Early Warning Information on Extreme Temperature Events in Japan

JMA is going to start experimentally issuing the ”Early Warning Information” targeting at extremely high/low temperature events beyond a week up to two weeks ahead.

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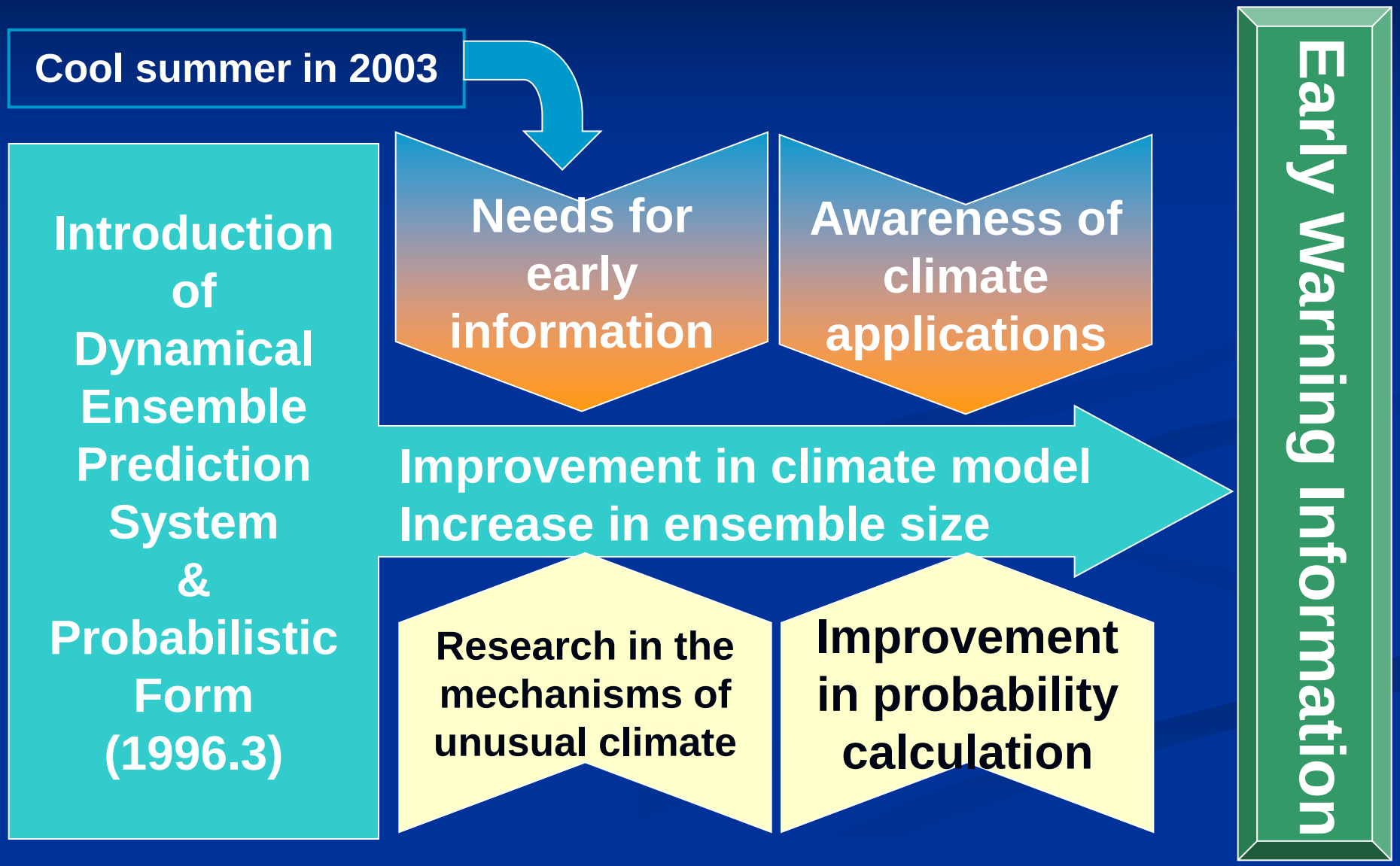
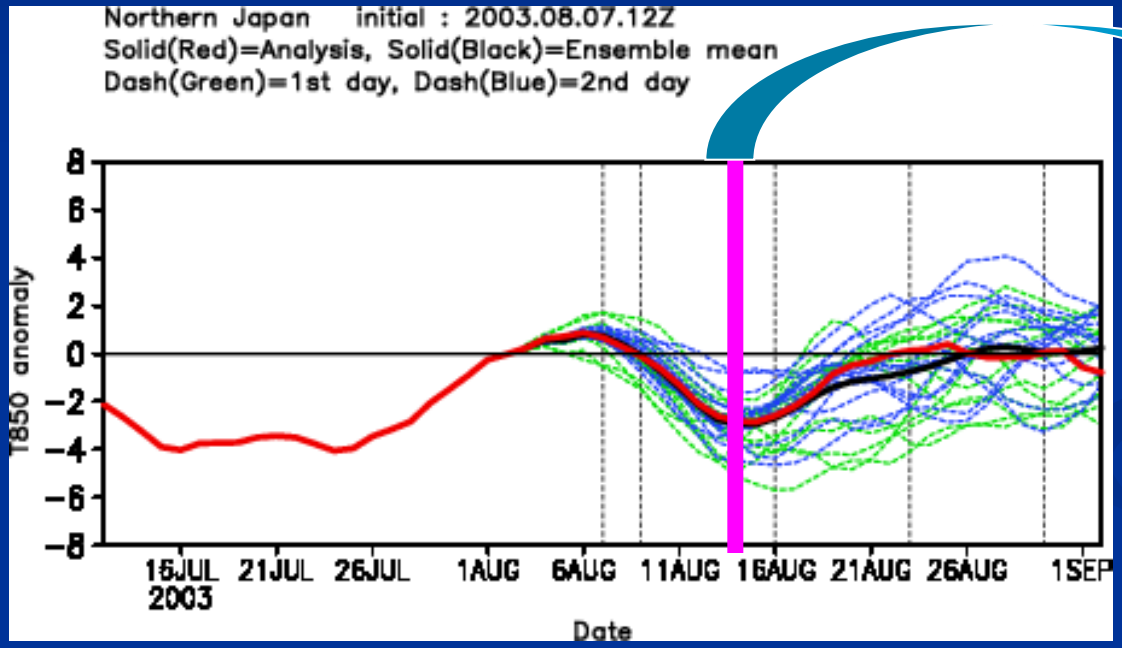
Background


Cool summer in 2003
Introduction of Dynamical Ensemble Prediction System & Probabilistic Form (1996.3)
Needs for early information
Awareness of climate applications
Improvement in climate model
Increase in ensemble size
Research in the mechanisms of unusual climate
Improvement in probability calculation
Early Warning Information

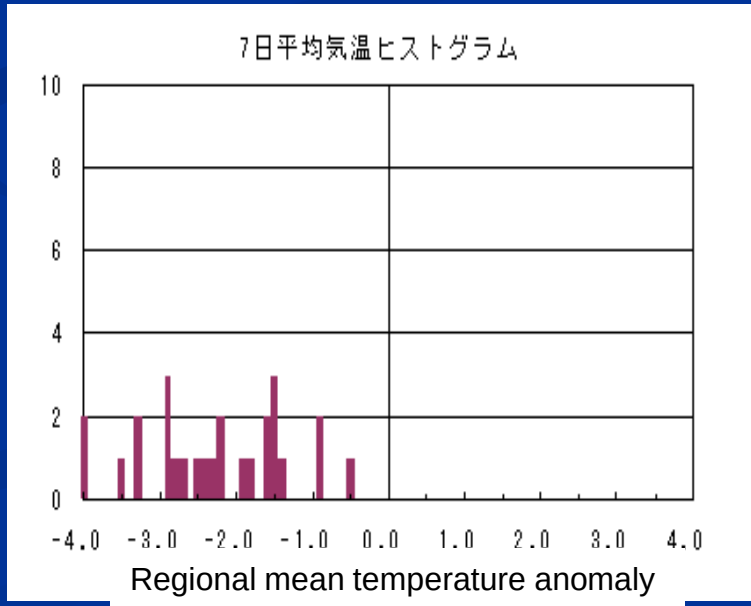
Ensemble prediction and probability

Chaotic nature of Atmosphere

⇒ Probabilistic information

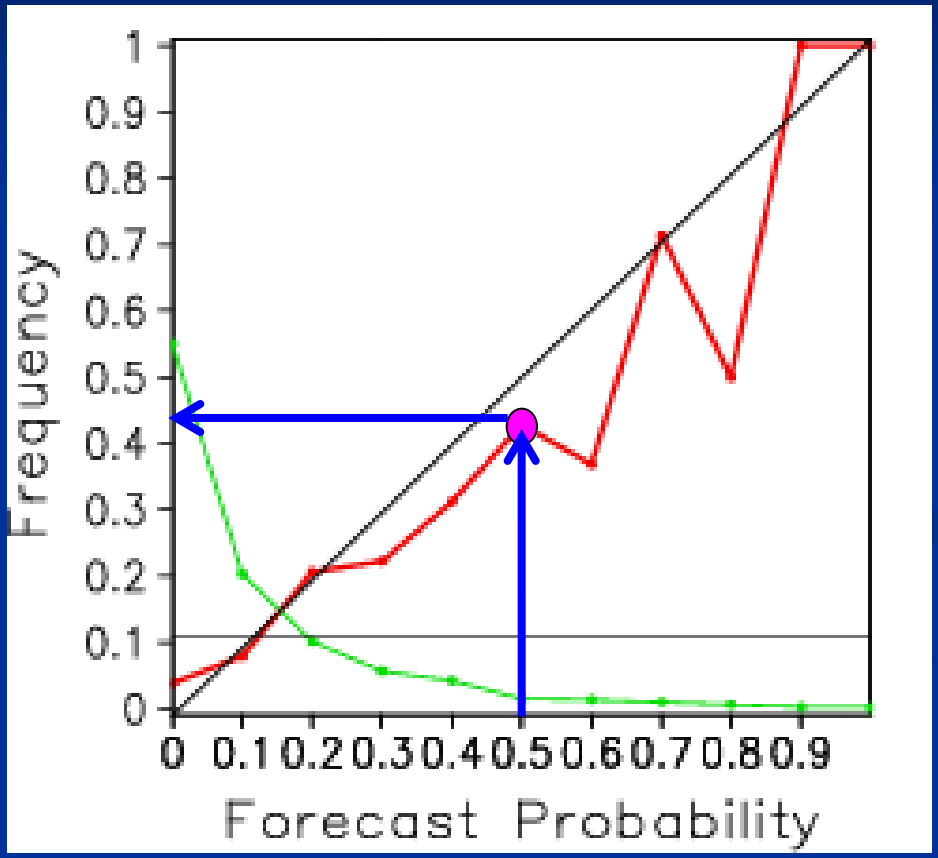


Distribution of predicted surface temperatures



- Daily prediction is impossible
- Reduce noise by spatial/temporal average
- Probabilistic information beyond a week

Verification of probabilistic prediction of extreme temperature beyond a week



Lead time = 6 day

Reliability Diagram of extremely high / low temperature with climatological occurrence probability of 10%

Expected Usage in Agricultural Sector

Crop	Weather Damage	Necessary Action
Paddy Rice	Low temp.	⇒ Deep-water Irrigation
Fruit tree	Cold, Frost	⇒ Fuel burning

Deep-water irrigation is one of the most effective management measures to prevent and mitigate cool weather damage to paddy rice.

It can be adequately prepared when information is provided with certain lead time.

For citrus cultivation, they reduce frost and freeze damage by earlier harvesting and fuel burning. Our information is expected to be available to modify harvesting plan and prepare burning materials.

Expected Usage in Energy Sector

Weather Risk **Necessary Action**

Temperature fluctuation

⇒ Rapid change in demand **Operation Planning**

Scheduled maintenance of power plants is conducted through the year in order to stable service. Review and re-scheduling of the maintenance are necessary according to power supply outlook, which is closely related to temperature variations.

Provision of early warning information on extreme temperature events, which may lead to soaring demand for the supply, is expected to help effectively to modify the operation plan for steady electric power supply.

Expected Usage in Health Sector

Disease	Weather Risk	Necessary Action
Heat stroke	Hot Temp.	Public Awareness/Preparedness

Early warning information on extreme temperature events can be used for predicting the number of patients of the temperature-sensitive disease such as heat stroke in summer and flu in winter.
The information helps medical institutions prepare for it and raise public awareness.

What is the Early Warning Information?

- Arbitrary 7-day mean temperature anomaly
  up to two weeks ahead
- Thresholds for “extremely high/low”
  = Climatological occurrence probability of 10%
- Issuing the Information as the probability over 30%
- 11 regional centers issuing for each region.
- Information is updated twice a week
  (every Tuesday and Friday)
- Detailed Probabilistic Products are provided to cooperative institutions through the Website with verification data

Text of Early Warning Information

[Early warning on extremely low temperature]

Region : Hokkaido

Period : 7 days starting from 16th July

Warning : Extremely low temperature

(The threshold is 2.3 degrees C below normal)

Probability : Over 30%

Please be cautious about managements of crops and keep paying attention to subsequent weather information or warning.

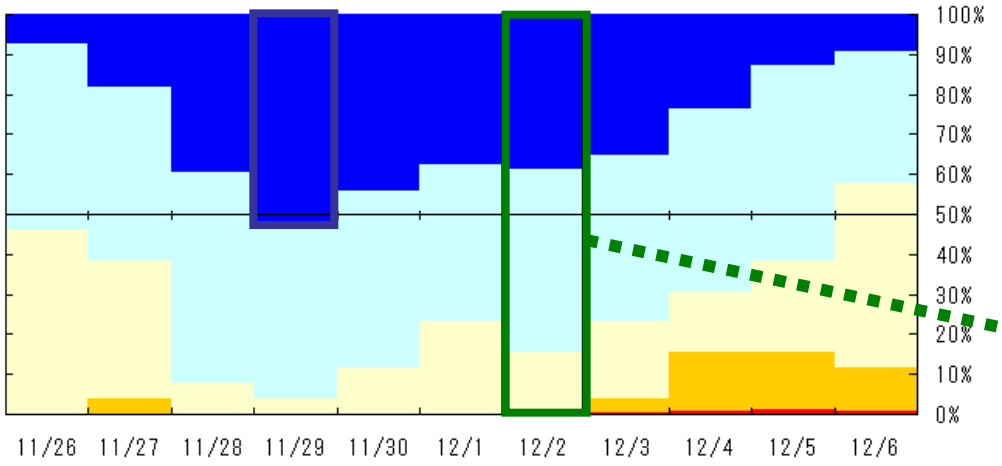
Please refer to detailed products at this website [URL].

Example of detailed products

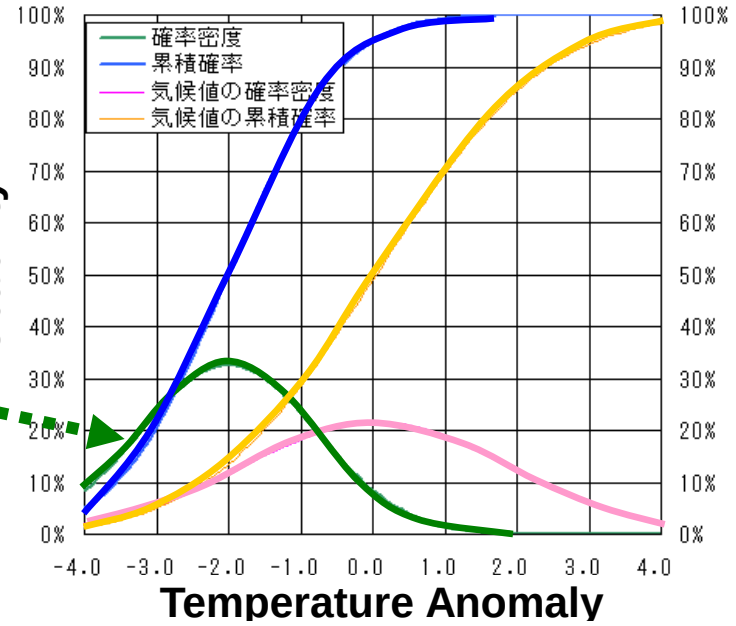
対象地域： 九州南部　　予報発表日： 2005年11月25日

予報期間： 12月2日 ～ 12月8日

Time Sequence of Predicted Probability



Probability Density & Cumulative Probability



Extremely Low

かなり低い確率： 39%

低い確率： 85%

Near Normal

平年並確率： 15%

Extremely High

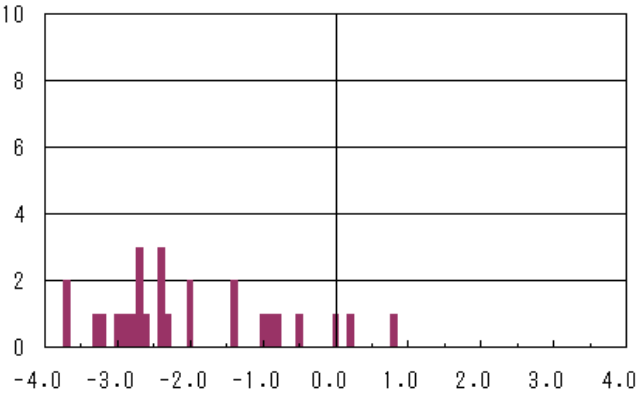
かなり高い確率： 0%

高い確率： 0%

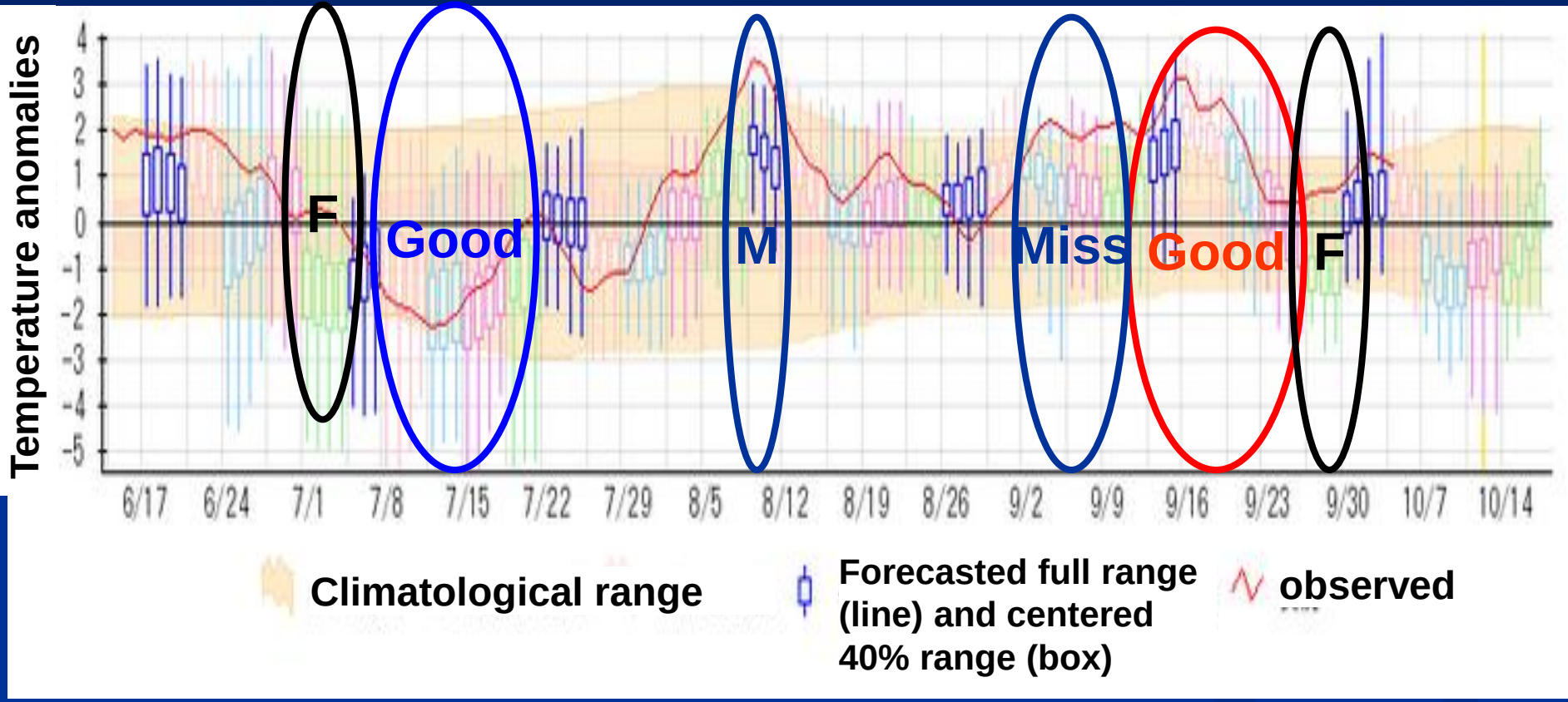
Low

High

Histogram of Ensemble Members



Real time verification of early warning information



Time series of observed and forecasted temperatures for Northern Japan (Lead time : 6 - 9 days)

Current status and future plan of early warning information

- Information suitable for all users
  > examine the threshold, content of information through experimental issuing
- Improvement of statistical translate scheme from EPS
- Operational issue will start in March 2008.
- Expansion of forecasted elements in further future
  > precipitation amounts, sunshine duration
  > maximum / minimum temperature
  > Station-to-station forecast

Thank you.