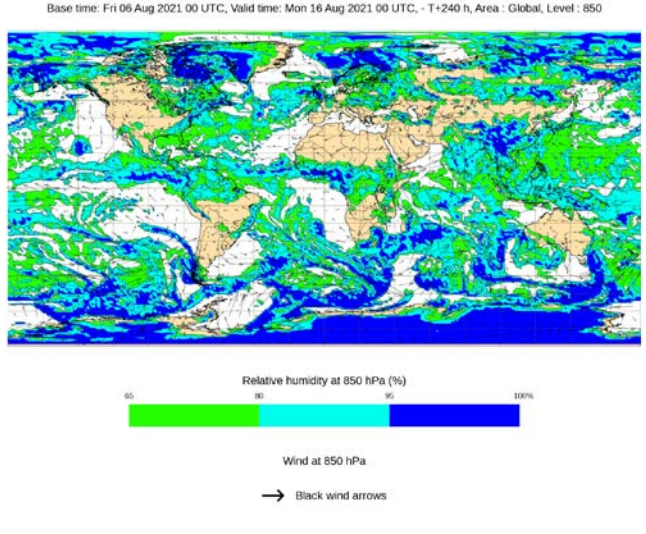
Minimum list of mandatory products

Parameter	*Level (hPa)*	*Resolution*	*Forecast range*	*Time steps*	*Frequency*
Geopotential height	850/500/250	1.5°× 1.5°	Up to 3 days/ Beyond 3 days up to 6 days	Every 6 hours/ Every 12 hours	Twice a day (0000 and 1200 UTC)/ Once a day
Temperature	850/500/250				
Wind zonal velocity (u) and meridional velocity (v)	925/850/700/500/250				
Relative humidity	850/700				
Divergence, vorticity	925/700/250				
MSLP	Surface				
2-m temperature 10-m u, 10-m v Total precipitation	Surface				

Geopotential 500 hPa and temperature at 850 hPa

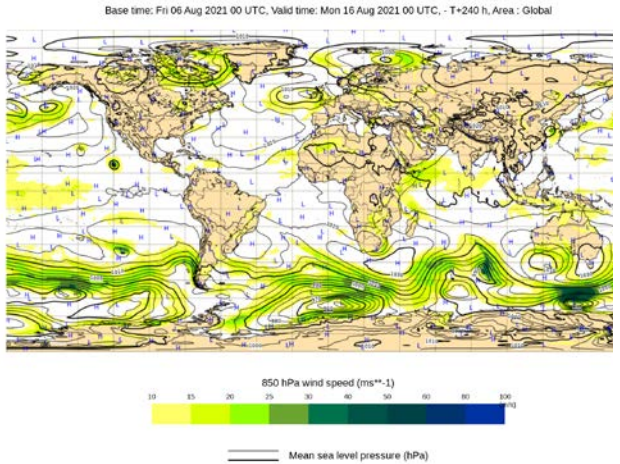


Wind and relative humidity at various pressure levels

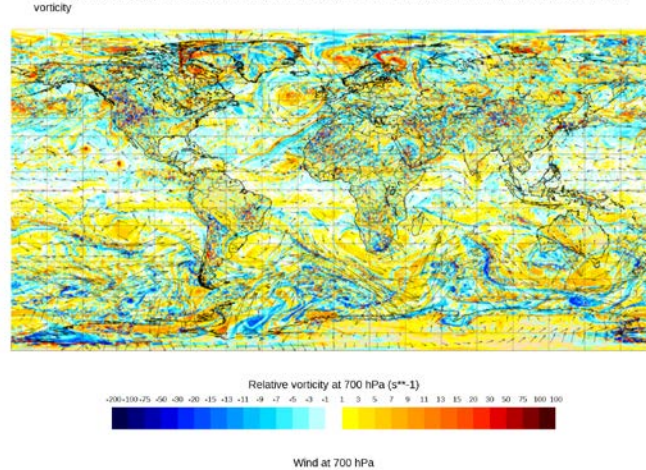


Some products of RSMC ECMWF for global deterministic NWP

Mean sea level pressure and wind speed at 850 hPa



Vorticity and wind at 700 hPa

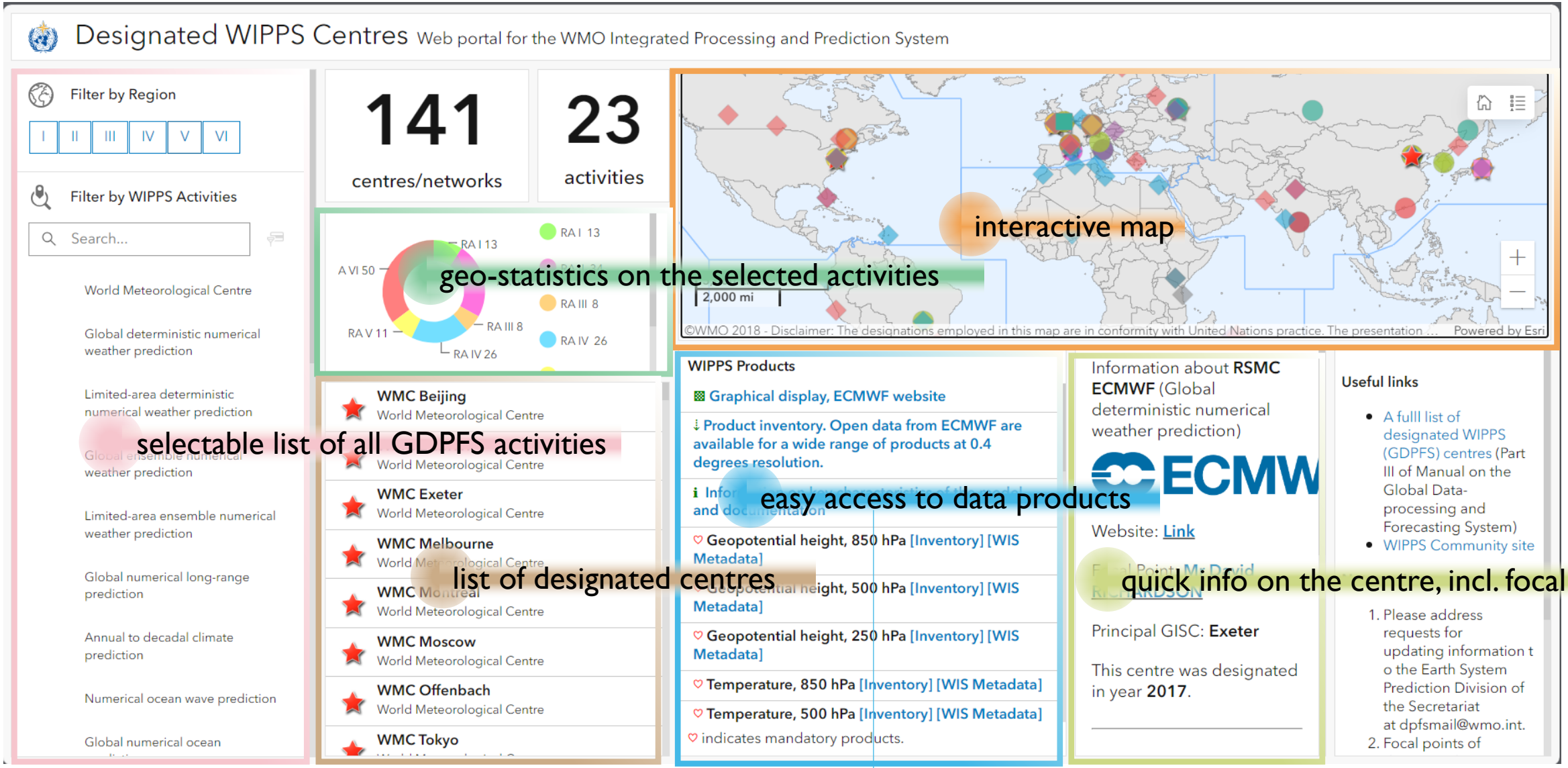


The products are distributed via WIS in the GRIB format.

WIPPS web portal

https://community.wmo.int/wipps-web-portal

✓ The web portal has been designed to improved data discoverability and accessibility



Mandatory products depicted by the Manual are listed here. Each links to a GISC of the WIS.

Provision of high-resolution NWP grid data from WMCs

WMC Washington (NCEP): Provision of high-resolution NWP grid data

Modeling System	Cadence/ Forecast Length	Products/Resolution of NWP data
GFS (Global weather and waves, deterministic, 13 km);	4 cycles, 16 days	0.25⁰, 0.5⁰ and 1⁰ data, 743 variables (surface and upper air); Available in GRIB2 via ftp; Available in GRIB2 via https; Available in GRIB2 via AWS
GEFS (Global weather and waves, 31-member ensembles, 25 km)	4 cycles, 16 days except 35 days at 00z	0.25⁰, 0.5⁰ and 1⁰ data, 505 variables, raw and bias corrected (surface and upper air); Available in GRIB2 via FTP; Available in GRIB2 via HTTPS; Available in GRIB2 via AWS
		istry); Available in GRIB2 via
		per air); Available in GRIB2 ed products at 3 km
		nd bias corrected); Available
		upper air), TC track and IB2 via https
WAM-IPE (Whole Atmosphere, Space)	4 cycles a day, 48 hrs	Available in netCDF via FTP; Available in netCDF via HTTPS

Plan to update soon

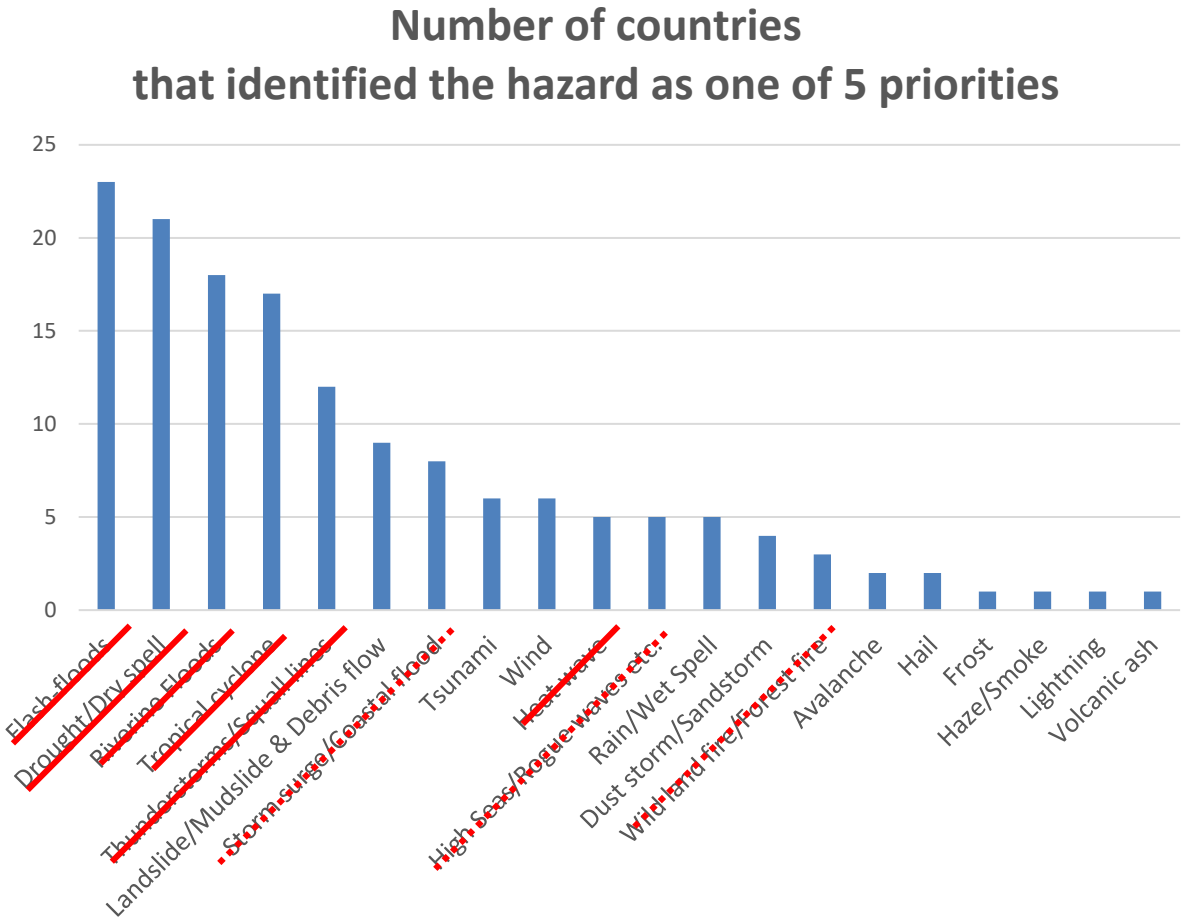
- All data freely available through FTP, HTTPS, and selected data on AWS (with longer retention time) in real-time, including unrestricted global observations in BUFR format for analysis and data assimilation. Longer archives are available through NCEI with additional filtering capabilities.
- Widely used worldwide for downscaling, initializing limited-area models (IC/BC), and various forecast applications
- GFS full resolution (C768L127) native model data available through AWS for running FV3 based NWP models
- Output from several high-resolution limited area deterministic models (NAM, RAP, HRRR) and ensemble models (SREF, HREF) are also available for North American Domain and other selected domains including Alaska, Hawaii, Guam and Puerto Rico
- Complete inventory of all NCEP operational models and their data availability is listed here.

Collected information at the GDPFS Symposium (2022)

Information for all presenters

- EW4All Initiative: **Approach to identify priority hazards**

- For the short-term activities of INFCOM, the six hazards were identified, mainly based on the hazards that were most frequently identified as “priority hazards” by the 30 countries.
  - **Flash-floods**
  - **Drought/Dry spell**
  - **Riverine Floods**
  - **Tropical cyclone**
  - **Thunderstorms/Squall lines**
  - **Heat wave**
- List of hazard types: defined by the implementation plan of the WMO Catalogue of Hazardous Events.



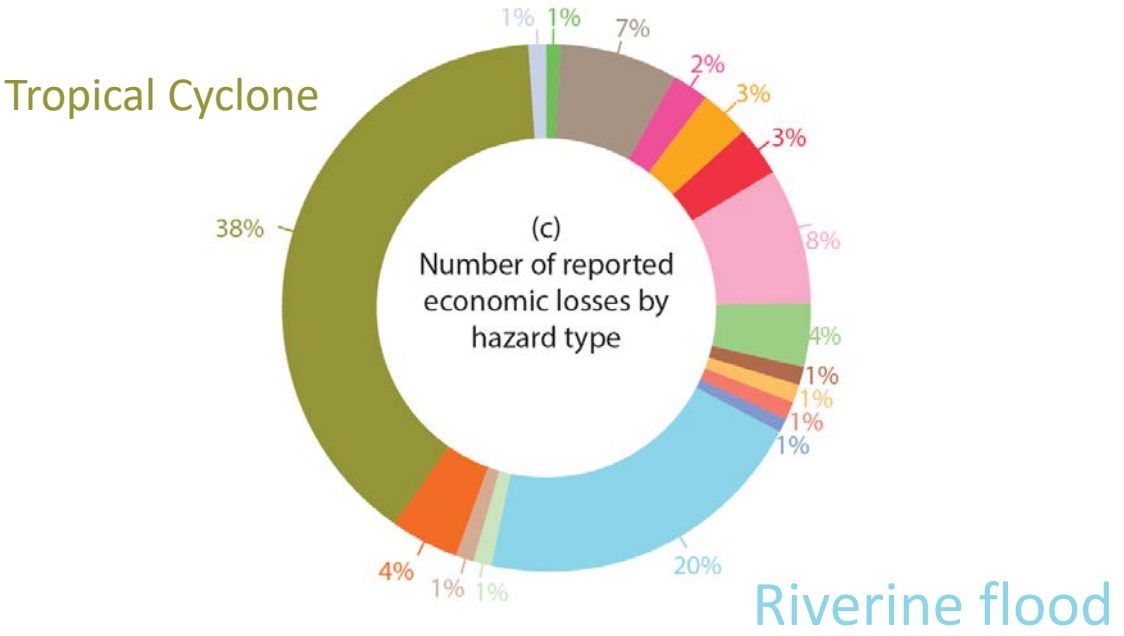
Inclusion of hydrology in WIPPS (ET-OHPS and HydroSOS)

- **EC-76 (2023) Resolution 3.2(13)/1**
- Establishment of Regional Specialized Hydrological Centres (RSHC):
- - RSHCs for S2S hydrological prediction
- - RSHCs for snow cover prediction
- - RSHCs for flash flood forecasting

- **ET-OHPS** ➡ Riverine flood, drought
- First meeting from 28 to 30 Nov. 2023

- **HydroSOS**
- The Hydrological Status and Outlook System

Riverine flood is the second hazardous type in terms of economic losses.



Source: WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019)

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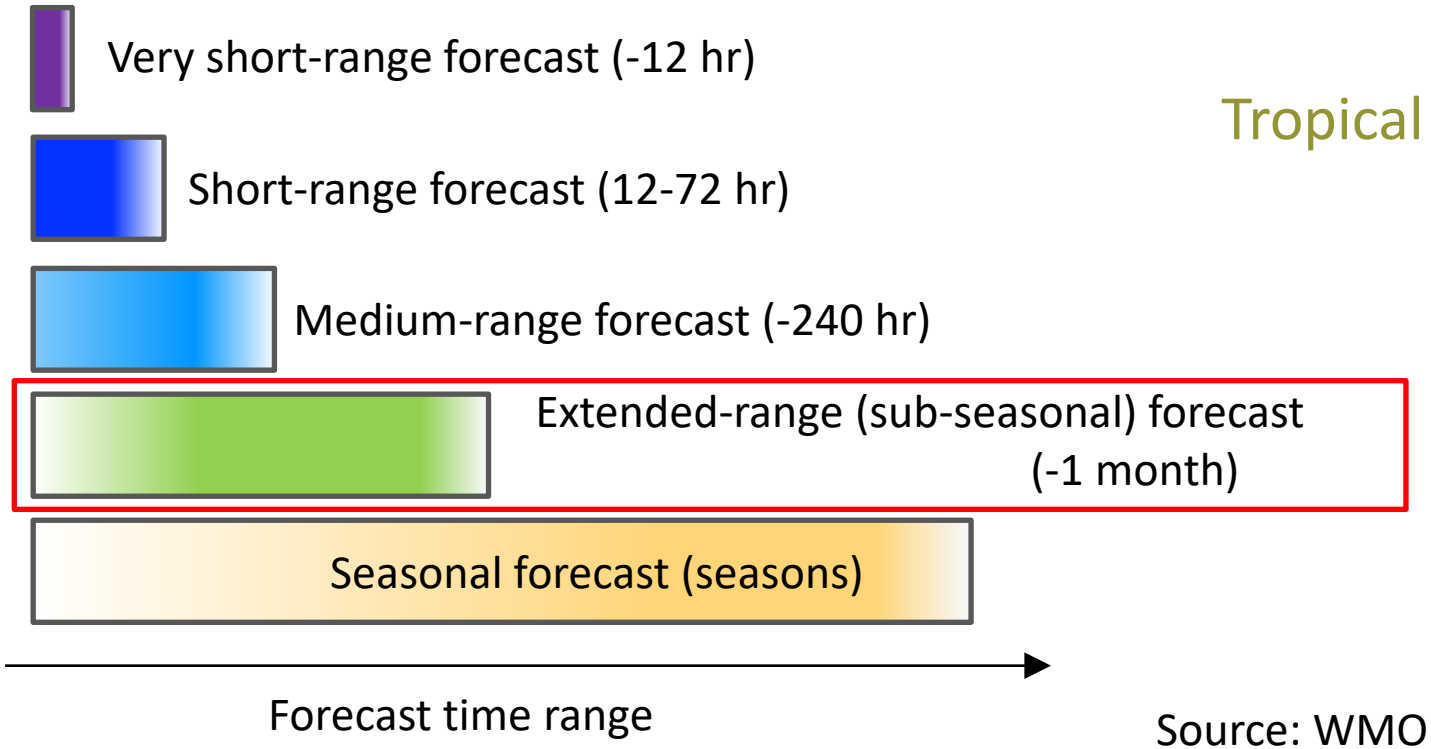
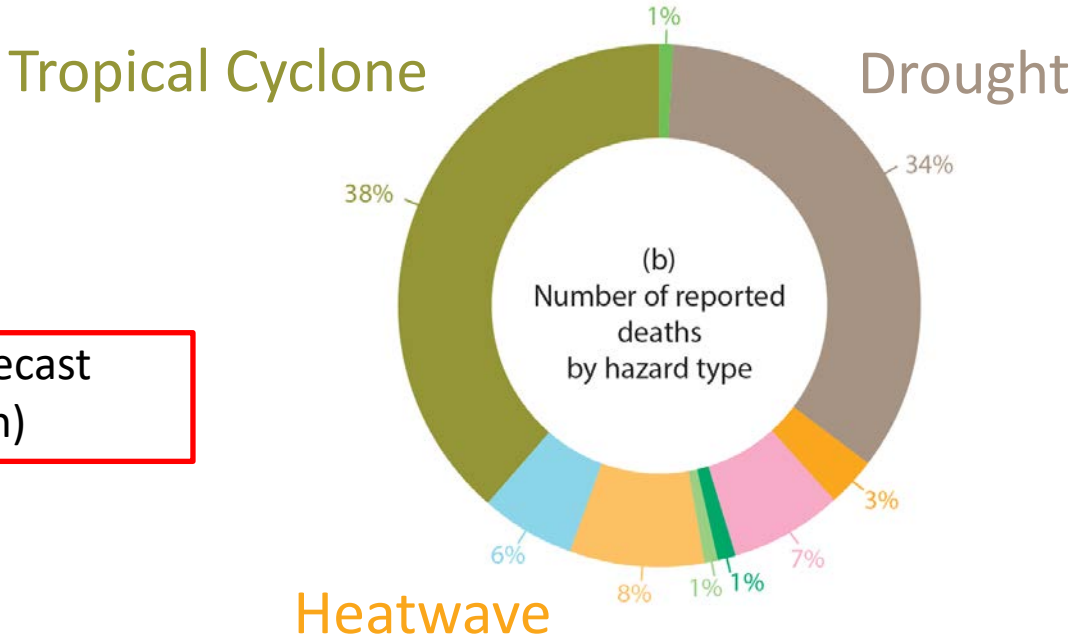
Seamless early warning services (LC-SSFMME, GPC-SSF)

GPC-SSF and LC-MMESSF have been established to fill the gap of forecast time ranges.



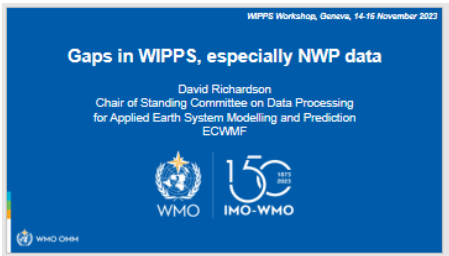
A drought and heatwave can persist a long period (weeks-months), impacting the society.



Source: WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019)

WIPPS Workshop as the 2nd WMC Workshop (14-16 Nov. 2023, Geneva, Switzerland)

The Workshop sought to facilitate the implementation of new requirements to meet user needs for the “Early Warnings for All" initiative.



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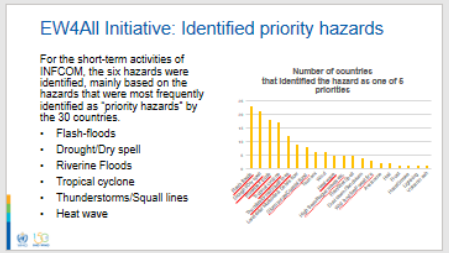

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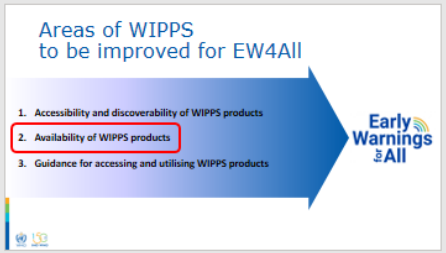

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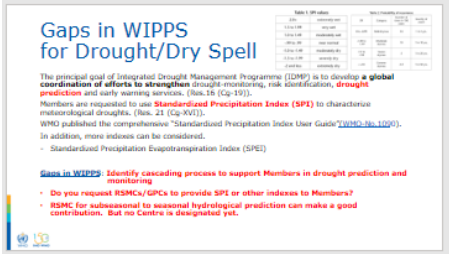

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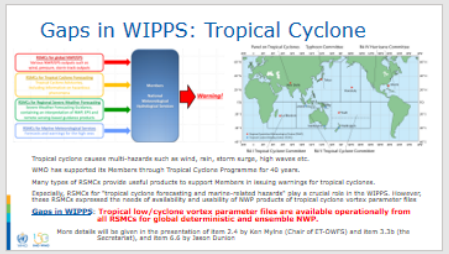

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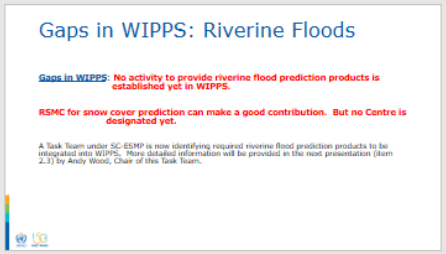

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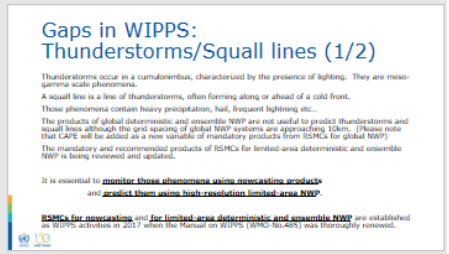

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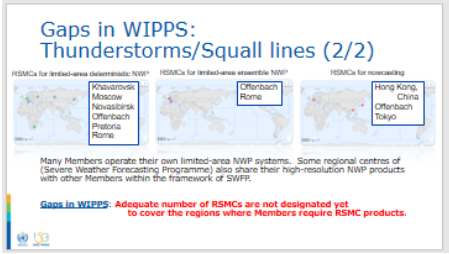

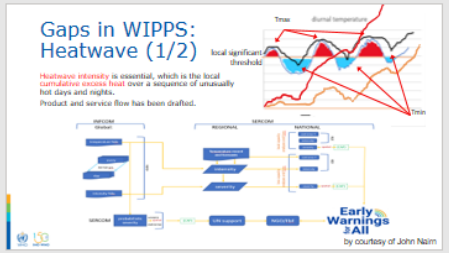

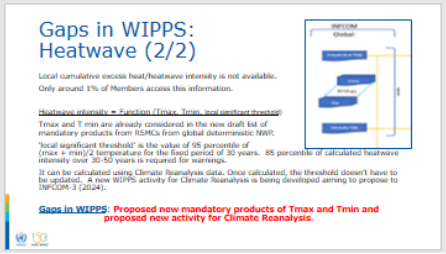

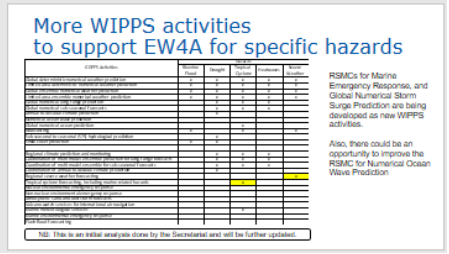

All presentations are available on [the minisite of the WIPPS Workshop](#).

Thank you

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