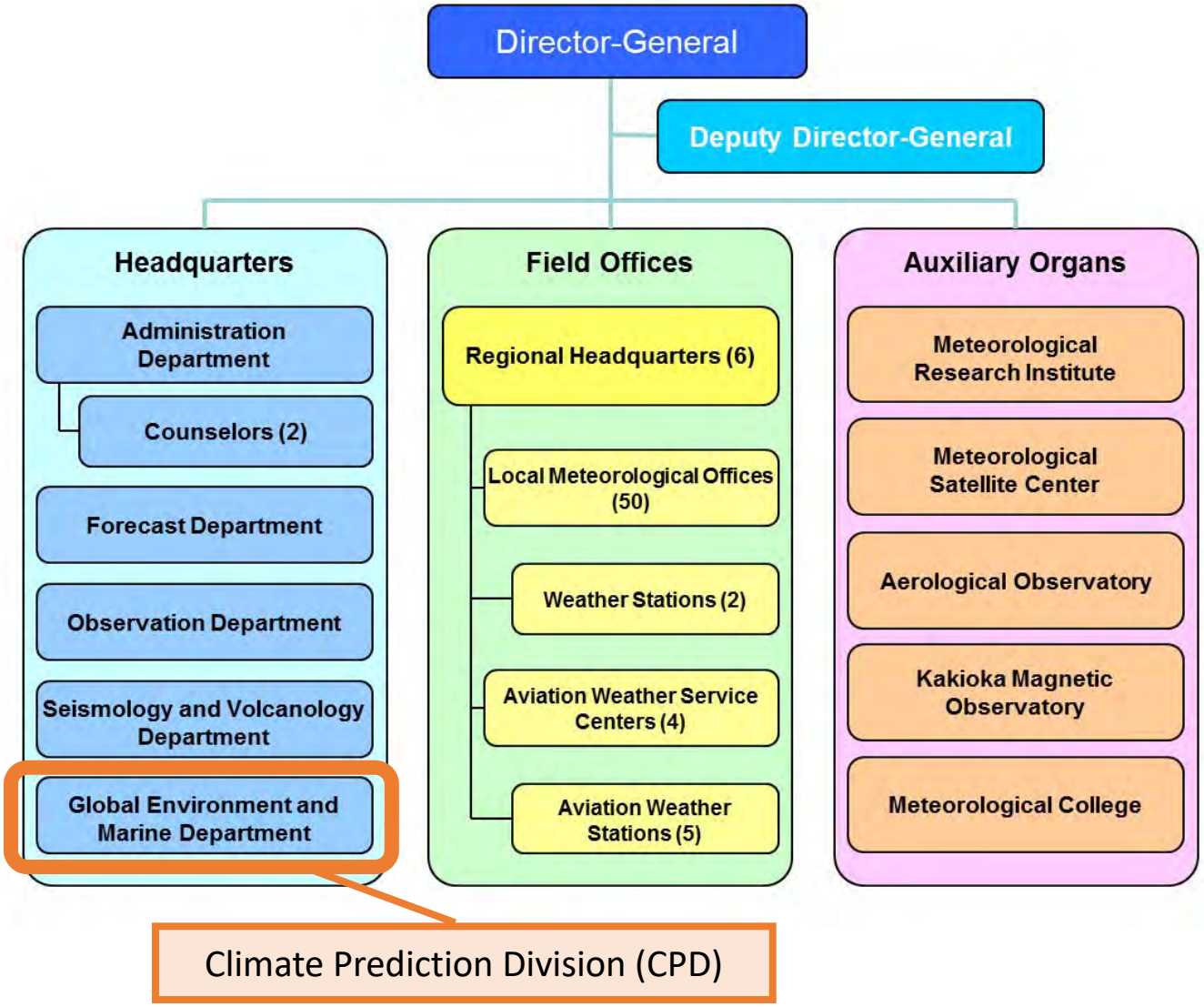
17th Annual Climate Prediction Applications Science Workshop, June 11-13, 2019

Improvement of JMA Two-week Temperature Forecasts

Shoichiro Miyawaki

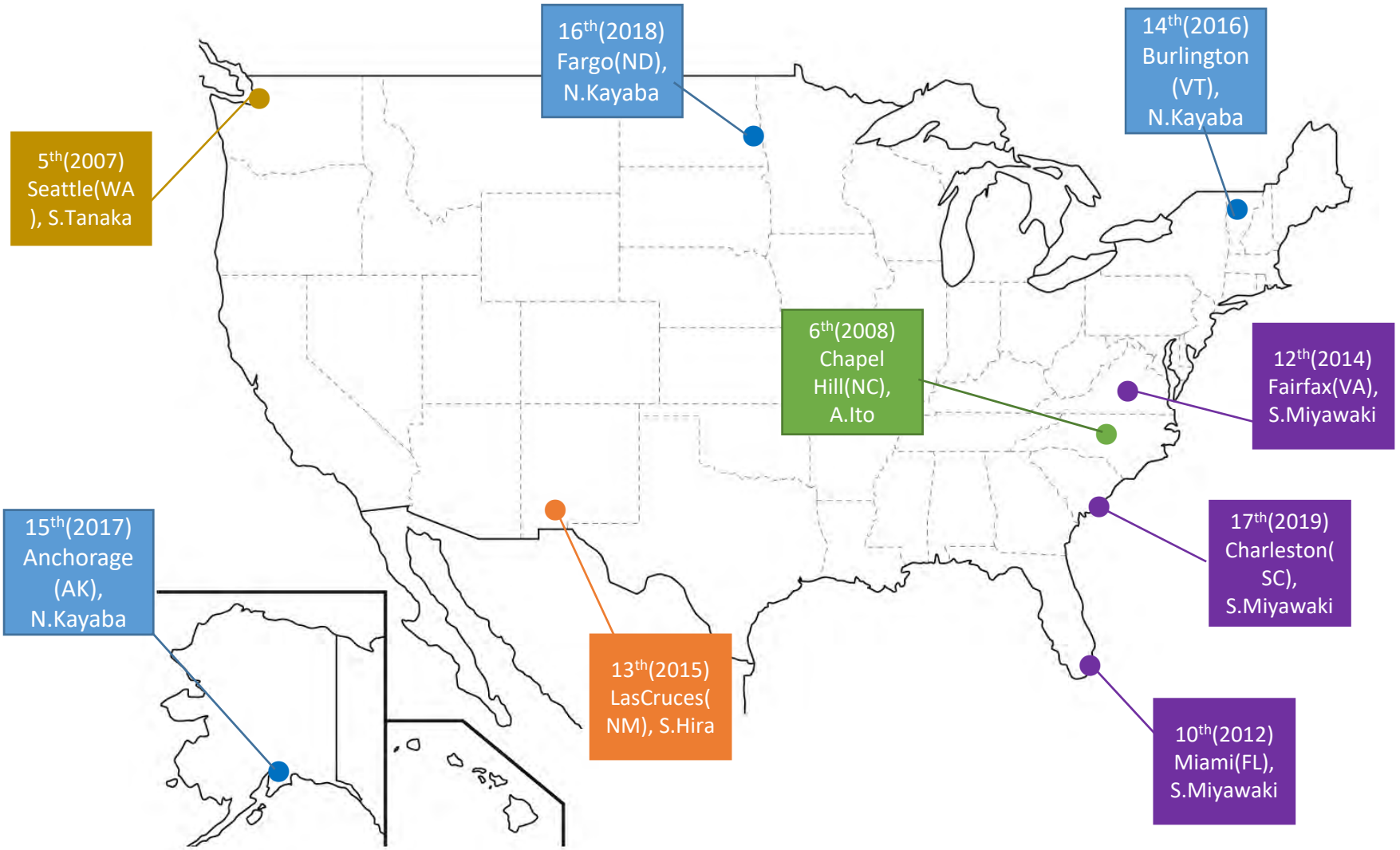
Climate Prediction Division, Japan Meteorological Agency

JMA's organizational structure



http://www.jma.go.jp/jma/en/Background/organization.html

JMA attendance at CPASW



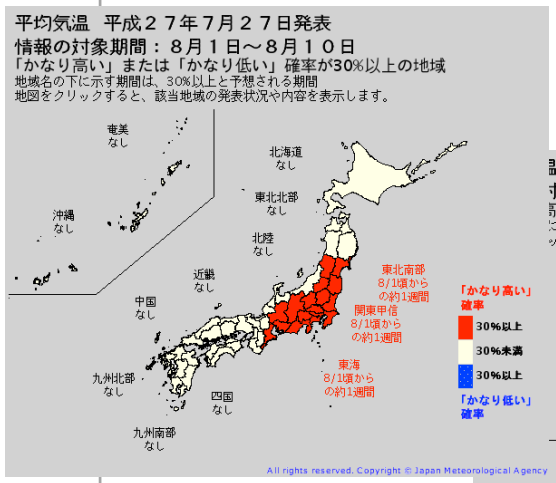
Outline

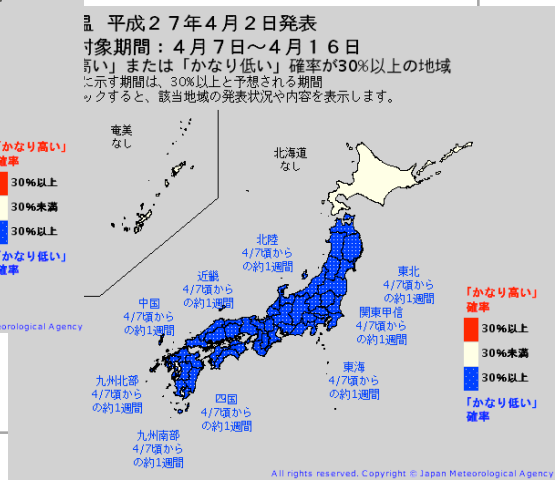
- JMA two-week temperature forecasts
  - Current situation
  - Launch of new forecast website
  - Usefulness of two-week temperature forecasts
- Further utilization of forecast data
  - Probabilistic forecast data (model guidance)
  - Improvement of two-week temperature forecast data
  - Promotion of application in agriculture
- Summary & future work

From March 2008

On 21st March 2008, JMA began to issue Early Warning Information on Extreme Weather (EWIEW) when the temperature for the two-week period ahead is expected to be significantly higher or lower than normal.

Early Warning Information on Extreme Weather (high/low temp)





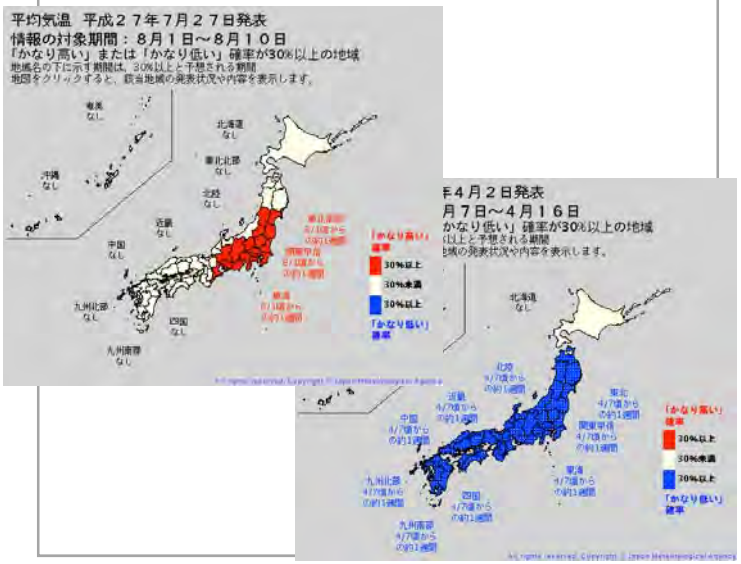
- Based on 7-day mean temperatures.
- Issued every Monday and Thursday. (2-times of week.)
- Qualitative and probabilistic information.

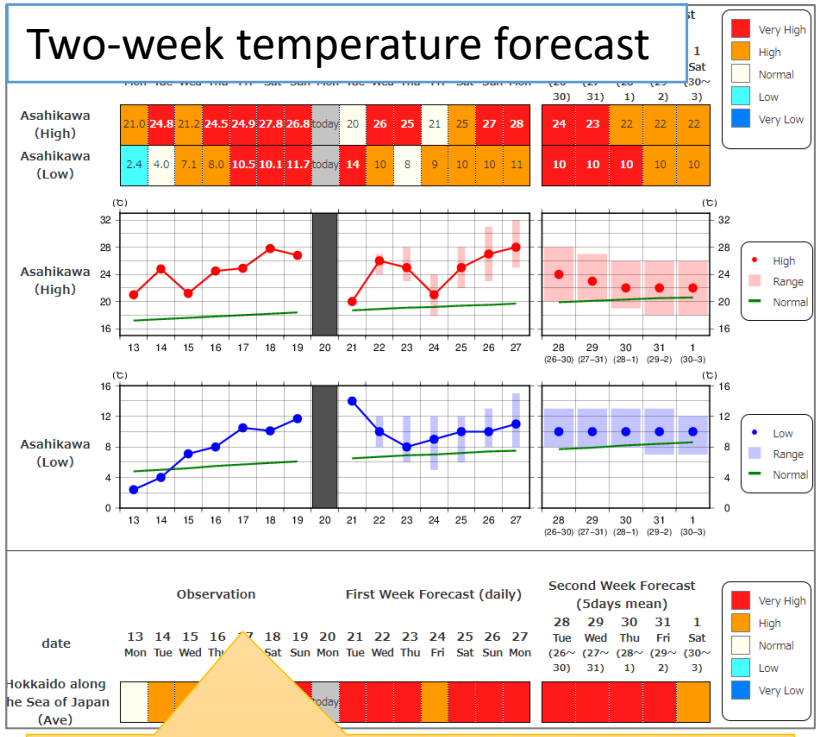
https://www.data.jma.go.jp/gmd/cpd/souten/en/

From June 2019

On 19th June 2019, JMA is planning to issue two-week temperature forecasts in addition to conventional EWIEW information.

Early Warning Information on Extreme Weather (high/low temp)



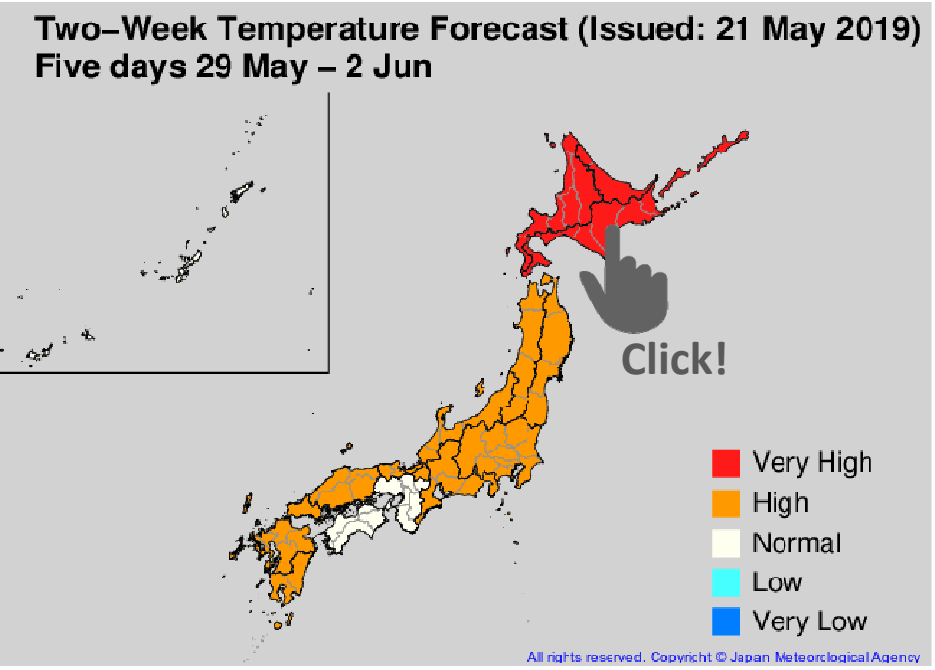


- Quantitative, more detailed forecast.
- Issued daily at 14:30 JST

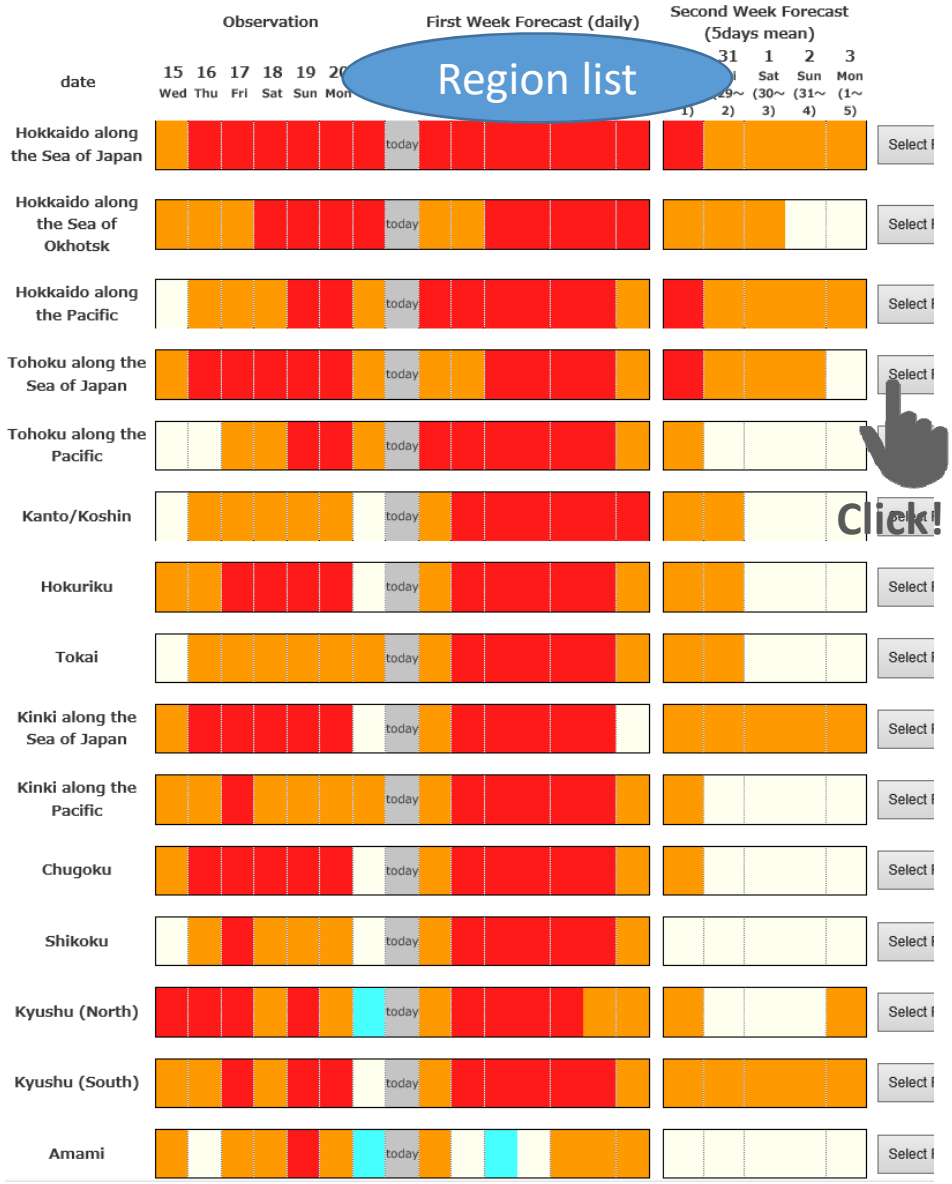
https://www.data.jma.go.jp/gmd/cpd/souten/en/

Two-week temperature forecast website

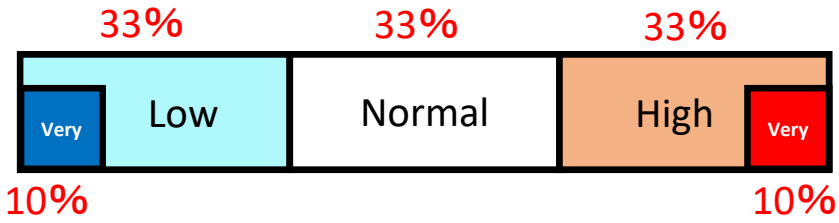
Japan Map



Region list



Colors indicate temperature appearance ratios



https://www.data.jma.go.jp/gmd/cpd/twoweek/en/

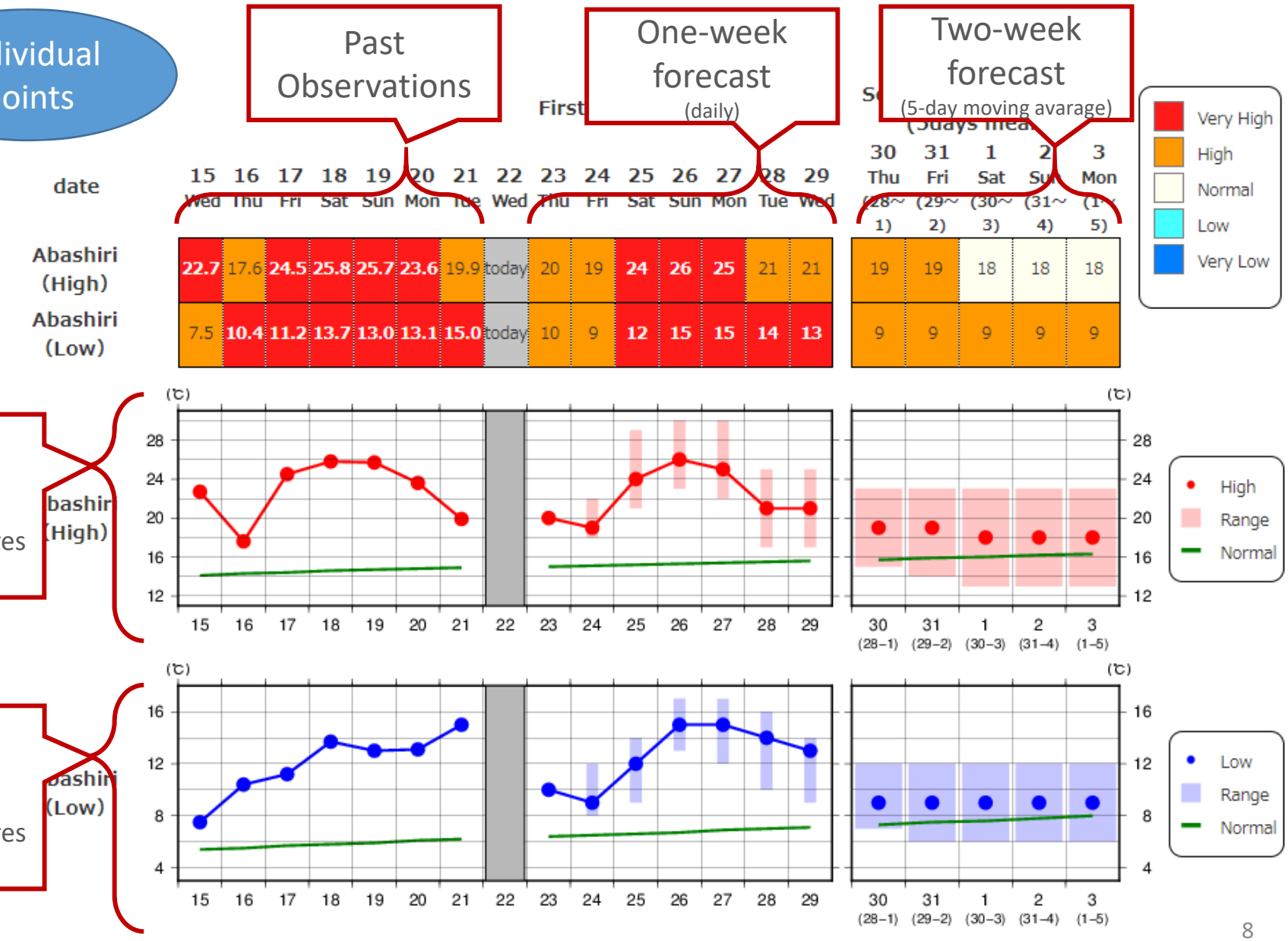
Two-week temperature forecast website

Individual points

Past Observations

One-week forecast (daily)

Two-week forecast (5-day moving avarage)



Daily maximum temperatures

Daily minimum temperatures

https://www.data.jma.go.jp/gmd/cpd/twoweek/en/

Usefulness of two-week temperature forecasts

Everyday living

These forecasts help people to decide what to wear/take on trips or to outdoor events ahead of time. They also allow advance measures against heatstroke when temperatures rise rapidly.

Agriculture

Crop damage can be reduced by taking measures against high/low temperatures in advance.

Retail

Forecasting of demand based on expected temperatures supports retailers in product ordering, inventory management and other related tasks.

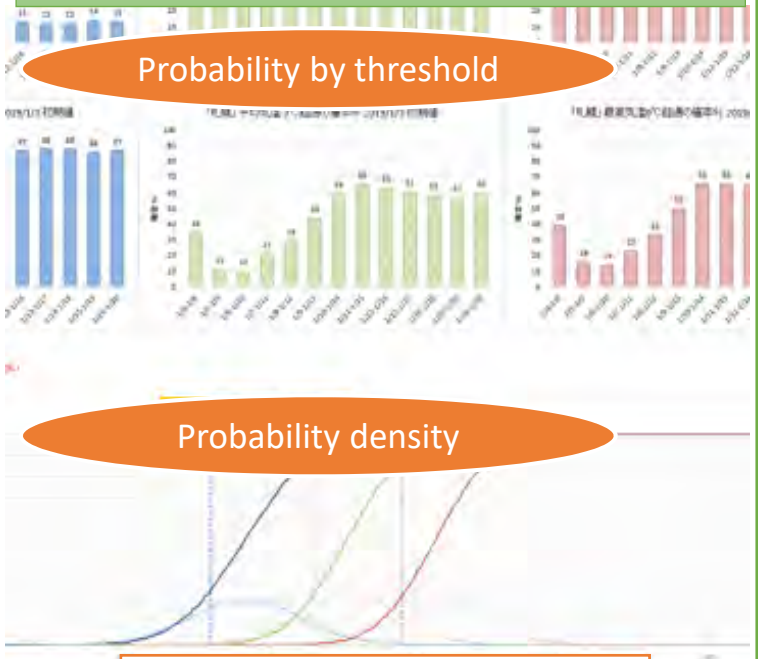
Outline

- JMA two-week temperature forecasts
  - Current situation
  - Launch of new forecast website
  - Usefulness of two-week temperature forecasts
- Further utilization of forecast data
  - Probabilistic forecast data (model guidance)
  - Improvement of two-week temperature forecast data
  - Promotion of application in agriculture
- Summary & future work

Probabilistic forecast data (model guidance)

- JMA provides detailed probability forecast data (model guidance based on ensemble forecasting) online for individual points in CSV format.
- The information is provided for numerical use, such as in agricultural growth models.

Excel sample files for data visualization are also provided.



Files can easily be customized for individual purposes.

https://www.data.jma.go.jp/gmd/risk/probability/guidance/csv_k2w.php

Improvement of two-week temperature forecast data (before and after)

	From 21st March , 2008	From 19th June , 2019
Forecast frequency	Twice a week (Monday / Thursday)	**Daily**
Target elements	Daily average temperature	**Daily average temperature** **Daily maximum temperature** **Daily minimum temperature**
Moving average period	7 days	**5 days**

Agricultural usage of temperature forecast data

The following information are applied in the agricultural sector:

Crop	Overview	Implementing agency & Information
Paddy rice 	Countermeasures against cold and high temperatures	NARO (The National Agriculture and Food Research Organization) Tohoku Agricultural Research Center Early warning system for potential cold-related damage to rice crops http://www.data.jma.go.jp/gmd/risk/taio_suitou.html
	Harvest period forecasting	Yamagata, Kagawa, Niigata Prefecture Technical information for farming
Wheat 	Flowering prediction	NARO (The National Agriculture and Food Research Organization) Western Region Agricultural Research Center Prediction of wheat growth stages using meteorological data http://www.data.jma.go.jp/gmd/risk/taio_komugi.html
Fruit 	Peach flowering prediction	Yamanashi Prefecture Information on peach flowering forecasts
Pests 	Pest proliferation forecasts	Okinawa Prefecture Information on stink bug control periods
Other 	Agricultural weather mesh information	NARO (The National Agriculture and Food Research Organization) Cultivation management support system https://www.magis.jp/

Only usage verified by JMA is included here.

Outline

- JMA two-week temperature forecasts
  - Current situation
  - Launch of new forecast website
  - Usefulness of two-week temperature forecasts
- Further utilization of forecast data
  - Probabilistic forecast data (model guidance)
  - Improvement of two-week temperature forecast data
  - Promotion of application in agriculture
- Summary & future work

Summary & future work

- Summary
  - JMA is planning to issue two-week temperature forecasts on 19th June 2019.
  - Probabilistic forecast data are also provided to operators in the agricultural sector and other advanced users.
- Next steps
  - Temperature forecasts will be improved on an ongoing basis via dialogue with users.
  - Plan for 2030 …
    - Improvement of temperature forecasts‘ moving average period (5-day → 1-day).
    - Toward the second week, precision forecasting of storms and heavy snow with a half-week span.

Thank You !!

HARERUN : A mascot of JMA

E-mail : climate-risk@met.kishou.go.jp