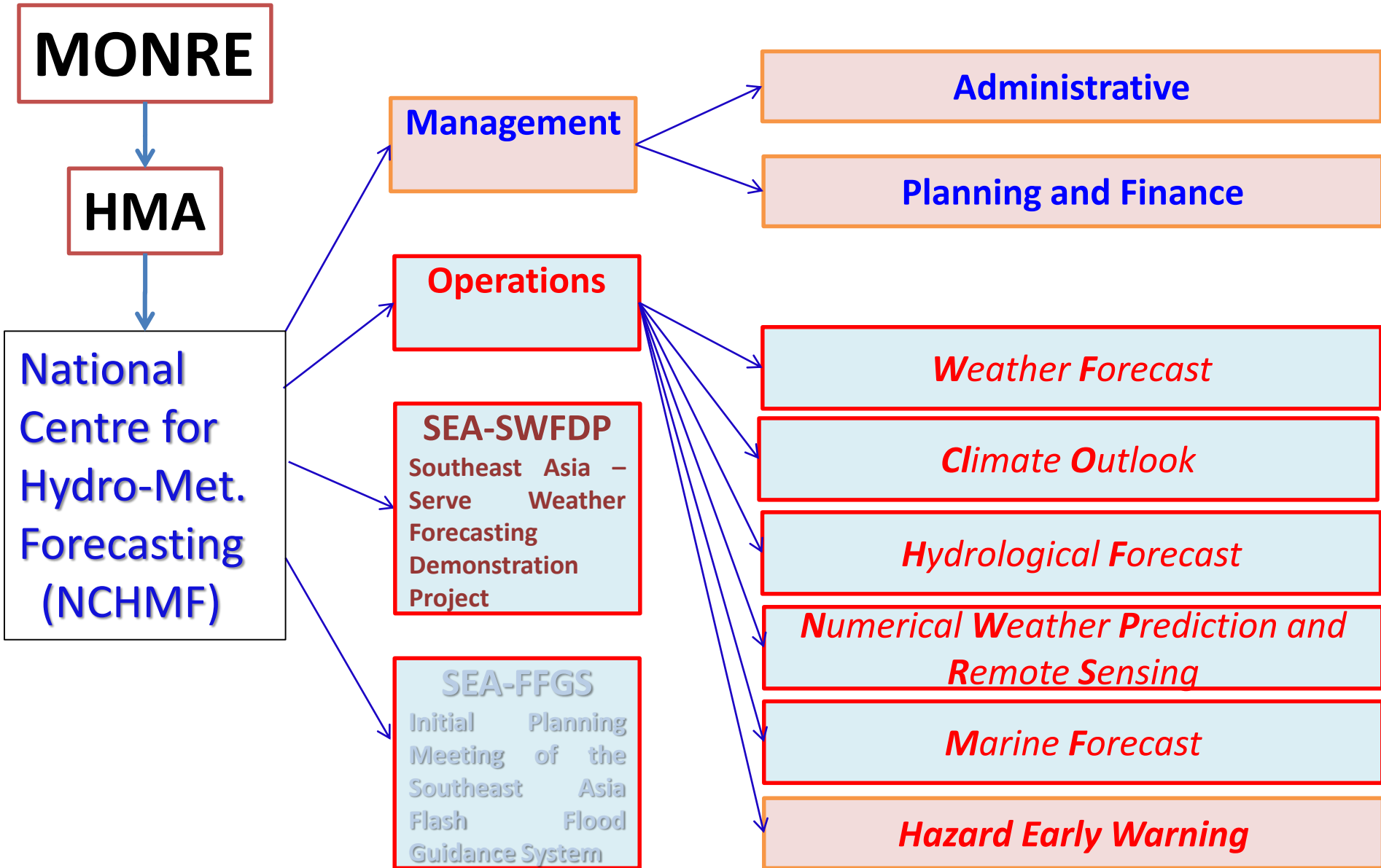
An Introduction to National Centre for Hydro-Meteorological Forecasting

Viet Nam Meteorological and Hydrological Administration

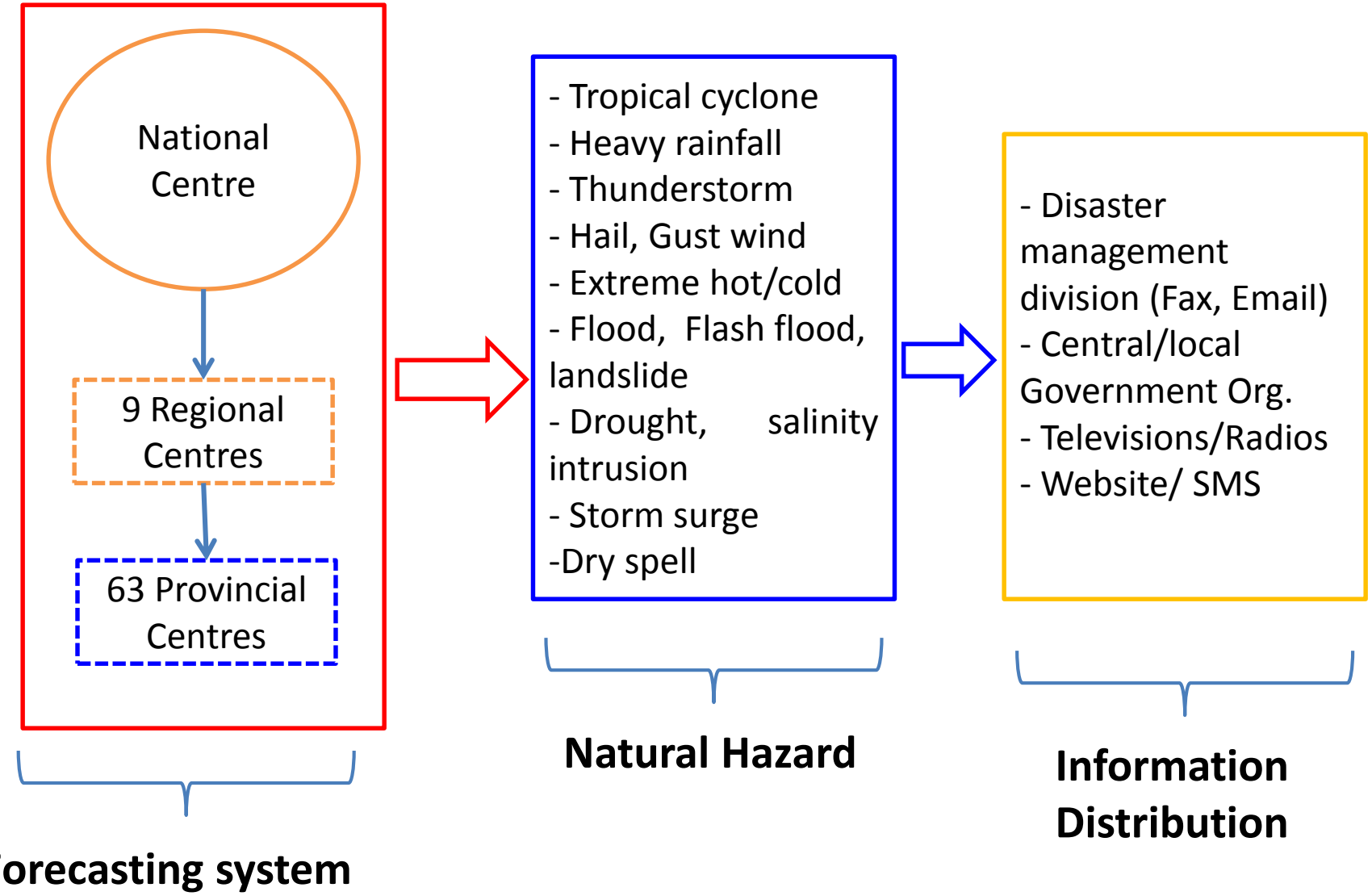
Outline

1. Administrations
2. Forecast Technologies
3. Typhoon Forecast
4. Regional Forecasting Support Center (SWFPD-SEA)
5. Future Developments

1. Administrations

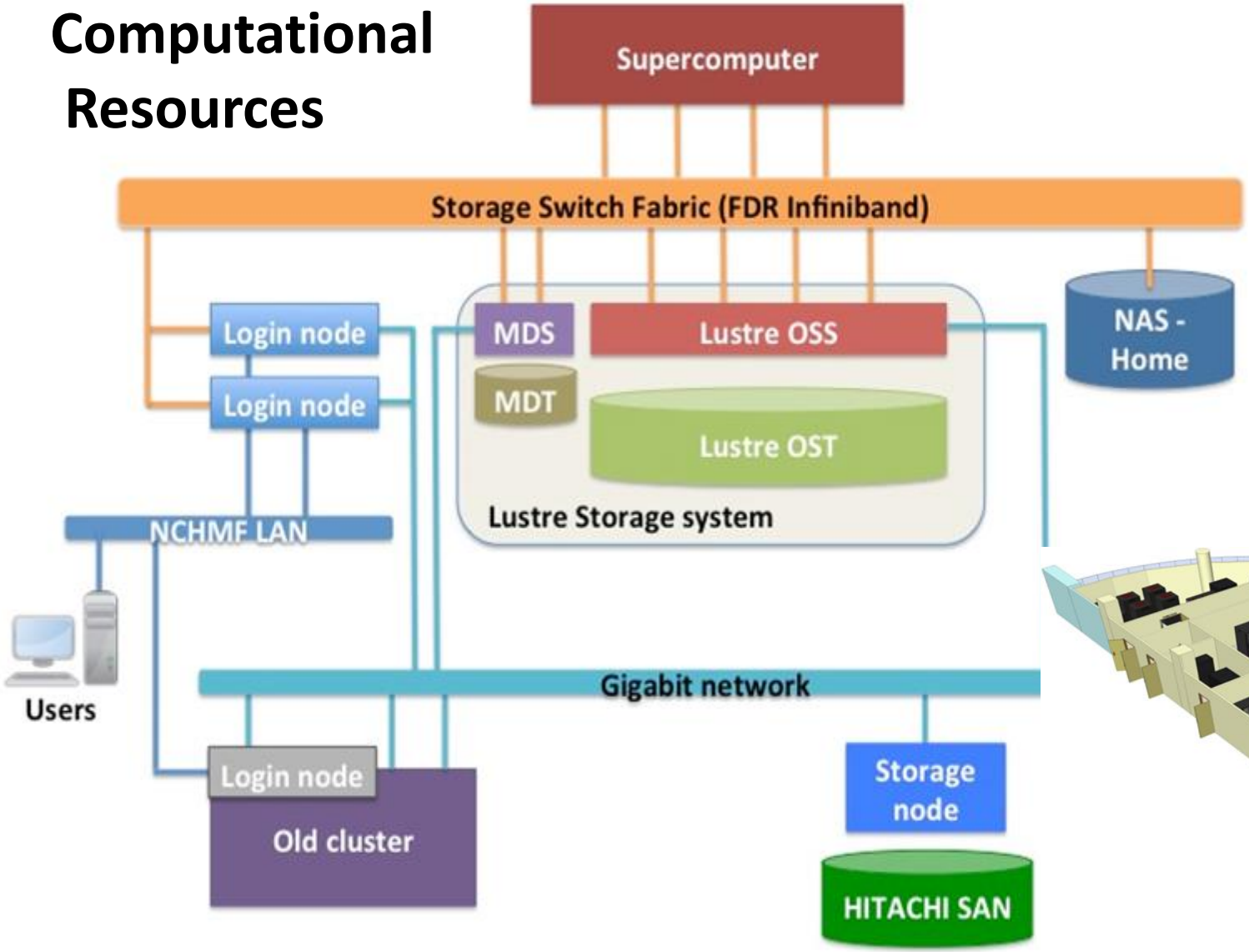


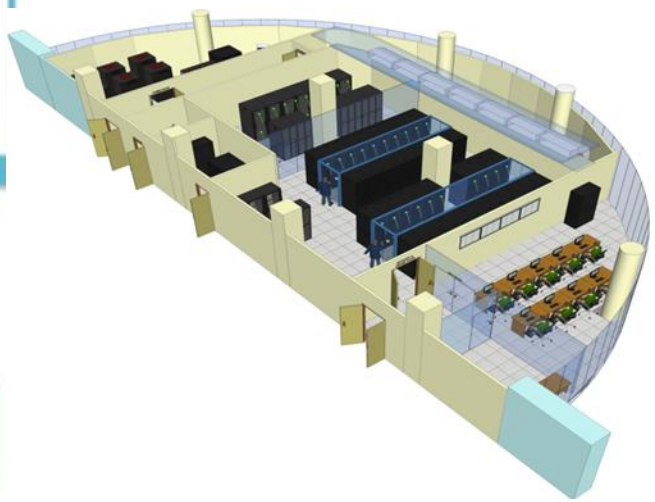
How the system works – What we do



2. Forecasting Technologies

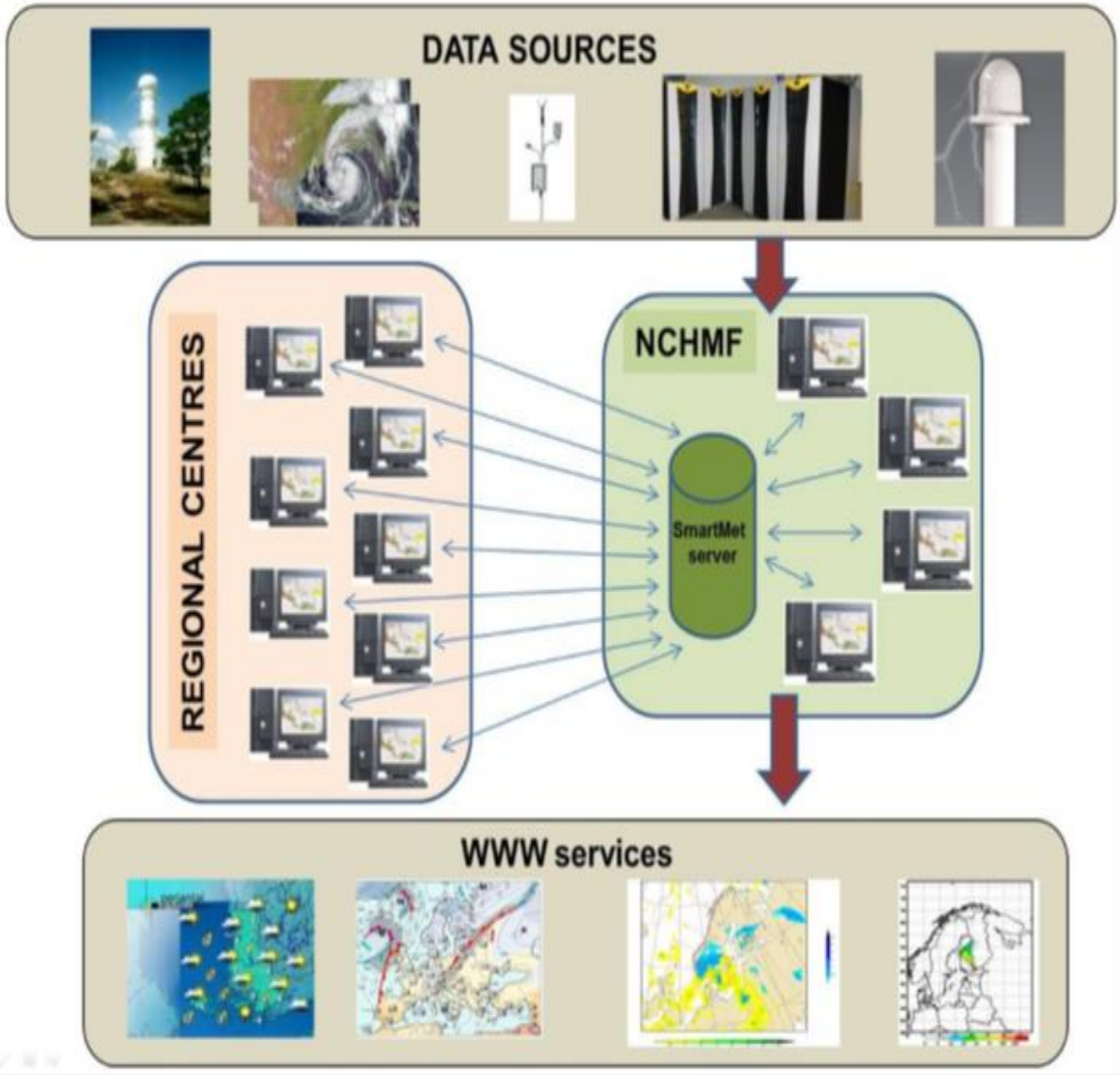
Computational Resources





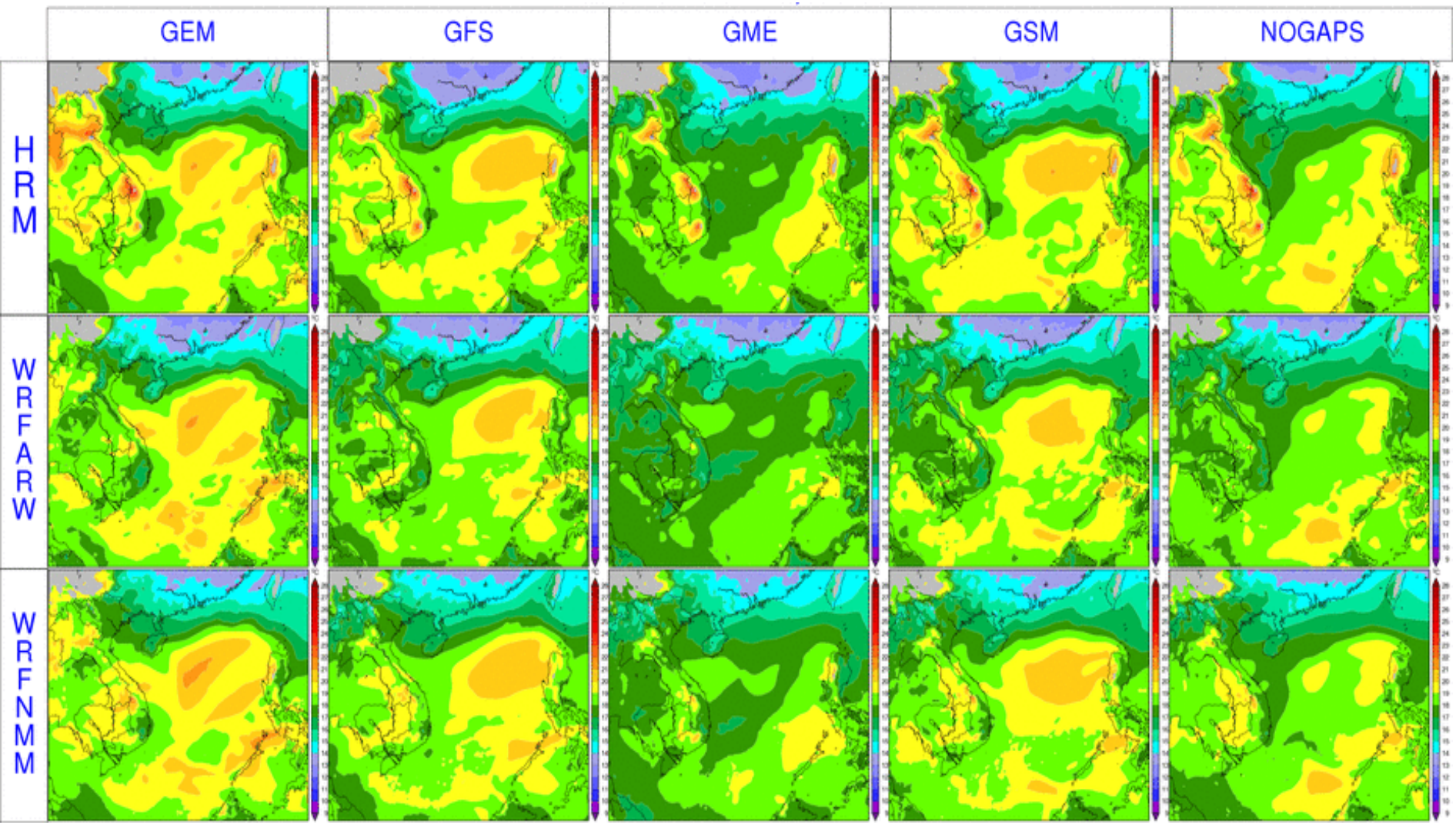
Ensemble Forecasting System

- ✓ NAEFS (100kmx100km, 2times/day, 10 days forecast)
- ✓ ECEPS (50kmx50km, 2times/day, 10 days forecast)
- ✓ SREPS (15kmx15km, 2times/day, 3 days forecast)
- ✓ LEPS (22kmx22km, 2times/day, 5 days forecast)



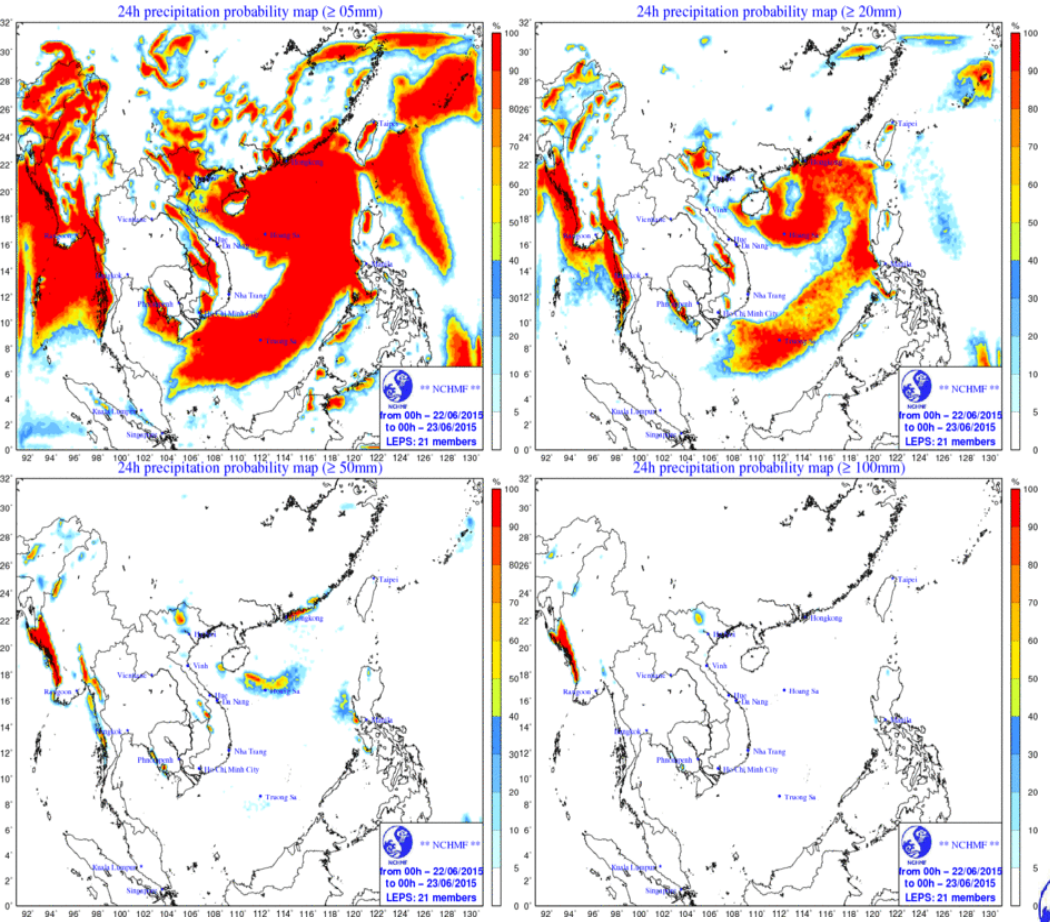
Ensemble Forecasting System

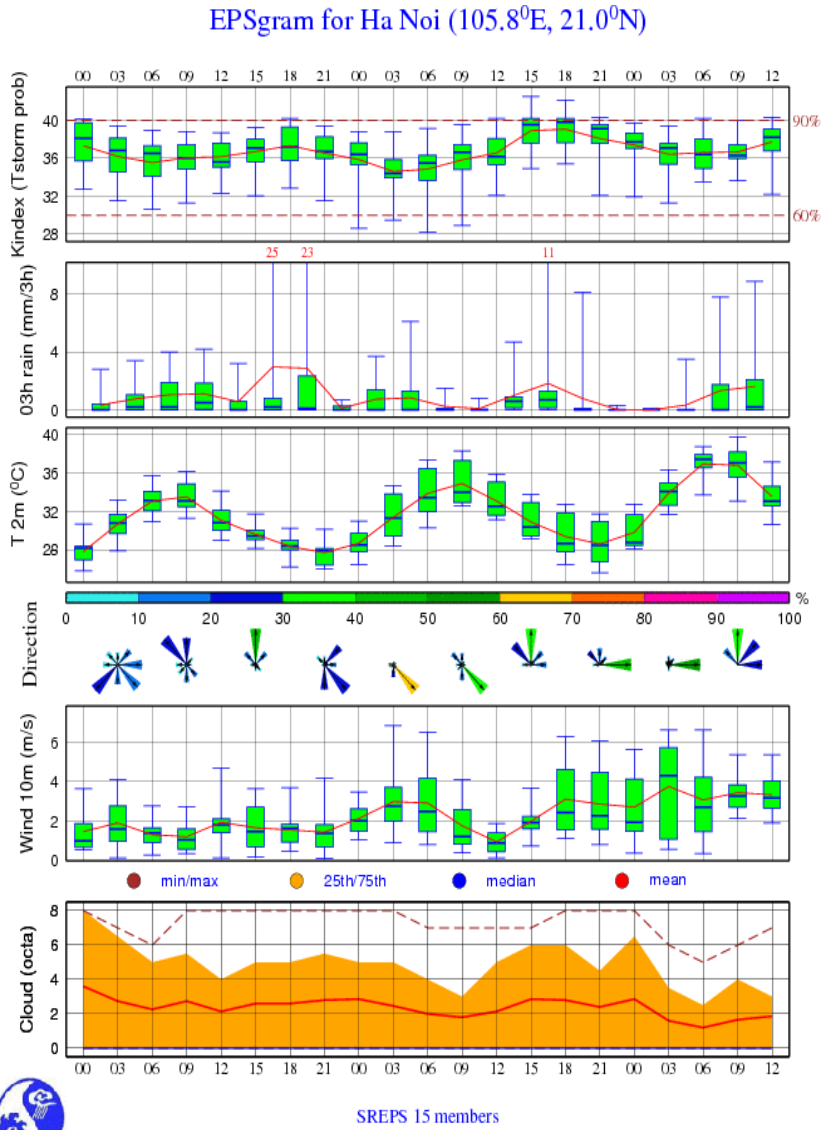
SREPS product for T850



Ensemble Forecasting System

Probability Maps and EPSgram from Regional Ensemble Systems





2.2 Hydrological Technology and products

Hydrological forecasting models from 1-10 days

Rainfall (observation, rainfall estimate from NWP, radar and satellite)

Hydrological Lumped model (TANK, NAM)

***Hydrological distributed model* (MARINE, IFAS…)**

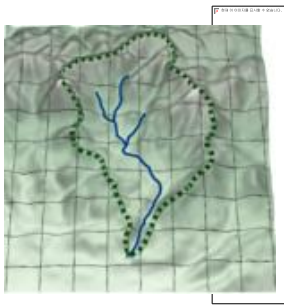
Reservoir regulation models

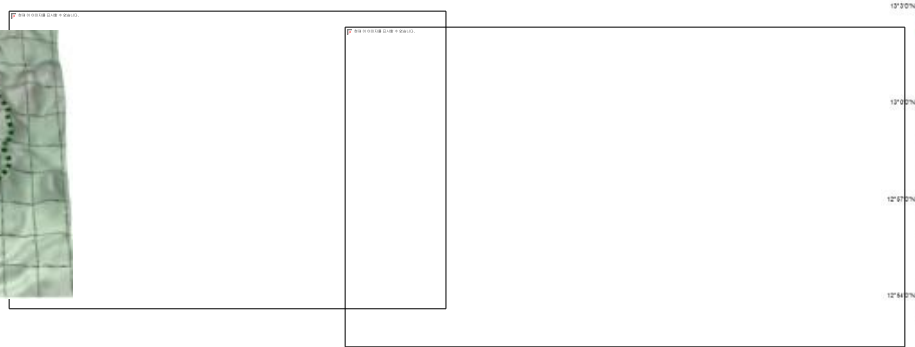
Transmission and Hydraulic models (MUSKINGUM, MIKE 11 GIS, Mike Flood)

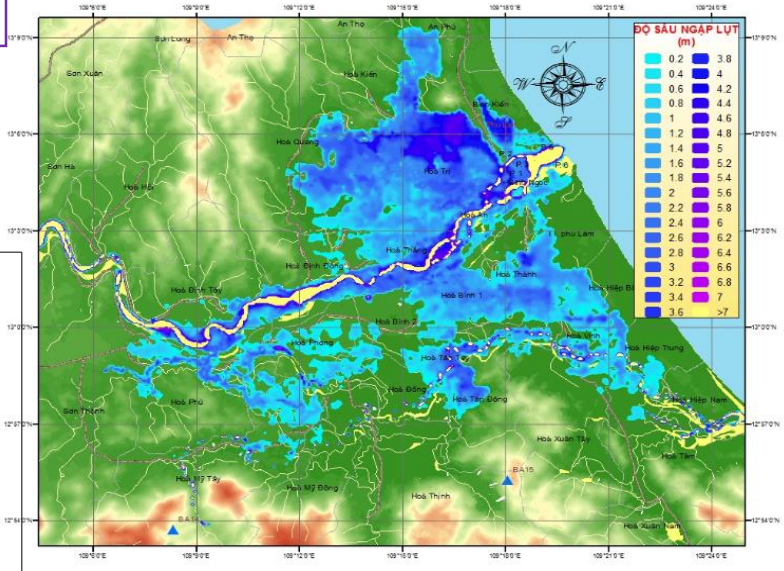
Reservoir regulation and Flood forecasting report

Water level and inundation report

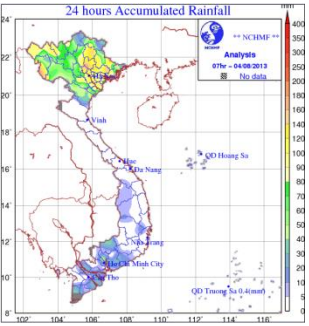
- 20 main rivers
- Daily, 10 days, monthly, seasonal hydrological forecasting
- Flood, Flash flood, landslide drought, salinity intrusion forecasting and warning

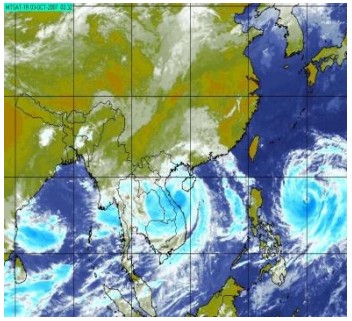


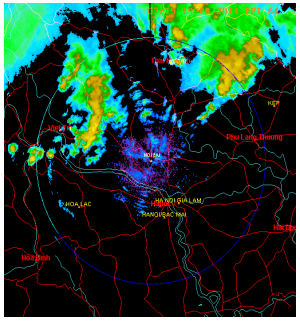


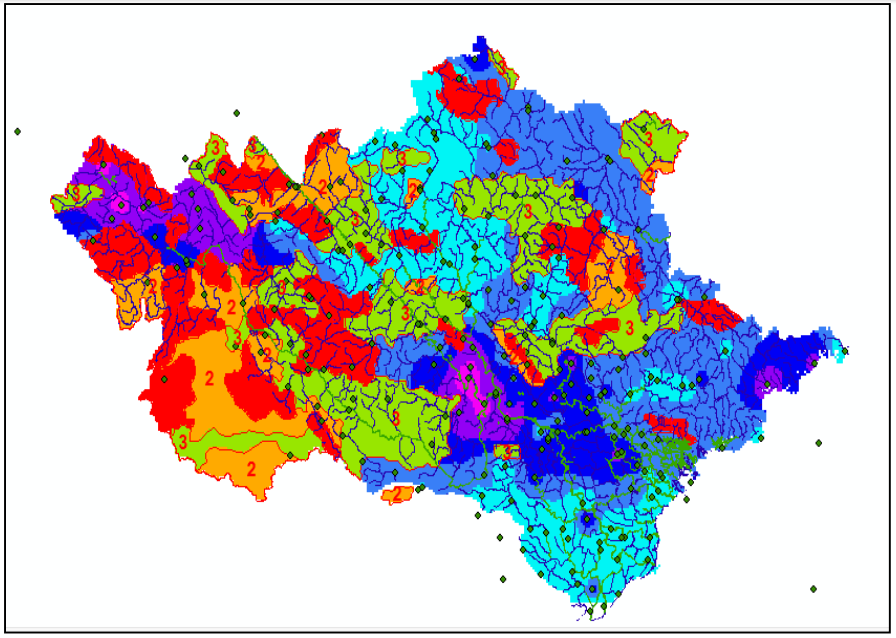


Hydrological Technology and products

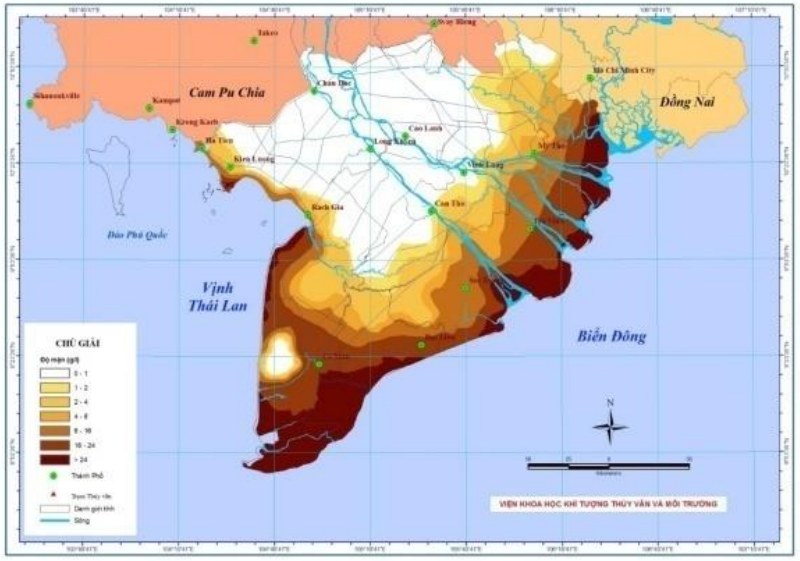




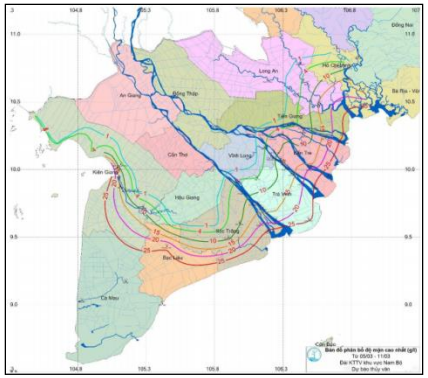




Flash flood and landslide warning using rainfall estimated from NWP, satellite, Radar images and automatic rain gauges

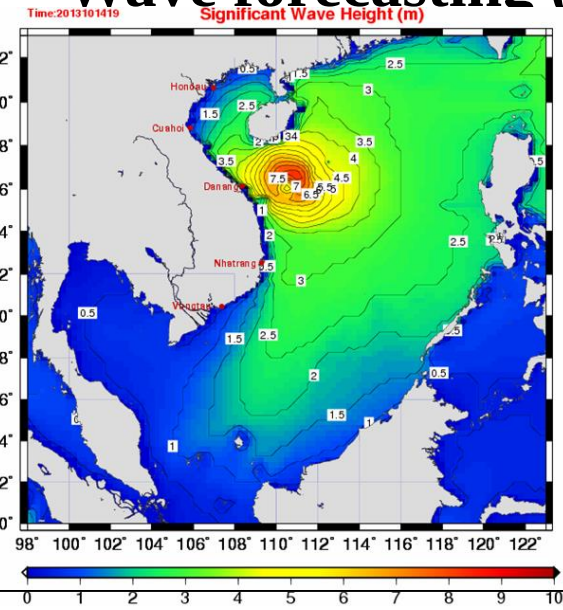


Drought and salinity intrusion forecasting and warning using hydraulic model

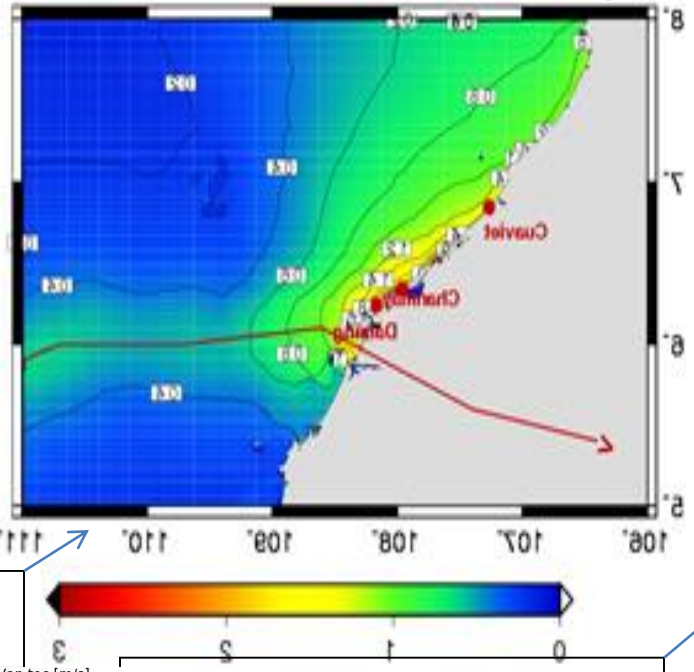


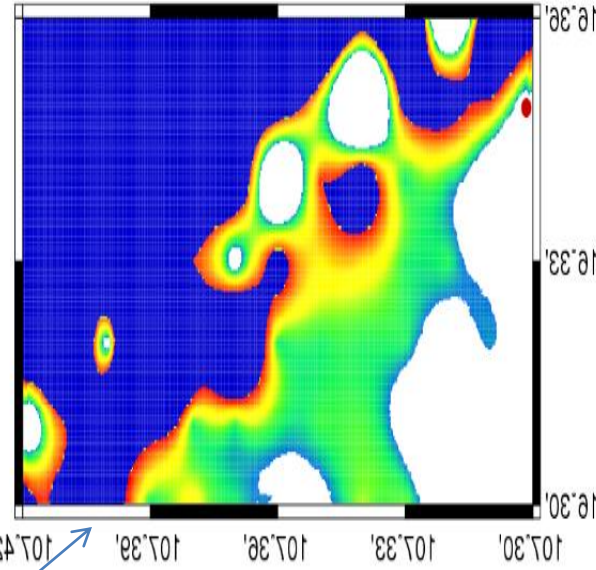
2.3 Marine Forecasting

Wave forecasting (SWAN)

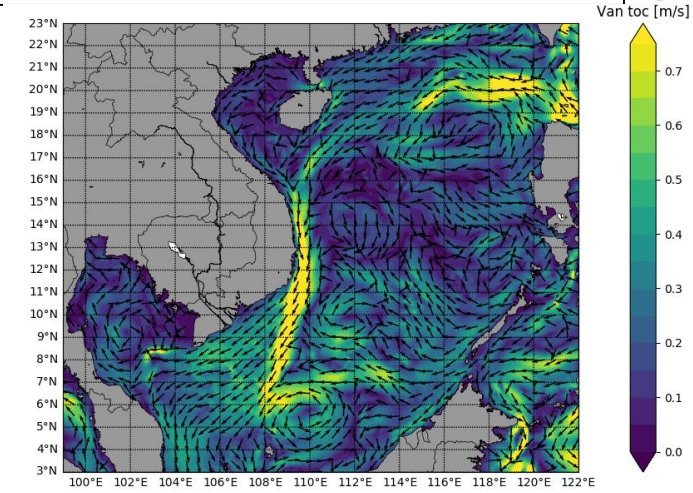


Storm surge and trajectory





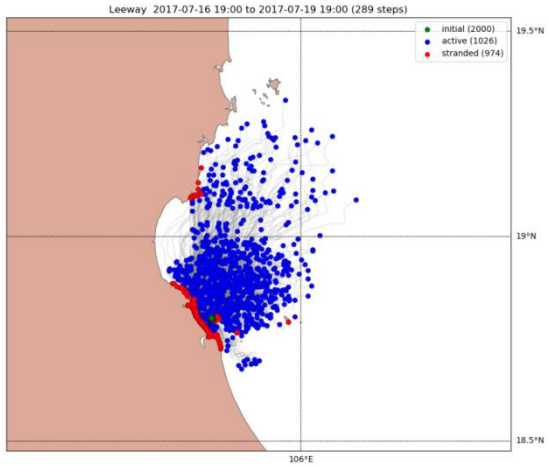
Maximum storm surge



Coastal inundation

Surface current

Trajectory of objective



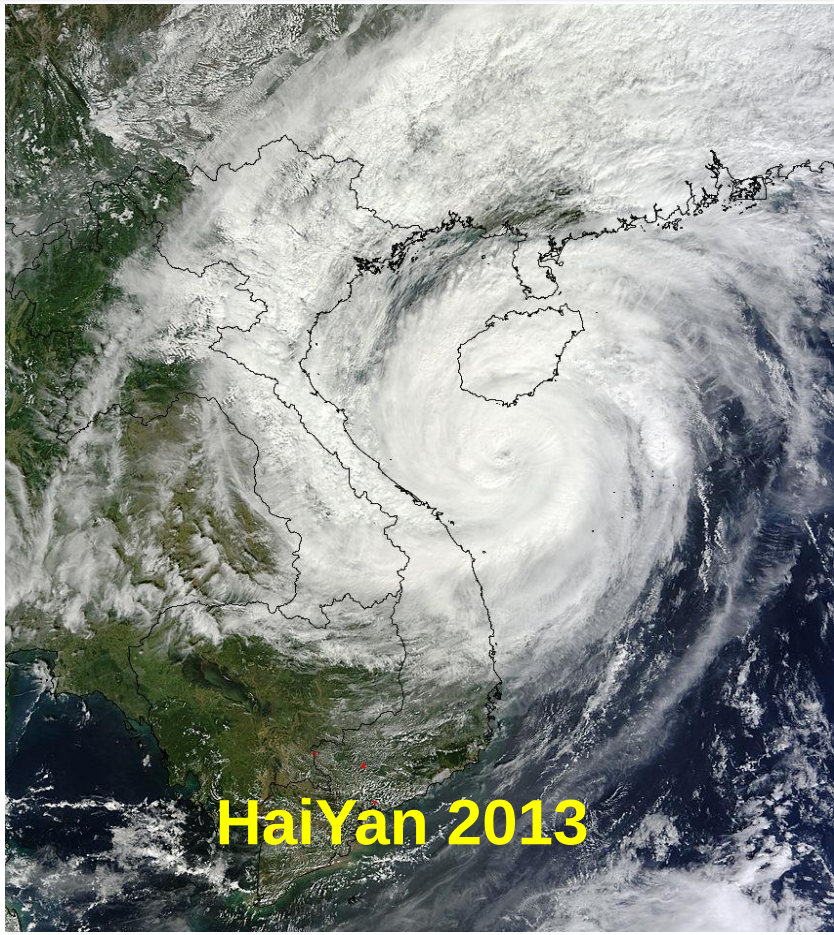
3. Typhoon Forecast System

Anually:

10 - 12 Tropical cyclones activate over the East Sea (40% from ES, 60% from WNP)

5-6 Tropical cyclones make landfall or indirectly affect to Vietnam

Storm Season: May-Dec (June-Nov)

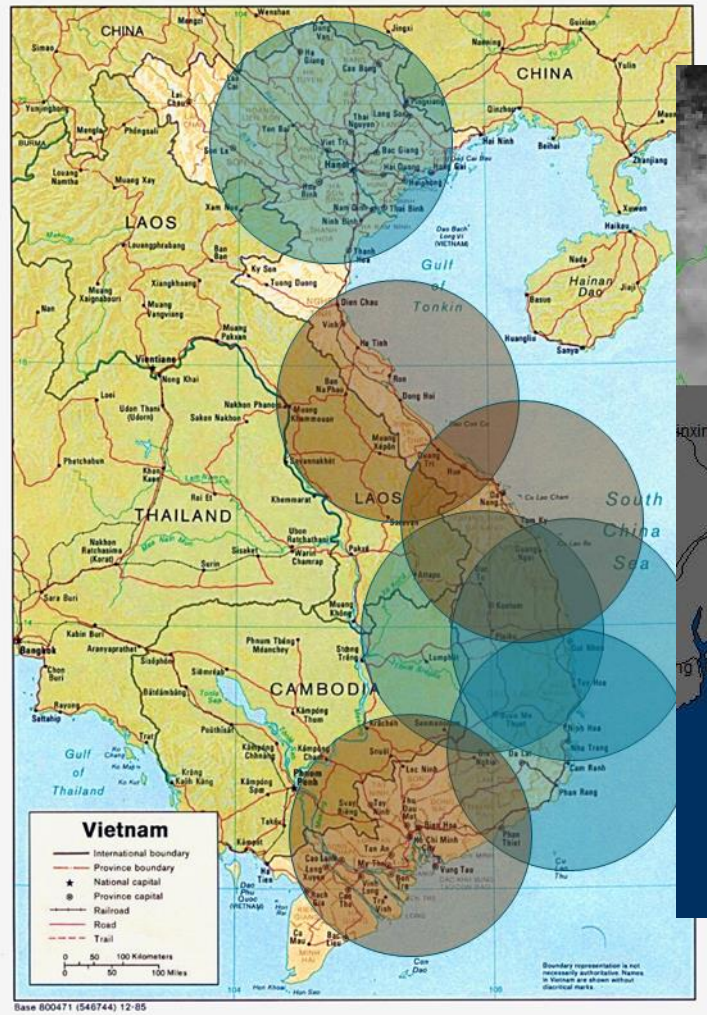


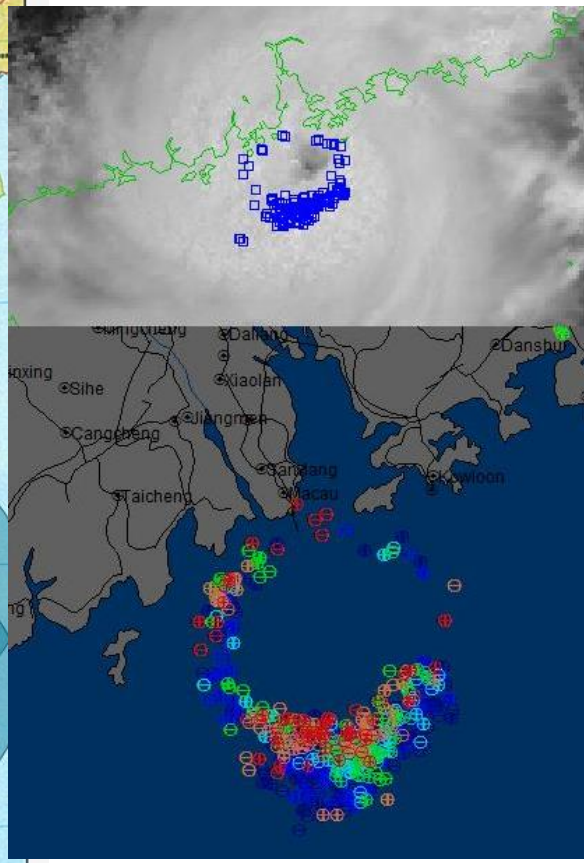
Tropical cyclones Frequency:

1	2	3	4	5	6	7	8	9	10	11	12
0.05	0.00	0.10	0.15	0.35	1.10	1.60	1.25	1.60	1.90	1.15	0.45

Remote sensing information

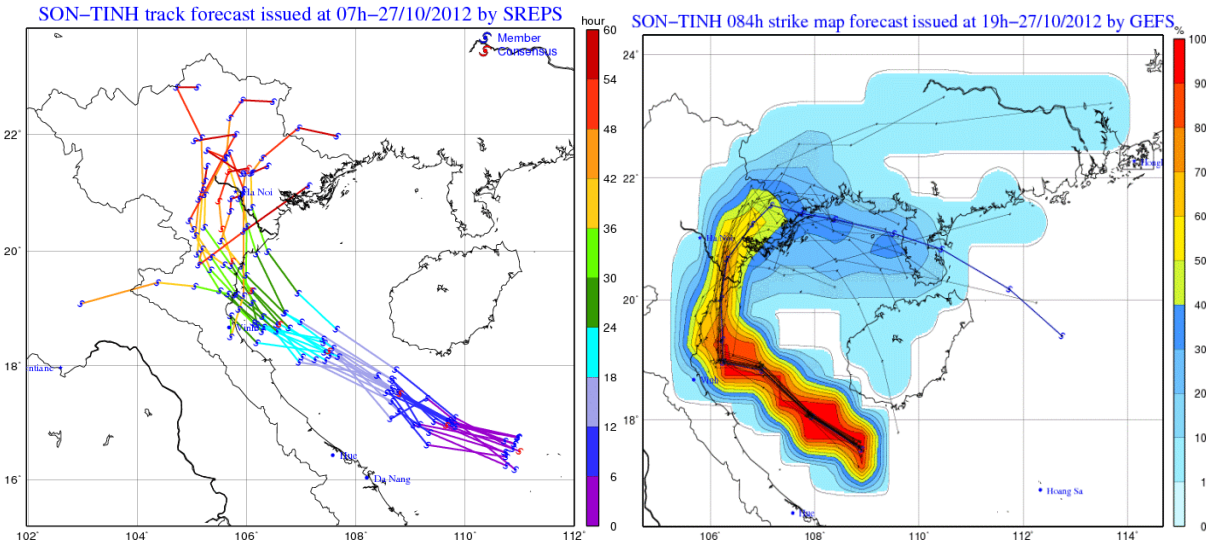
Band		Wavelength [μm]	Spatial Resolution
V1	VIS	0.46	1Km
V2		0.51	1Km
VS		0.64	0.5Km
N1	Near IR	0.86	1Km
N2		1.6	2Km
N3		2.3	2Km
I4	IR	3.9	2Km
WV		6.2	2Km
W2		7.0	2Km
W3		7.3	2Km
MI		8.6	2Km
O3		9.6	2Km
IR		10.4	2Km
L2		11.2	2Km
I2		12.3	2Km

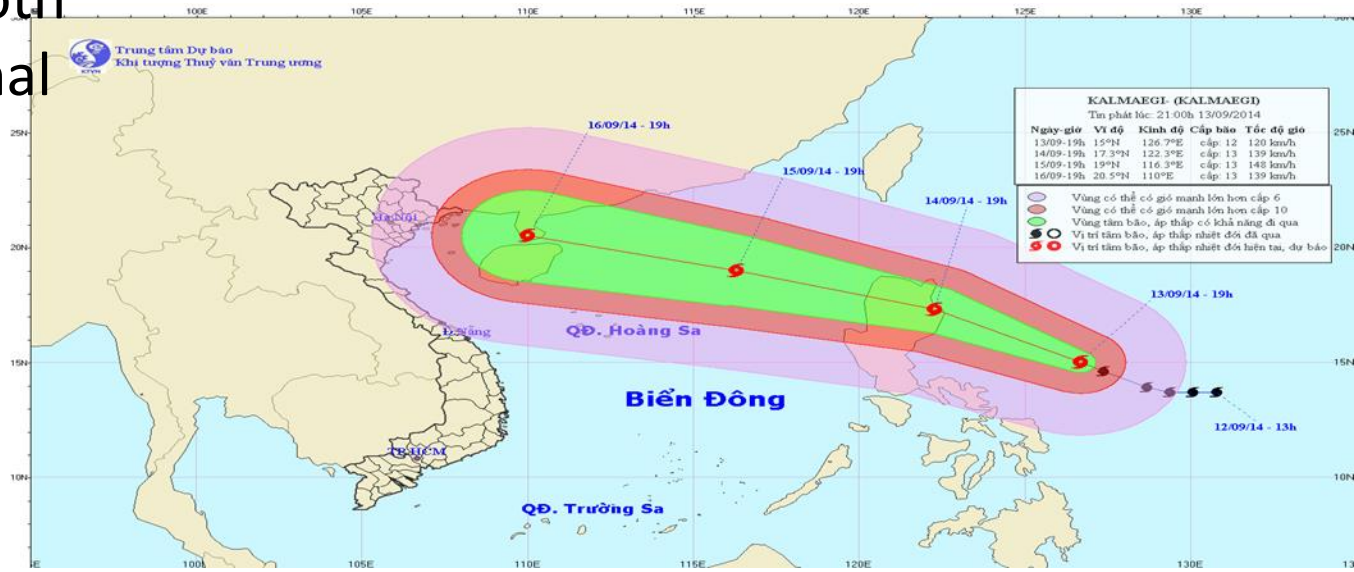




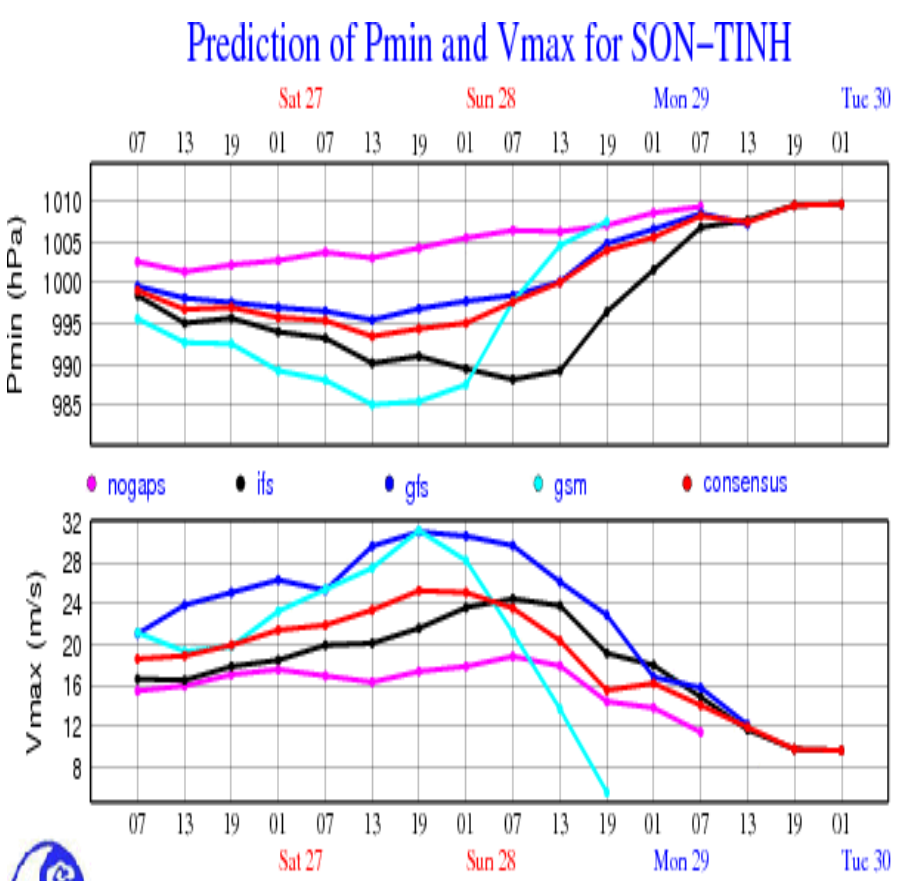
Tropical Cyclone Forecasting

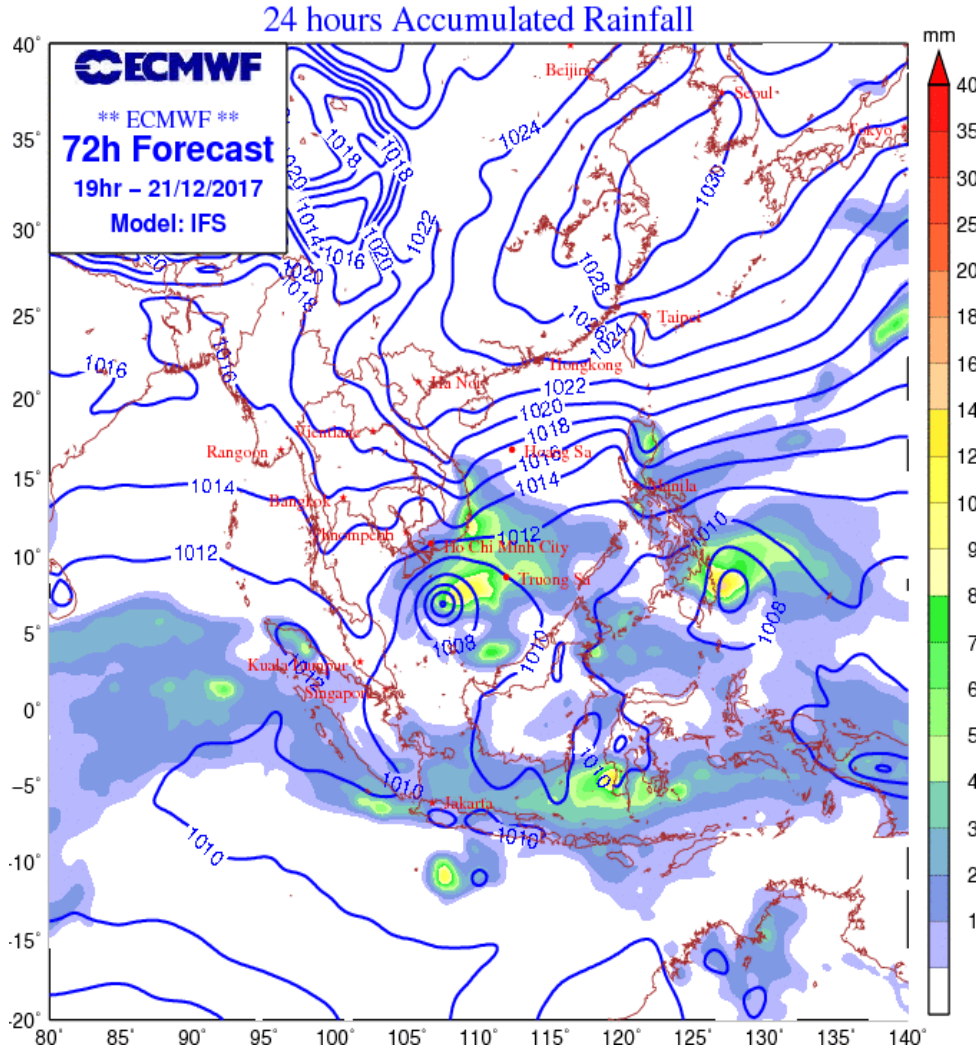
- Track
- Intensity
- Wind
- Precipitation
- EPSgram for specific locations
- All products in both global and regional system





TC Intensity: Pmin, Vmax, Rainfall





TC Forecast Verifications

Along track error (AT): AT > 0 ----> Forecast of TC movement is faster than observation.
AT < 0 ----> Forecast o

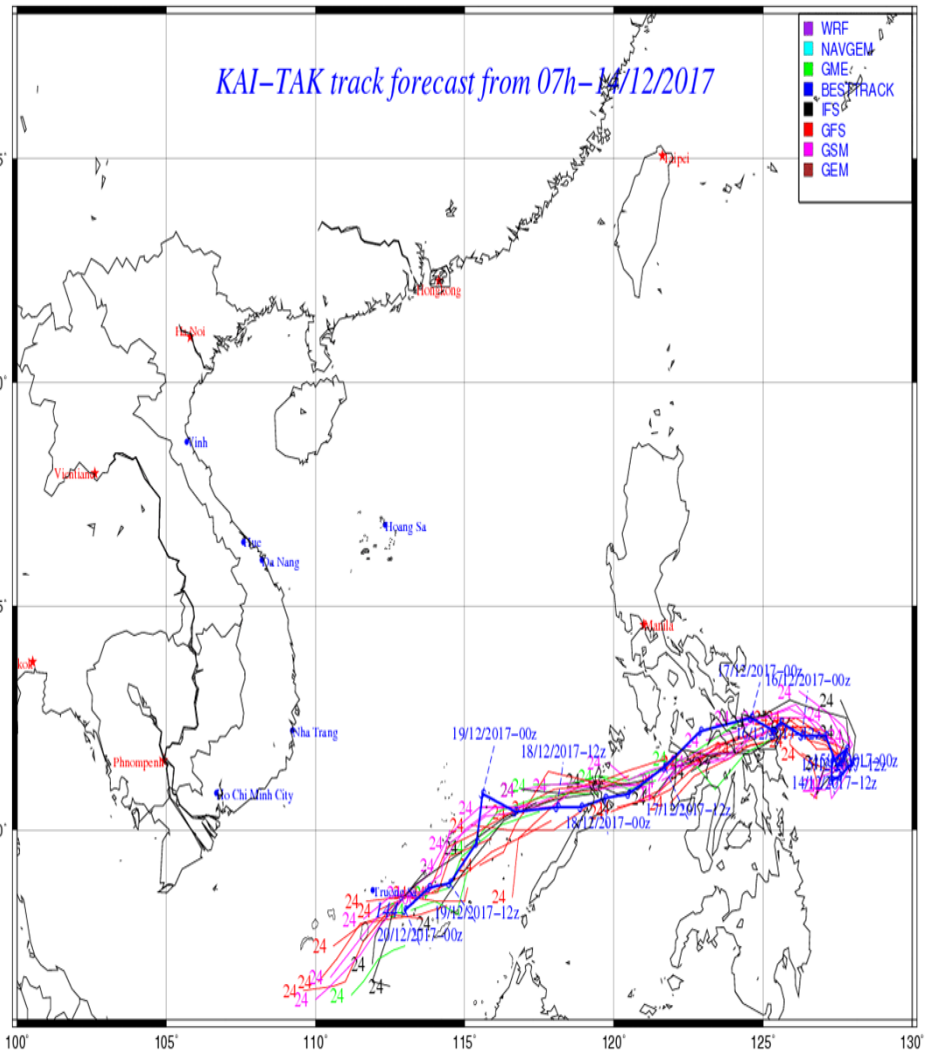
	24h	48h	72h
gfs	27.17	-1.21	-36.06
gme	15.85	19.73	117.37
gsm	-26.44	-49.79	-79.16
ifs	43.39	55.01	-8.91
ensmean	-67.49	-78.65	-100.95

Cross track error (CT): CT > 0 ----> Forecast o
CT < 0 ----> Forecast o

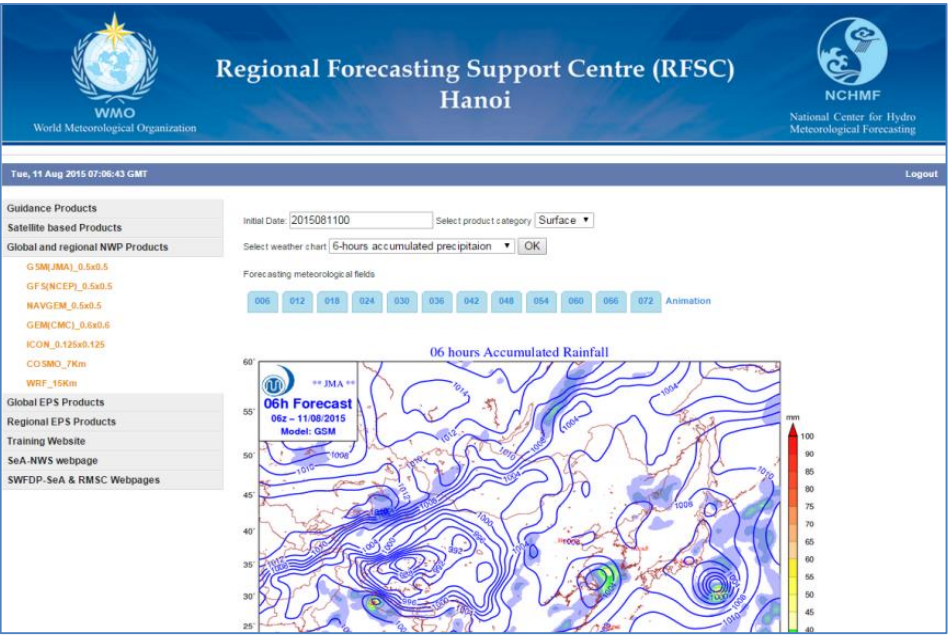
	24h	48h	72h
gfs	-13.04	-22.92	-15.09
gme	-2.52	3.11	9.18
gsm	16.87	16.90	-47.45
ifs	-17.04	5.08	19.47
ensmean	-2.08	-3.87	-32.26

Direct positional error (DPE)

	24h	48h	72h
gfs	112.87	88.15	97.45
gme	70.77	66.18	119.78
gsm	94.66	103.48	131.31
ifs	129.04	91.86	107.61
ensmean	108.53	134.57	137.24



4.Regional Forecasting Support Center



RFSC Guidance Product for SWFDP-Southeast Asia

SHORT-RANGE (DAY 1 and DAY 2)

***Issue time*: 0800Z Mon 27th July, 2015**

***Valid time*: DAY1: 1200Z Mon 27th to 1200Z Tue 28th July 2015**
DAY2: 1200Z Tue 28th to 1200Z Wed 29th July 2015

Preamble

RFSC Guidance Products are based on a skillful evaluation of both Global and Regional model outputs for the domain area, satellite imagery at the hour of the issue and, expert interpretation that takes into consideration interactions with the local features. For generating the guidance products, the following criteria are used:

- Heavy precipitation: > 50mm/24h & > 100mm/24h (the risk over 200mm/24 shall be described in discussion text)
- Strong Winds: > 30 Knots (over land and Sea) > 50 Knots (over Sea)

Assessment Scale for the Degree of Confidence of Forecast:

Confidence Level >75% (High); Confidence Level 50-75% (Medium); and Confidence Level <50% (Low)

Synoptic Situation BOTH DAYS:

Over the Southeast Asia domain:

- A trough having axis along 21°N – 23°N is across the north of Vietnam with a low pressure area during next 24 and 48 hours.
- In the south of Sea domain, the medium-intensity southwest monsoon prevails over Amanda Sea, Thailand Gulf, the south of Biendong Sea, the western sea of Phillippine.
- The sub-tropical high is expected to weak next 24 and 48 hours.

Risk over Southeast Asia domain next 24h and 48h

- The risk of heavy rain is expected over:
  - The northeast of Vietnam and Bacbo Gulf in DAY 1 and DAY 2.
- The risk of strong wind is expected over:
  - The Bacbo Gulf of Vietnam in DAY 1.

Degree of Confidence for DAY ONE:

5. Future Developments

- Forecast Tech. (NWP) will be developed as follows:
  - A system of **non-static meso-scale** numerical forecast models with high-resolution non-hydrostatic models (2-5km) is capable of accurately simulating and forecasting moderate-to-large-scale weather phenomena, such as heavy rainfall events, thunderstorms
  - The **typhoon high-solution track** and intensity forecast system for South China Sea;
  - The short and medium-range ensemble forecast system for Vietnam based on multi-models, initial disturbance analysis;
  - The problems of **climate and climate change** will be solved by regional climate models and global climate models
- Improving the quality of Hydro-Meteorological models using automatic rain gages; Setting up early warning and alert systems…
- Take part in Southeast Asia Flash Flood Guidance System.


Thank you