

Comparison of Ensemble Flood Forecasts from Two Regional EPS: Simple Downscaling of Global EPS and Regional Data Assimilation

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HEPEX Workshop, Melbourne 6 Feb.2018

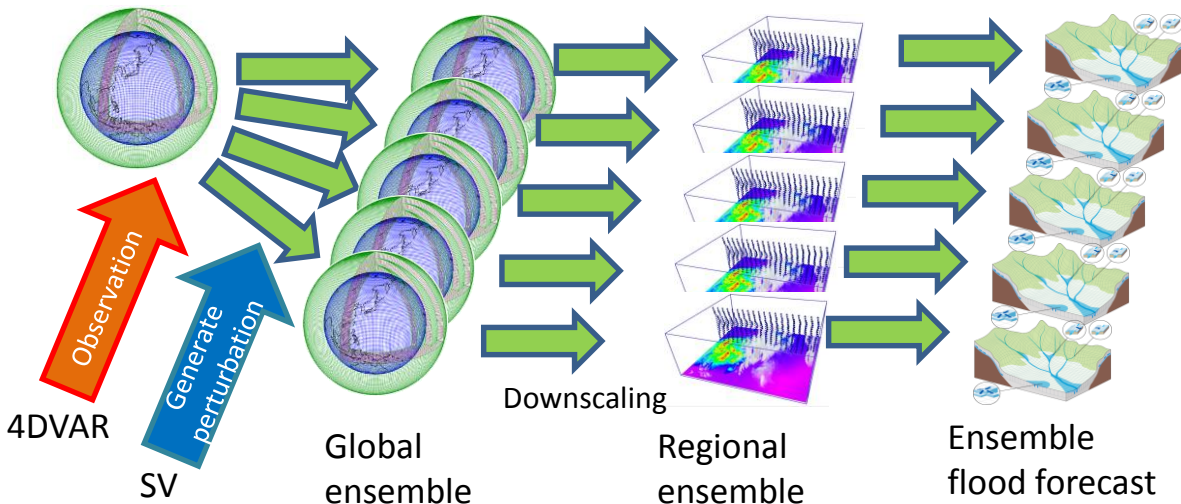


Regional ensemble prediction system (EPS)

- Simple Downscaling of Global EPS
- Regional Data Assimilation

Regional EPS

Simple Downscaling



UK Met office



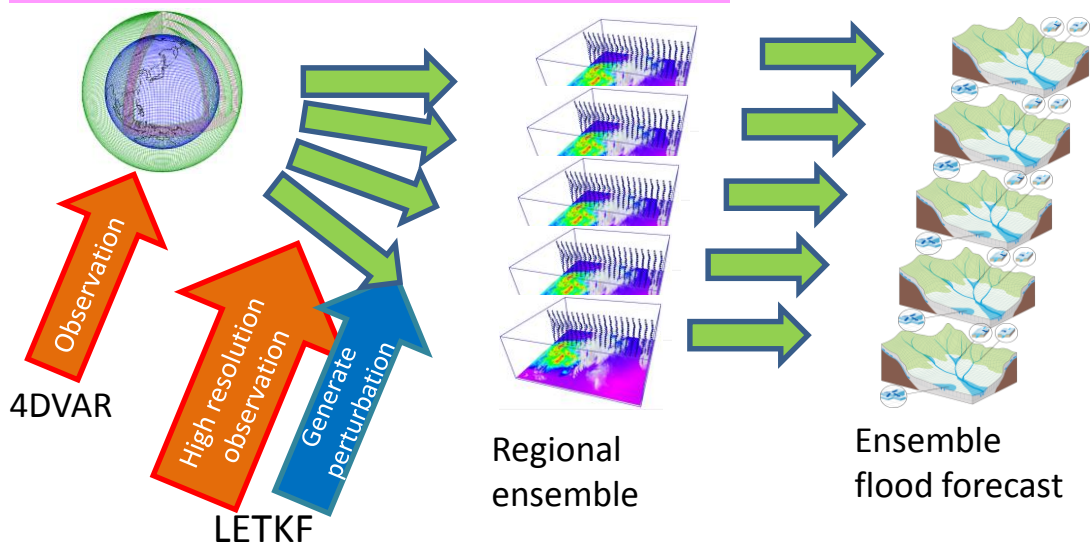
33 km global → 2.2 km regional

Météo France

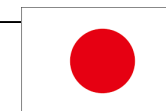


15 km global → 2.5 km regional

Regional data assimilation



JMA



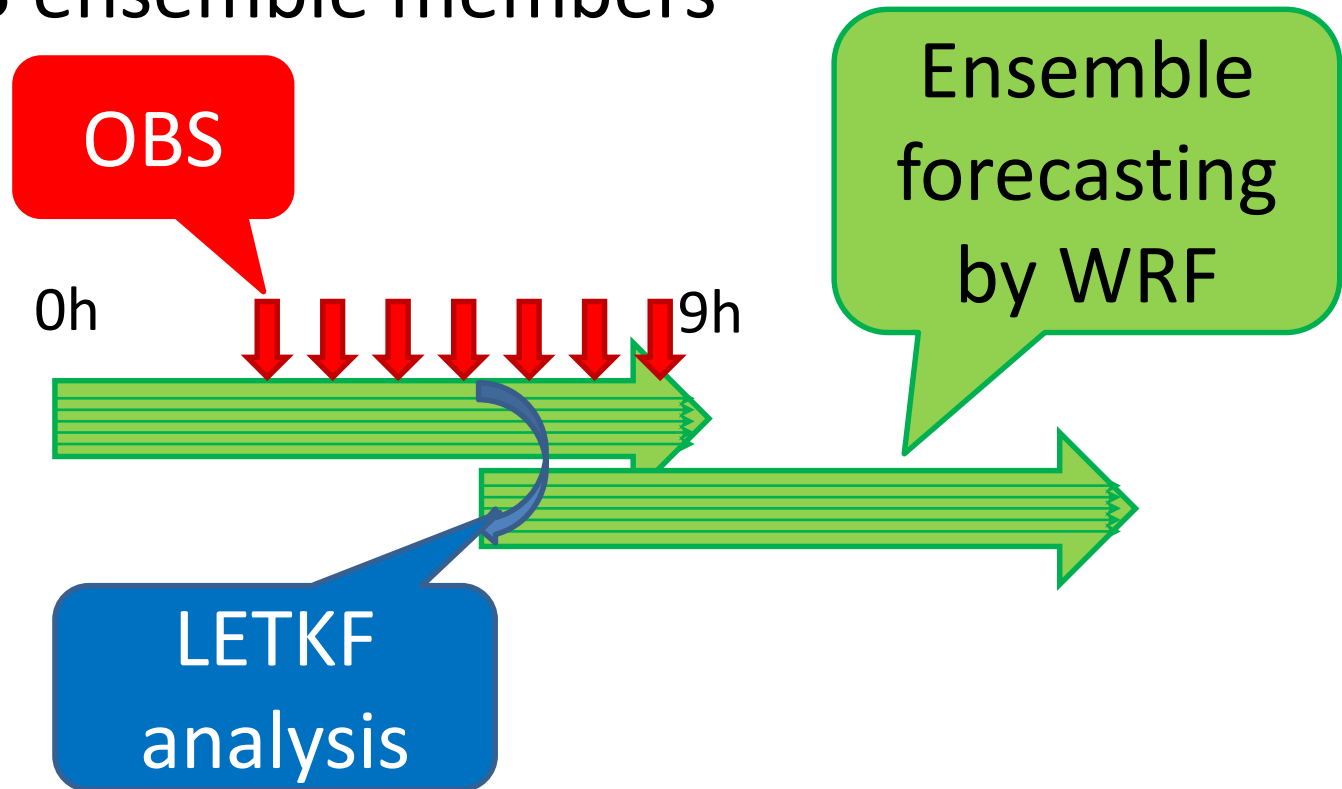
20 km Global → 5 km regional (SV)

ICHARM

20 km Global → 3 km regional (LETKF)

Regional Data Assimilation by WRF-LETKF (Miyoshi and Kunii 2012)

- Assimilated data: PREPBUFR(U, V, T, Q, PS)+GPS PWV
- 27~33 ensemble members

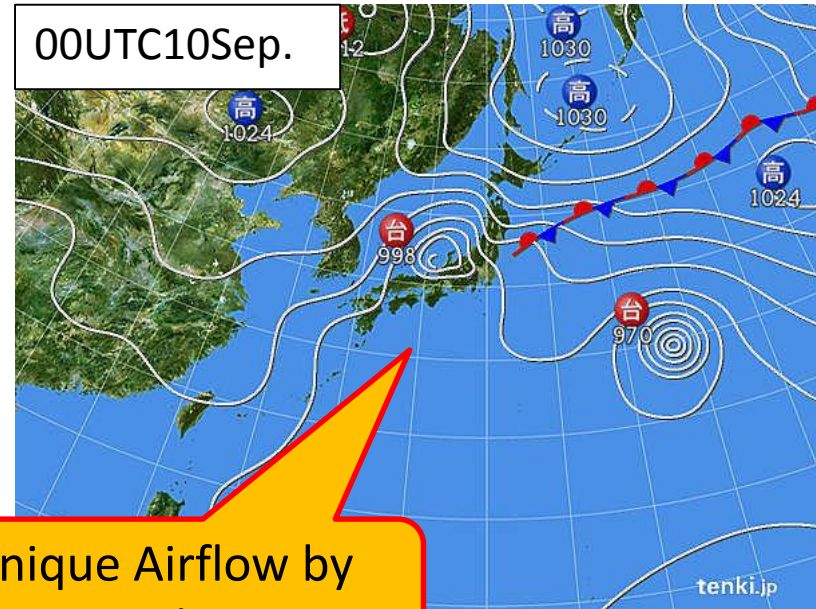
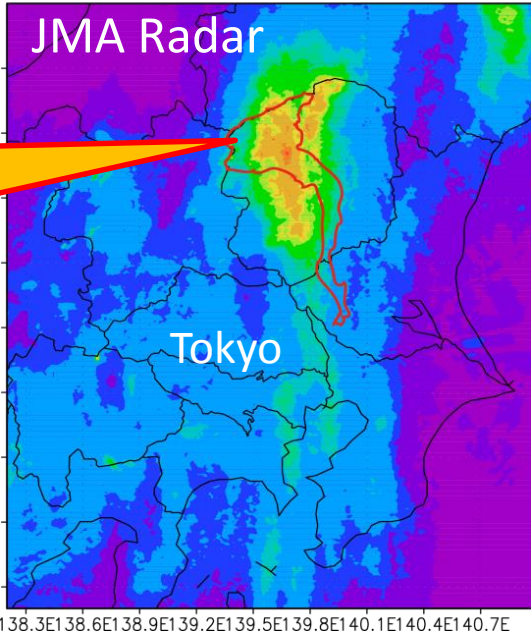


Analyzed cases

Location	River	Time	Phenomenon
Japan	Kinugawa River	Sep. 2015	Mesoscale rainband
Philippines	Pampanga River	Jun. 2011	Typhoon

Kinugawa River flood on 10 Sep.2015

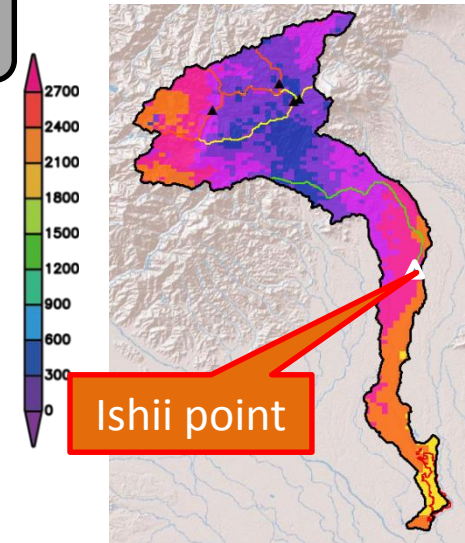
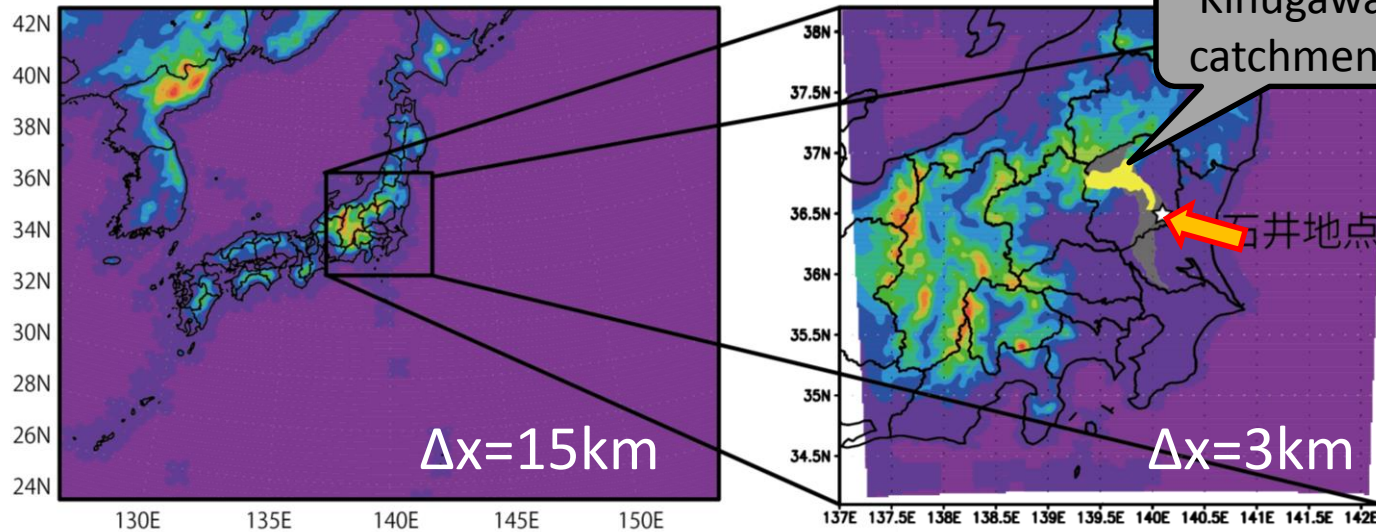
JMA Cband 08-10Sep.2015



Unique Airflow by two typhoons



WRF model domain



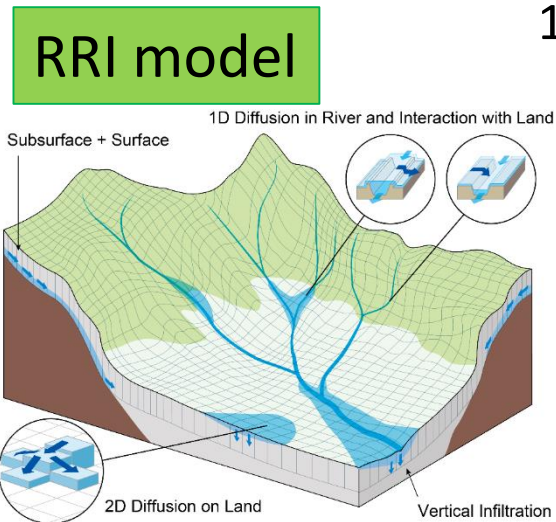
Outer domain :

Boundary condition: JMA-GSM
Kain&Fritsch cumulus scheme

Inner domain:

No cumulus scheme

Kinugawa river
catchment area
 1760 km^2



$\Delta x=100\text{m}$

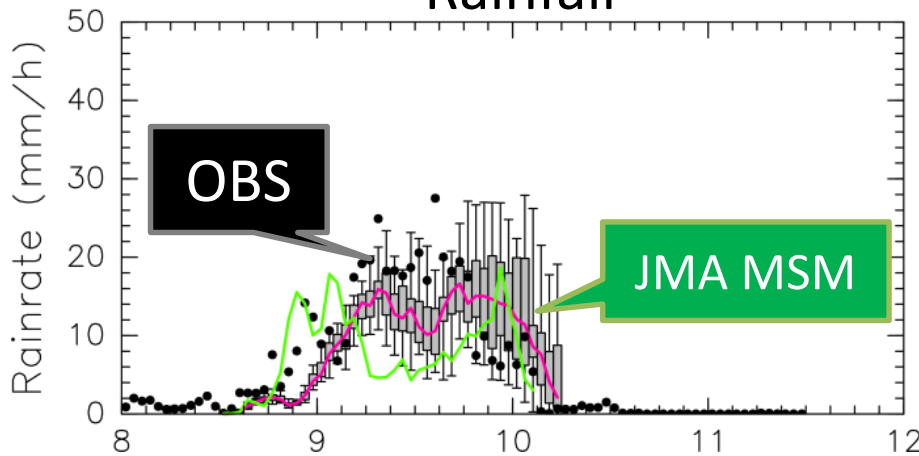
Ensemble rainfall/Flood forecasts

Simple downscaling:
27 member

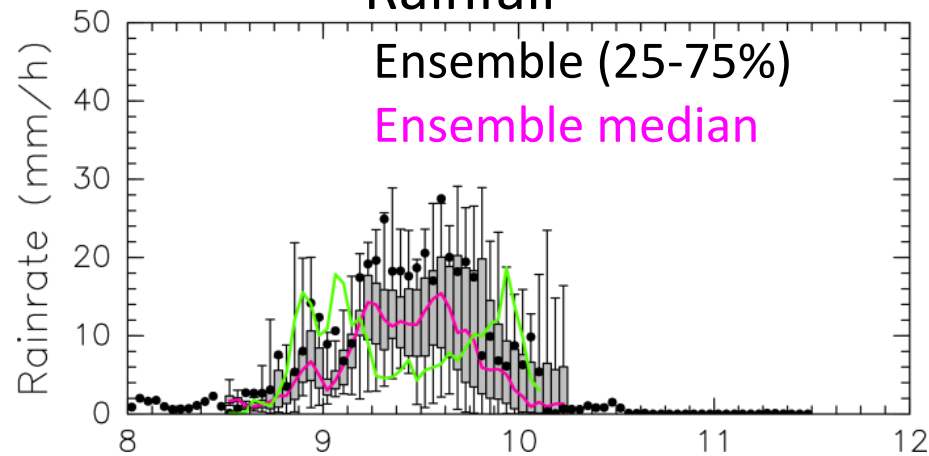
Regional data assimilation by
WRF-LETKF: 27 member

12z08 ~ FT=18h

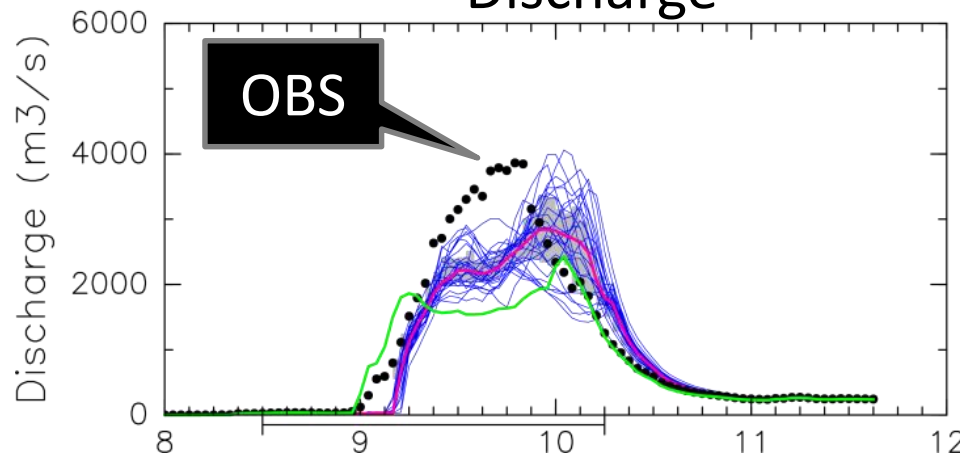
Rainfall



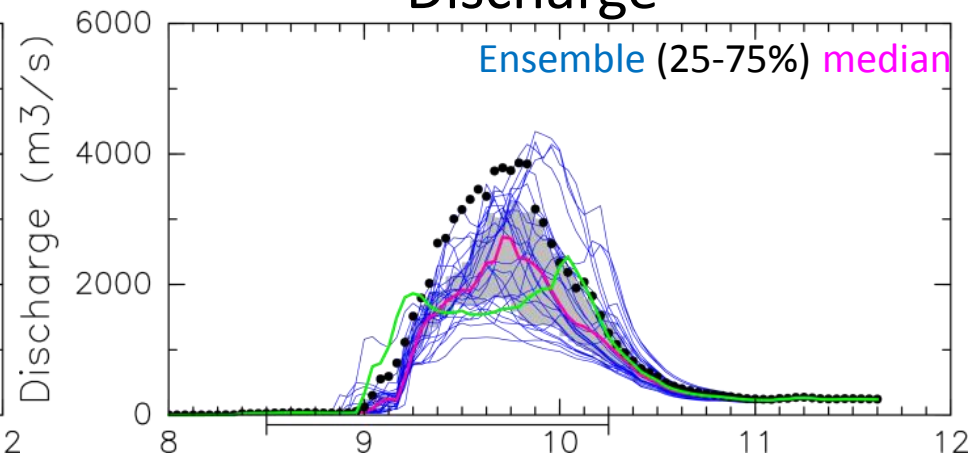
Rainfall



Discharge

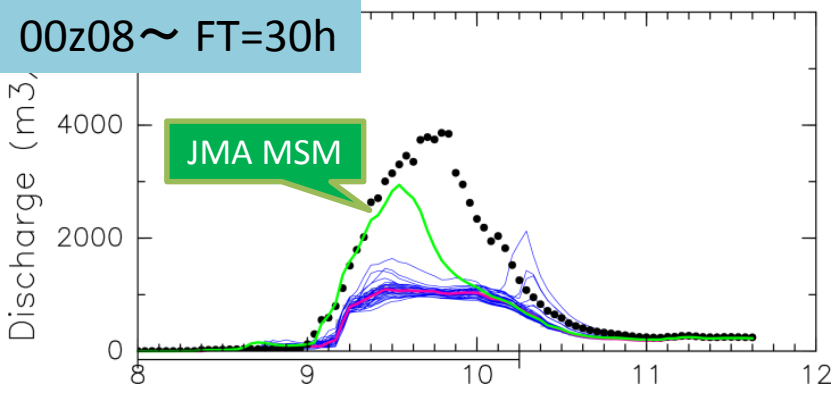
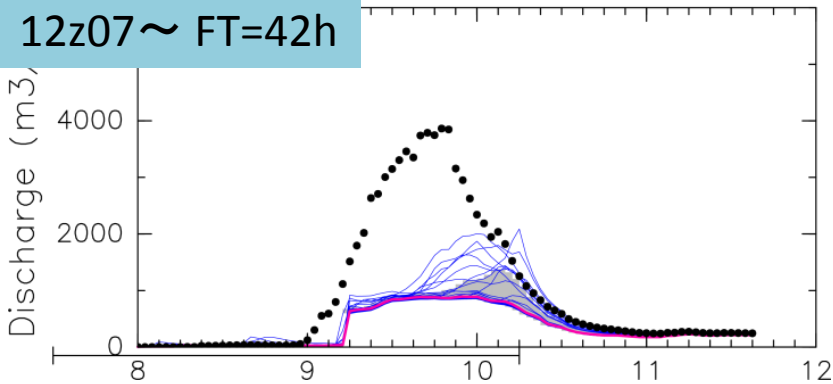
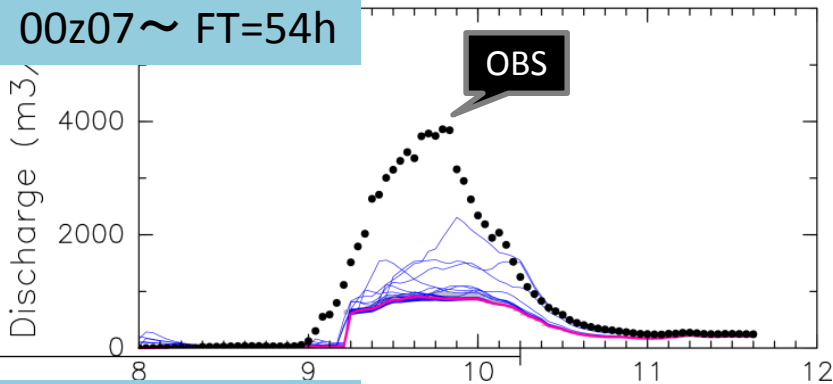


Discharge

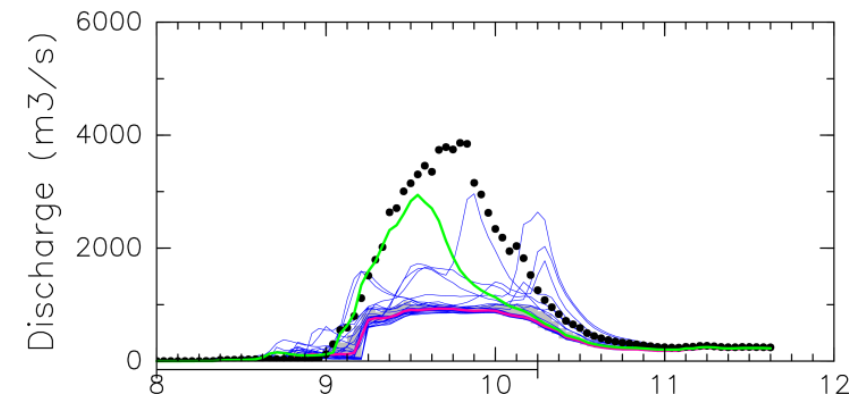
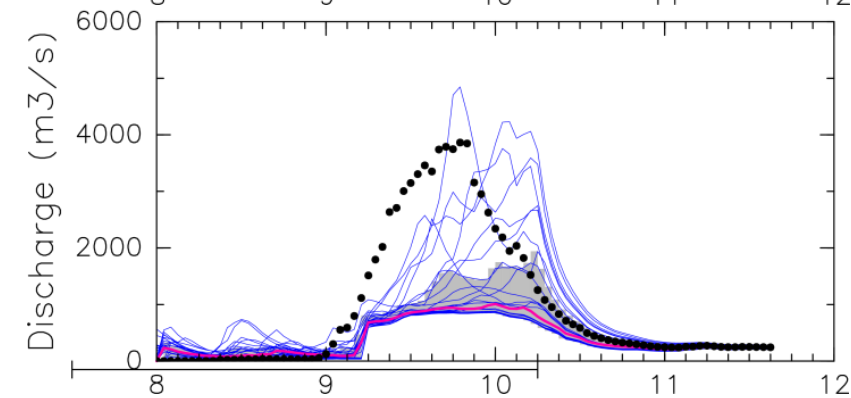
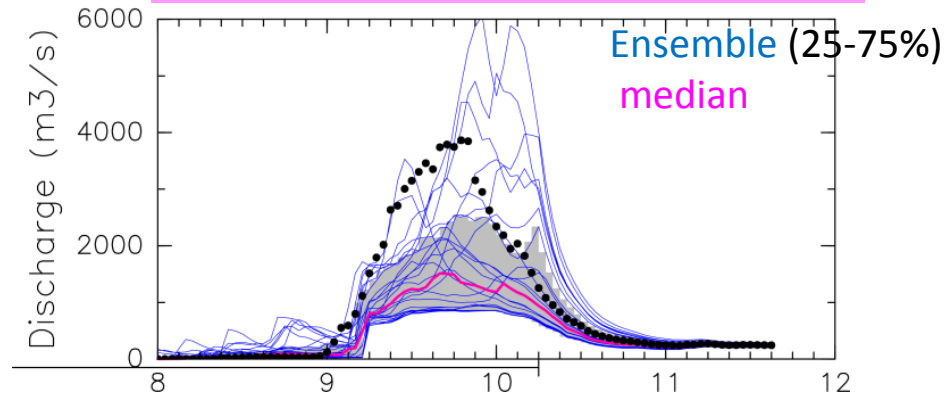


Ensemble streamflow forecasts

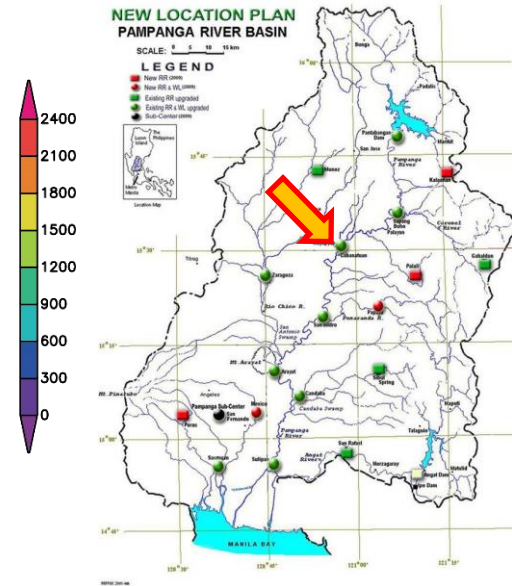
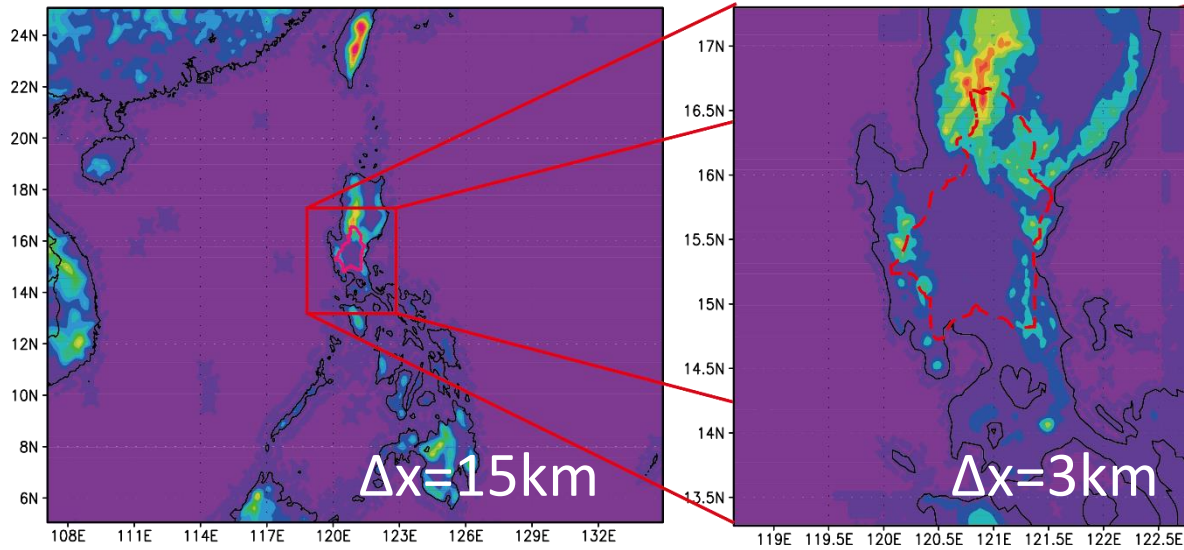
Simple downscaling:
27 member



Regional data assimilation by
WRF-LETKF: 27 member

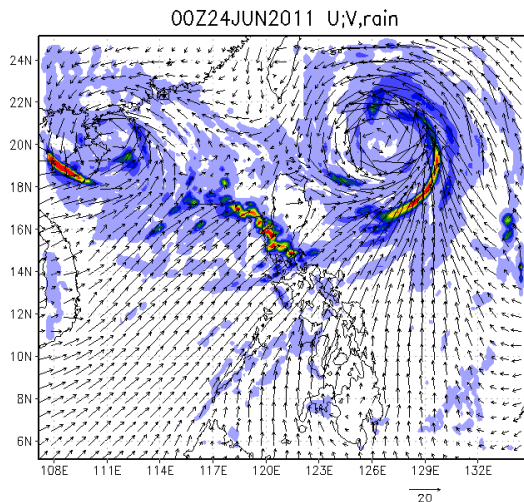


WRF Model domain for Philippines

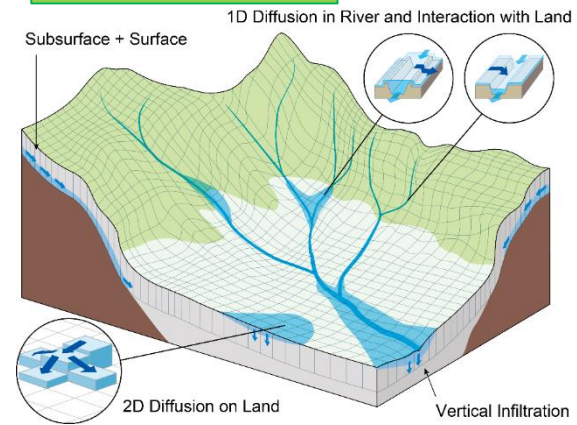


Outer domain :

Boundary
Grell3D c
+shallow
Inner do
No cumu



RRI model



Pampanga river
catchment 10434 km^2

$\Delta x=450\text{m}$

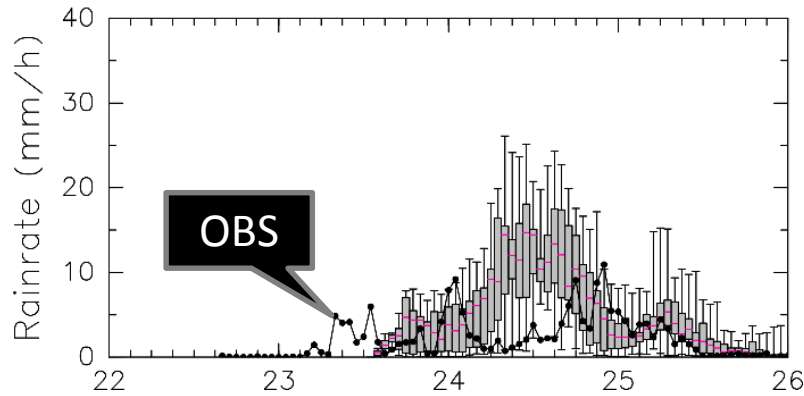
Ensemble rainfall/flood forecasts

Simple downscaling:
16 member

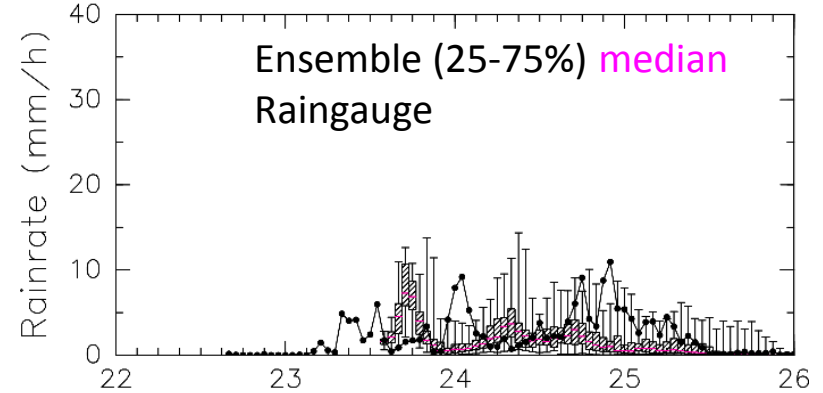
Regional data assimilation
by WRF-LETKF: 33 member

12z23 ~ FT=12h

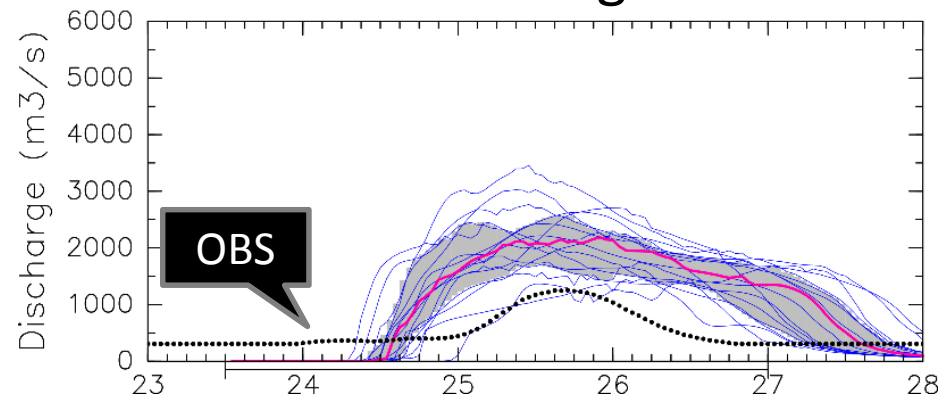
Rainfall



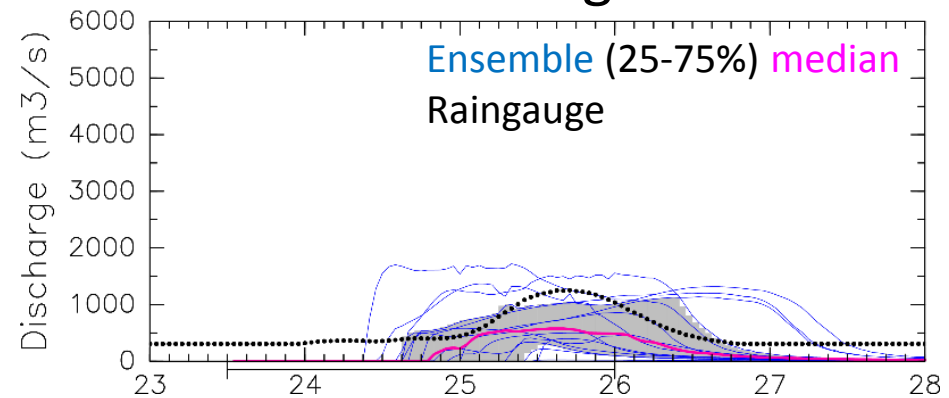
Rainfall



Discharge



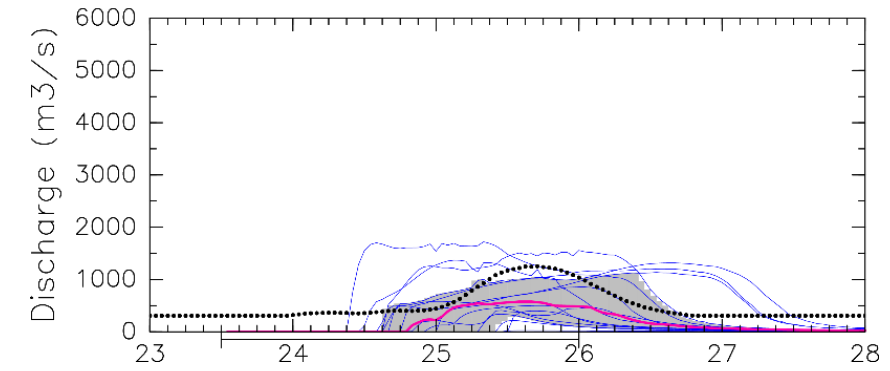
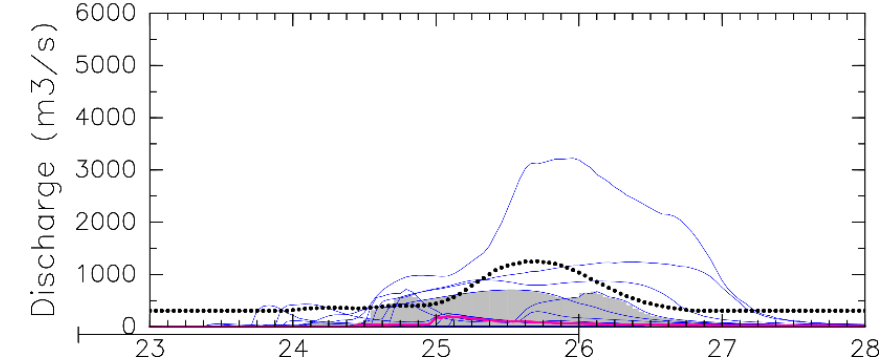
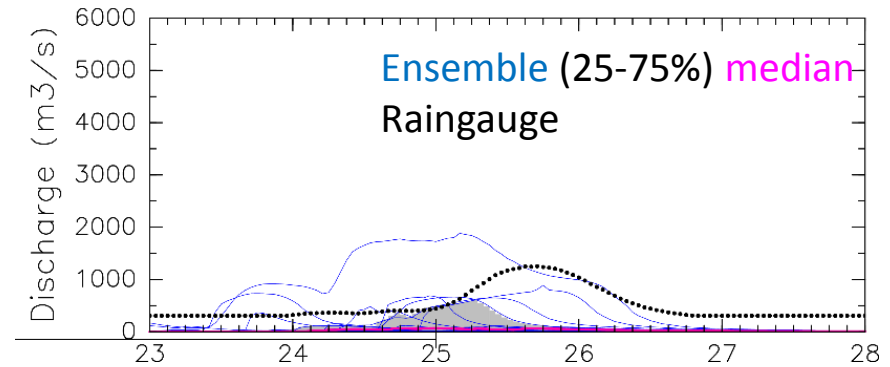
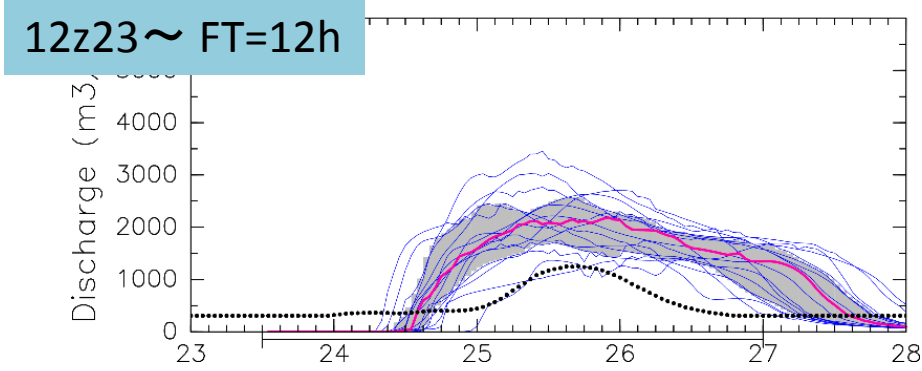
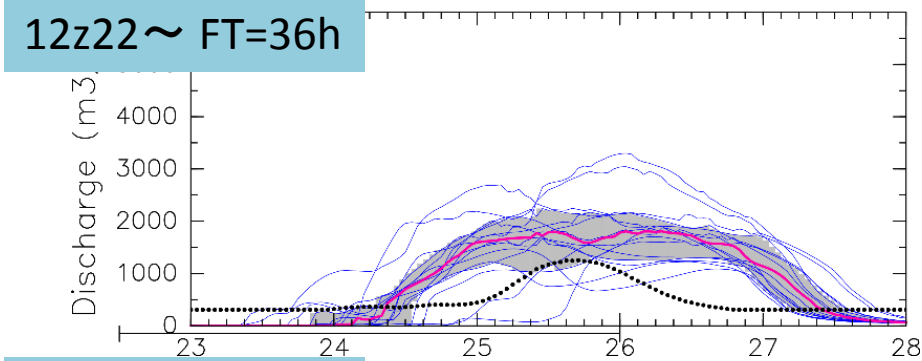
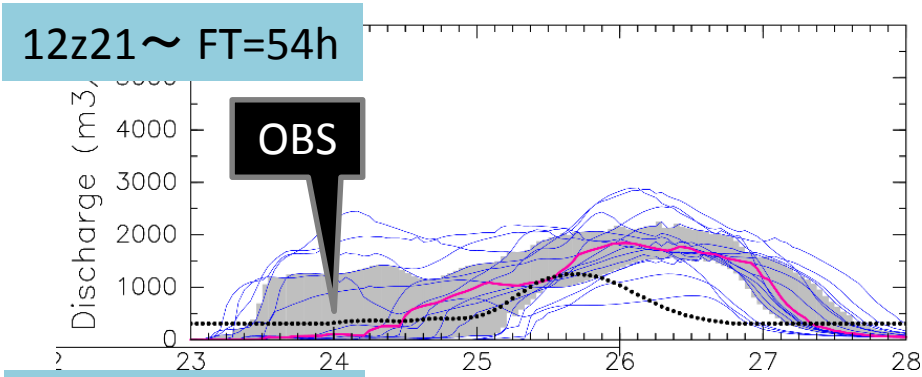
Discharge



Ensemble streamflow forecasts

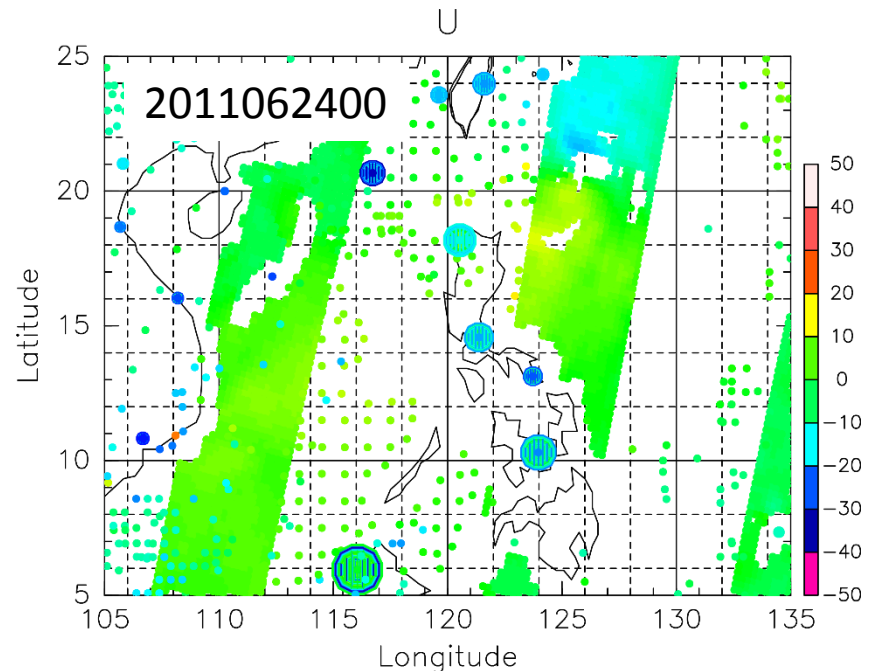
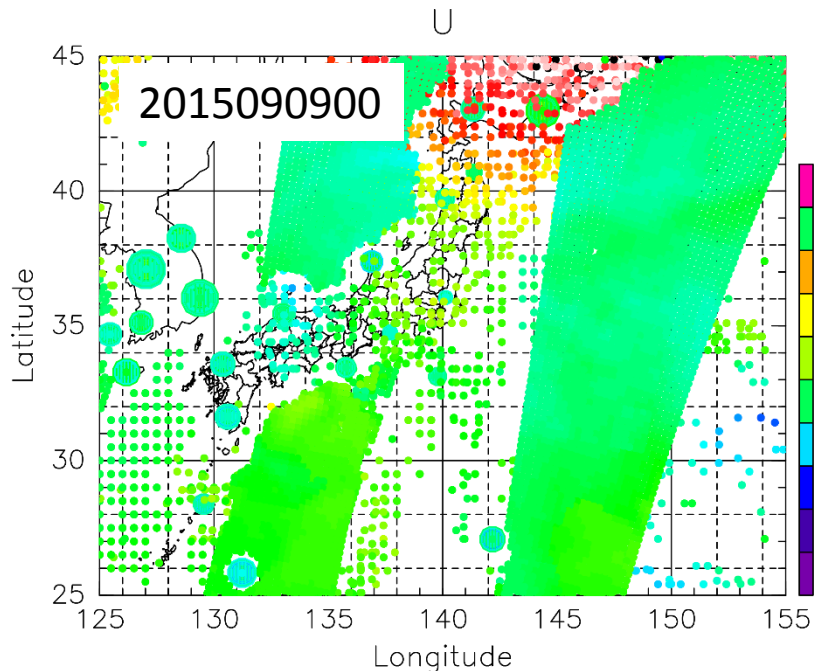
Simple downscaling:
16 member

Regional data assimilation by
WRF-LETKF: 33 member



Discussions

Country	Phenomenon	U spread	U RMSE	U bias	Assimilated OBS
Japan	Mesoscale rainband	0.8 m/s	6 - 8 m/s	2 m/s	10000
Philippines	Typhoon	1.2 m/2	6 - 12 m/s	5 - 12 m/s	7000



Conclusion

- Regional data assimilation by WRF-LETKF was better in Japan.
- Simple downscaling was better in Philippines.
- We'd be careful to choose the better method of regional EPS.



Kinugawa flood in 2015

Thank you for attention!