

Verification of Precipitation Forecasts over Japan Region

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WGNE-24, Montreal, CANADA

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Severe rainfall events in Japan

In August 2008, 3 children has been died due to flood cased by severe rainfall



Only 10 minutes
later

3

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Data and verification method

- Verification grid
 - Horizontal resolution : 80km x 80km
- Reference data (Observation)
 - Precipitation amount observed by surface raingauge
 - About 1300 sites corresponding to 17km x 17km
- Verified data (QPFs data sent by NWP centers)
 - Horizontal resolution
 - Please see next page.
- Converting method (sent data to verification grid)
 - High resolution QPFs and Observation
 - Simple Average of the predicted or observed values at the point which is in a verification grid.
 - Low resolution QPFs
 - Interpolated value of the GPV.

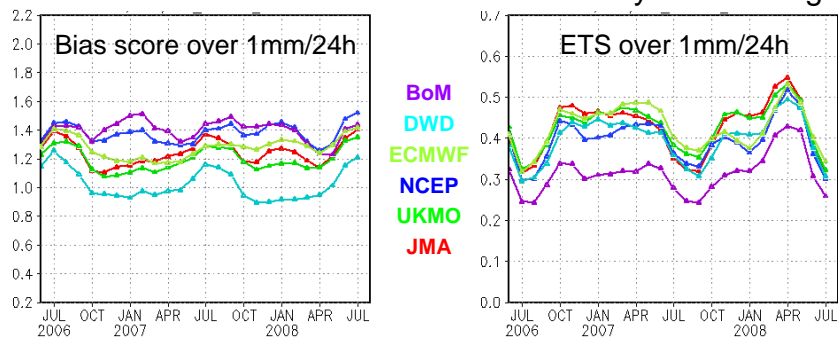
Specifications of the forecast data sent by NWP centers as of Oct. 2008

NWP center	horizontal resolution of data (degree)	forecast time (hour)	Convection scheme	Cloud scheme	converting method
BoM	1.25 X 1.25	12,24,36,...,120	Not mentioned in WMO Technical Report.	Not mentioned in WMO Technical Report.	Interpolate
DWD	0.36 X 0.36	6,12,18,...,168	Tiedtke (1989) ¹⁾	Kessler-type ¹⁾	Average
ECMWF	0.50 X 0.50	6,12,18,...,72	Tiedtke (1989) ²⁾	Tiedtke (1993) ²⁾	Average
NCEP	1.00 X 1.00	6,12,18,...,72	Pan and Wu (1994) ³⁾	Zhao and Char (1997) ³⁾	Interpolate
UKMO	0.56 X 0.38	6,12,18,...,96	Fritsch and Chappell (1980) ¹⁾ , Grant (2001) ¹⁾	Wilson and Ballard (1999) ¹⁾	Average
JMA	0.25 X 0.25 ⁴⁾	6,12,18,...,84	Arakawa and Schubert (1974)	Smith (1990)	Average
observation	Corresponding to 17km X 17km	-	-	-	Average

- 1) WMO Technical Progress Report : <http://www.wmo.int/pages/prog/www/DPFS/ProgressReports/>
 2) IFS document : <http://www.ecmwf.int/research/ifsdocs/>
 3) EMC model Document : <http://www.emc.ncep.noaa.gov/modelinfo/>
 4) JMA data resolution was 0.56X0.56 (degree) until Nov. 2007.

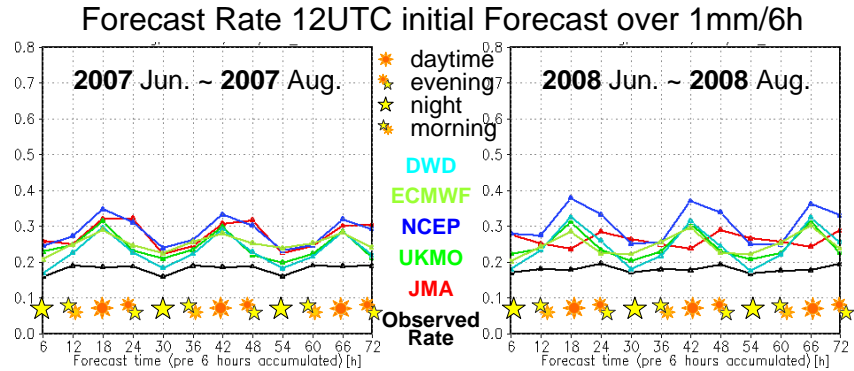
Verification in respect of time series

12UTC initial 24h~48h Forecast 2006 May ~ 2008 Aug.



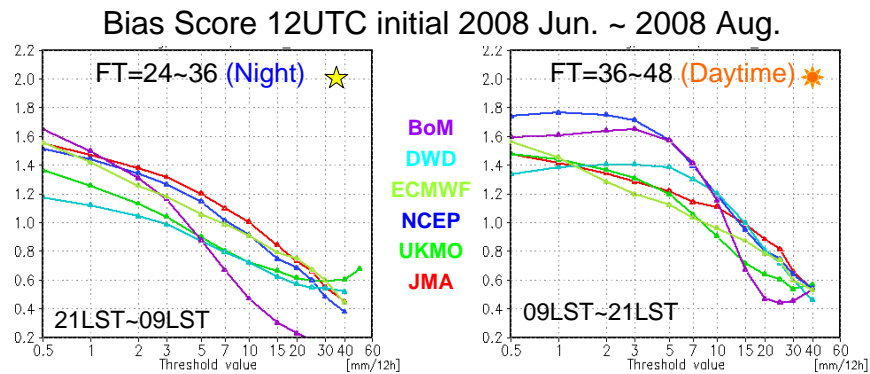
- Bias scores (threshold 1mm/24h) tend to be larger in summer than in other seasons.
- All models except DWD estimated frequency of precipitation higher than observed.
- Threat scores (threshold 1mm/24h) tend to be smaller in summer than in other seasons.

Verification (in Summer)



- JMA model did not show clear periodic variation of frequency of precipitation over 1mm/6h.
- Other models overestimated frequency of precipitation especially in daytime.

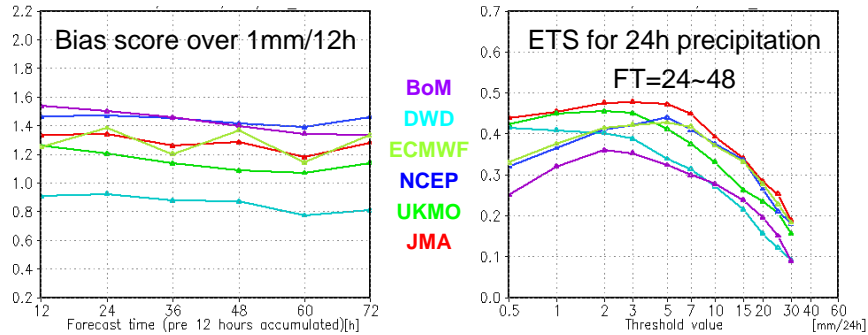
Verification (in Summer)



- Some models showed that bias score in day-time was higher than that in night-time was.
- JMA model showed that bias score in day-time was lower than that in night-time was in threshold of less than 5mm/12h. (JMA did not show this feature in 2007 summer.)

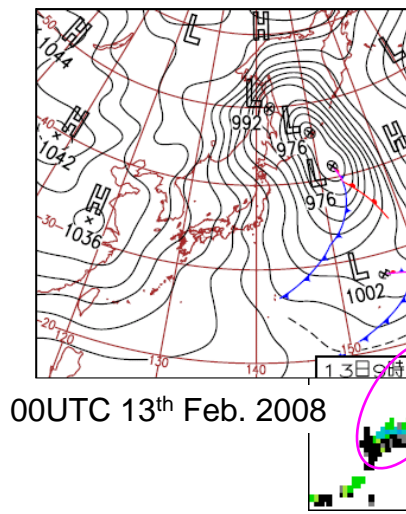
Verification (in Winter)

12UTC initial Forecast 2007 Dec. ~ 2008 Feb.



- Though bias score of most models were over 1.0, all models showed frequency of precipitation decreased as the forecast time got longer in winter.
- The peak of ETS existed around 2mm/day ~ 5mm/day in most of models.

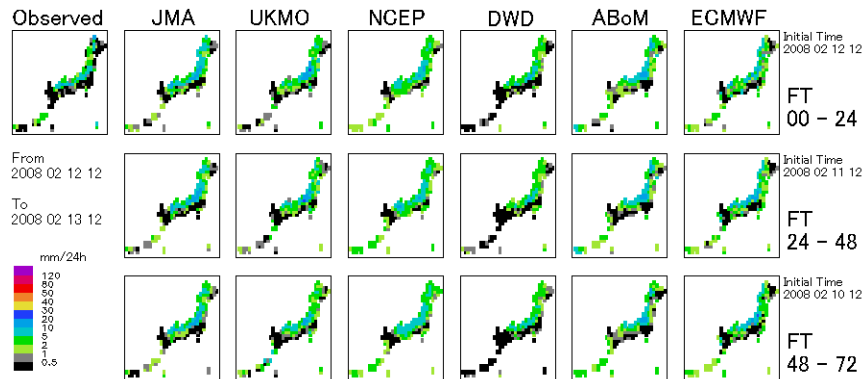
Case 1 (Winter Monsoon)



- There were developing lows to the east of Japan, and northerly wind was flowing to Japan on 13th Feb. 2008.
- Snow was falling on the North-West side of Japan.

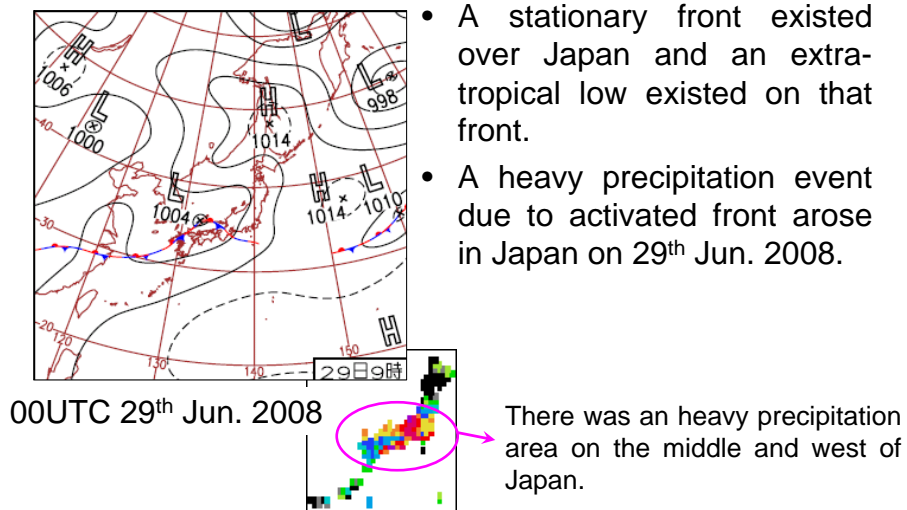
Snowfall due to winter monsoon.

Case 1 (Winter Monsoon)



- All models predicted precipitation over North-West side of Japan.
- Some models estimated precipitation area on the leeward side of the mountains where precipitation was not observed.

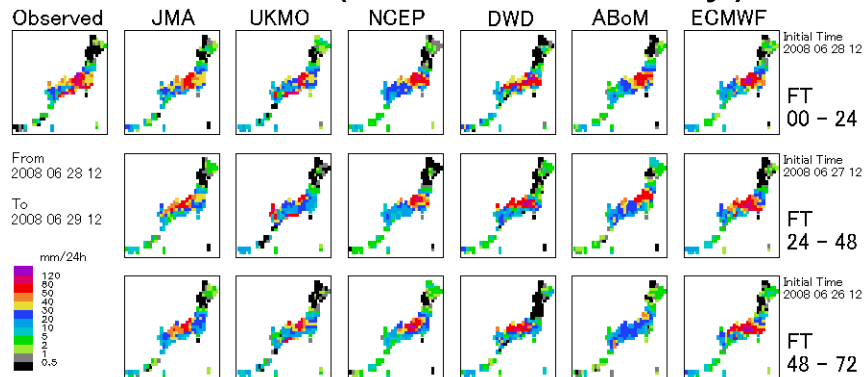
Case 2 (Frontal Activity)



- A stationary front existed over Japan and an extratropical low existed on that front.
- A heavy precipitation event due to activated front arose in Japan on 29th Jun. 2008.

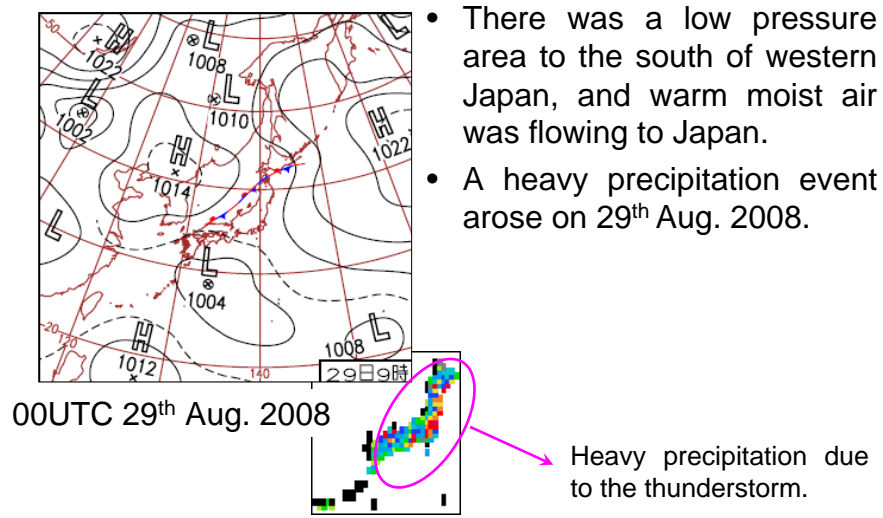
There was a heavy precipitation area on the middle and west of Japan.

Case 2 (Frontal Activity)



- Little difference between predicted precipitation area and observed precipitation area in some models.
- Heavy precipitation area was not predicted well.

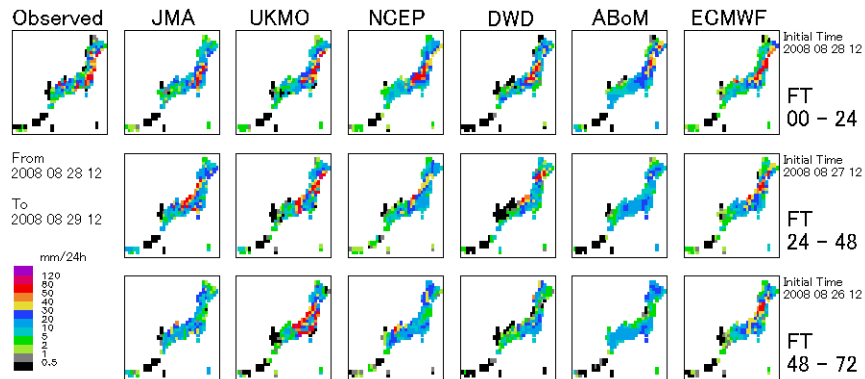
Case 3 (Heat Thunderstorm)



- There was a low pressure area to the south of western Japan, and warm moist air was flowing to Japan.
- A heavy precipitation event arose on 29th Aug. 2008.

Heavy precipitation due to the thunderstorm.

Case 3 (Heat Thunderstorm)



- Even though the heavy rainfall areas were not predicted well, some models predicted heavy precipitation before the heavy rainfall event.
- In this summer, heat thunderstorm events like this came out frequently.

Summary

- All models except DWD estimated frequency of precipitation higher than observed.

The web page for precipitation verification over Japan

- We have web pages on WGNE precipitation forecast verification over Japan. The URL is follow.

http://nwp-verif.kishou.go.jp/wgne_precip/index.html

- If you need to contact us, please send mail to follow.

nwp_verif@naps.kishou.go.jp