気象庁
Japan Meteorological Agency

Our Efforts to Promote the Use of Climate Predictions in JMA

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Outline

1. Introduction
2. Climate Risk Management
3. Our past efforts
4. Our further efforts
5. Summary

JMA's mascot
HARERUN

Outline

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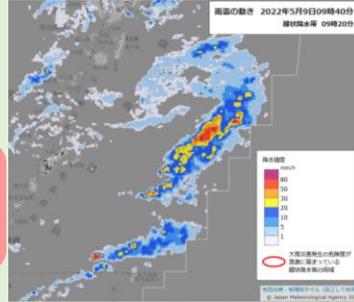
JMA's Weather/Climate forecasts overview

Today   Tomorrow   One week   One month   Three month

Short-range

Precipitation Nowcast
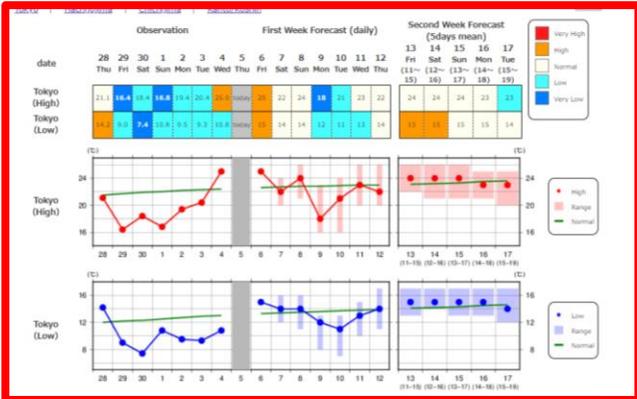
Weather Warning/Advisory

Daily forecast

One-week forecast

JMA's forecasting services cover a wide range of meteorological information.

- Two-week temperature forecast
- Early warning information on extreme weather

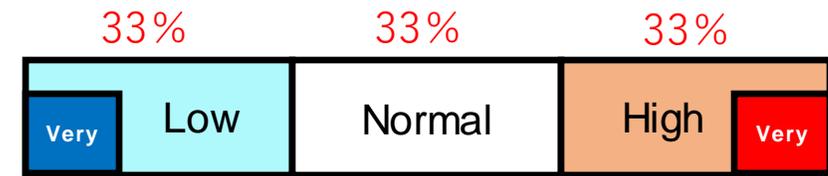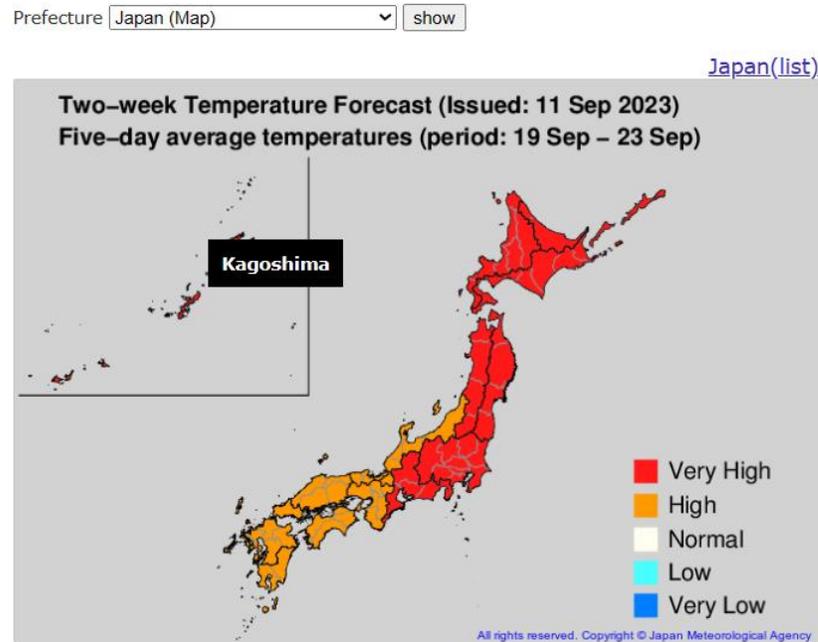- One-month forecast
- Three-month forecast

- Summer/Winter forecasts
- El Niño outlook

Long-range
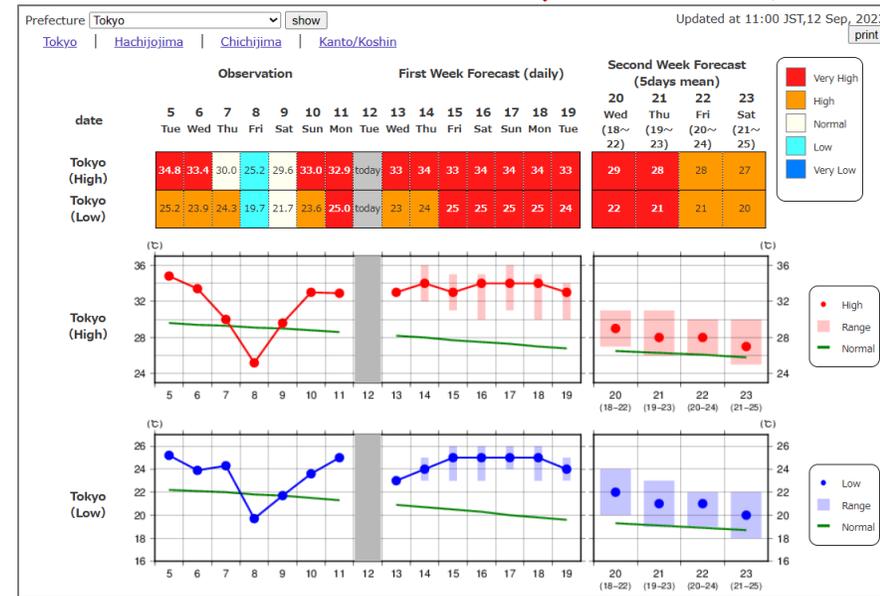
Two-week temperature forecast

Seasonal forecasts

Two-week temperature forecast

◆ Issued every day.

◆ Predicts temperature for the next two weeks to be (very) higher or lower than normal in 5 levels.

◆ Provided in maps, tables and graphs.

The colors show Temperature appearance probabilities.

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

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One-month and Three-month forecasts

◆ One-month forecast : issued every Thursday

◆ Three-month forecast : issued every end of the month

- • Average temperature
- • Precipitation
- • Hours of sunshine (one-month forecast only)
- • Snowfall (in winter season)
- ➢ Probability of above or below normal occurrence
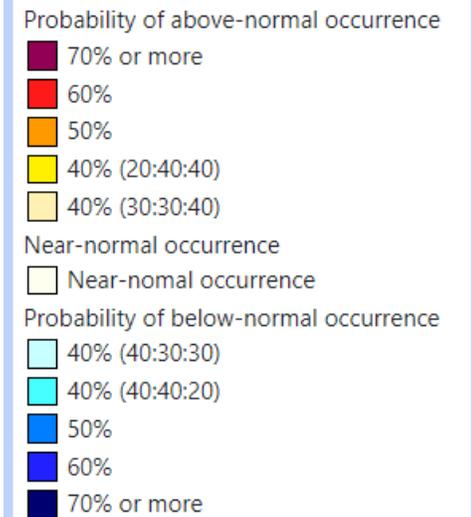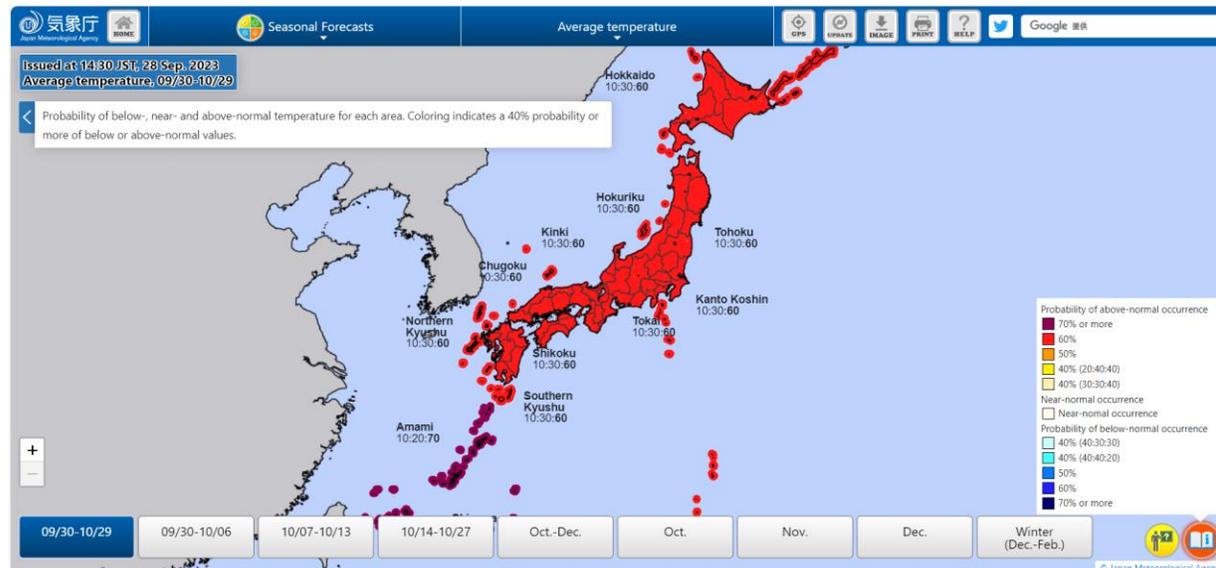
https://www.jma.go.jp/bosai/map.html#contents=season&lang=en

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Why has JMA promoted the use of climate predictions?

◆ The global climate is changing dramatically.
- ☐ Global warming and boiling.
- ☐ Increasing extreme weather conditions.

➢ The WMO's Global Framework for Climate Services (GFCS) is intended to support better management of climate-related risks.

➢ We need to recognize and adapt to climate risks.

https://gfcs.wmo.int

What are Climate Risks?

Awareness → Assessment → Adaptation
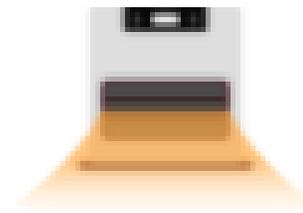
◆ The impacts of global warming and extreme weather conditions are called climate risks.

◆ Climate risk management (CRM) involves awareness and action on them.

◆ To promote the use of climate predictions for CRM in Japan, JMA has been working to create better ways for CRM in collaboration with our users.

What is Climate Risk Management?

1. Each organization needs to aware of potential influence by climate.

2. The organization need to assess climate risks quantitatively based on the analysis of own data.

3. Actions for adaptation to climate risks should be taking to reduce adverse influences and increase benefits in climate-affected sectors.

CRM process has 3 steps!

Climate Risk Management process

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JMA's efforts for climate risk management (2011-)

Year	Efforts	
	Other industries	**Agriculture**
2009	GFCS was established by the international community at the World Climate Conference-3	
2011		・Joint research with National Agriculture and Food Research Organization (NARO), about effective agricultural technology using climate prediction
2012	・Collaboration with Apparel / Fashion industries ・Publishing climate risk management portal web site	
2013		
2014	・Collaboration with drugstore industry	
2015	・Surveys of Convenience stores / Supermarket	・Trial seminars for instructors belonging to prefectural agricultural institutes
2016	・Collaboration with Household electronics / Soft drink industries	・Preparation of guidelines for agriculture using weather information
2017		
2018		・Study on the use of climate information for instructors belonging to prefectural agricultural institutes
2019		
2020	・Study of using advanced climate information in various industries (home appliance manufacturing, tourism promotion, soft drink and food)	・Start of seminars for instructors belonging to prefectural agricultural institutes
2021	・Study of using advanced climate information in private weather companies	
	・Start of Three-month forecast briefings for private weather companies (until 2023)	
2022		Study of using advanced climate information in agriculture
		Joint research with NARO, about effective agricultural technology using advanced climate prediction

Investigation on effective uses of two-week temperature forecast

Start of two-week temperature forecast

Investigation on effective uses of advanced climate information

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Developed download tools

◆ To use temperature forecasts for two-week and one-month.
◆ Users can get data in CSV files.

We also provide Excel sample files that visualize data.
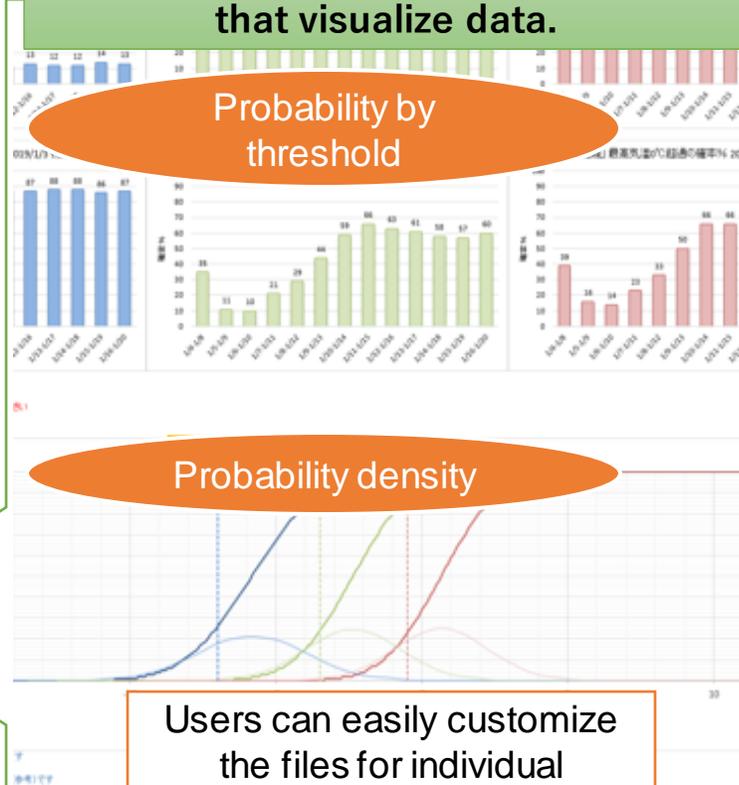
Probability by threshold

Probability density

Users can easily customize the files for individual purposes.

Japanese websites only

Agricultural use cases of two-week temperature forecast

Crops	Overview	Implementing agency & Information
Paddy rice	Countermeasures against cold and high temperature	NARO (National Agriculture and Food Research Organization) Tohoku agricultural research center Rice cold damage early warning system
	Prediction for harvest date	Yamagata, Kagawa and Niigata Prefecture Technical information for farming
Wheat	Prediction for blooming date	NARO (National Agriculture and Food Research Organization) West-Japan agricultural research center Growth stage prediction of wheat using meteorological data
Fruit	Prediction for blooming date	Yamanashi, Saitama and Fukushima Prefecture Information of blooming forecast date of peach, pear, apple
Seaweed	Sea surface temperature prediction	Aomori, Miyagi and Fukuoka Prefecture Information on prediction of seeding date for seaweed
Pest	Pest occurrence forecast	Okinawa Prefecture Information on the time of stink bug control
other	Agricultural weather mesh information	NARO (National Agriculture and Food Research Organization) Cultivation management support system

The cases listed in this table are only those confirmed by JMA and just examples.

Prediction for peach blooming date in Yamanashi (spring 2021)

R3 モモの開花予想（R3/3/4現在）

表　　発育速度モデルによるモモ「白鳳」の開花予想

今後の気温推移	予想開花始め	昨年差 （日）	平年差 （日）
平年並	3月29日	3日遅い	5日早い
平年より2.3℃高い*	3月23日	3日早い	11日早い

予想地点は山梨市江曽原（標高440m）、品種は「白鳳」
*　モデル予測値：気象庁HPにおける確率予測資料（1か月予報、甲府、3/6～4/2）より
　　昨年の開花始め　3/26、平年の開花始め　4/3（H14～R2の平均）

○ 留意点
今後の気温推移により、予測日は変化します。
3月末まで毎週1回予想を更新し、果樹試験場HPに掲載する予定です。
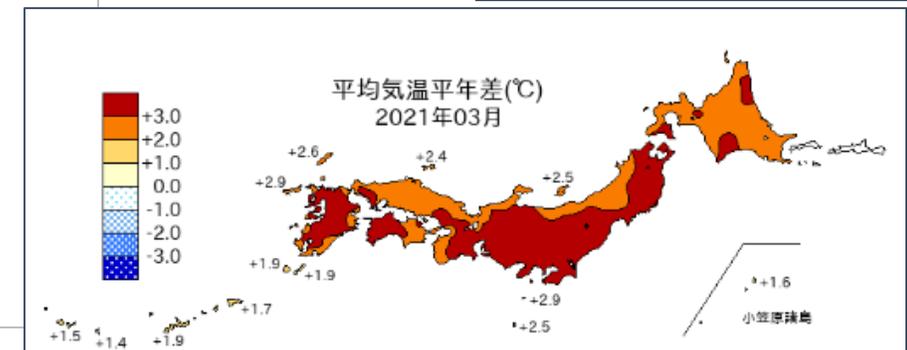(http://www.pref.yamanashi.jp/kajushiken/103_001.html)

○ 次回発表予定
　3月8日（月）（第2報）

The temperature was more than 3 degrees over than normal.

Observation results （March 2021）

平均気温平年差(℃)
2021年03月

The normal peach blooming date is March 29th.
The predicted blooming date using the two-week temperature forecast was March 23rd.
Actual blooming date was March 23rd (earliest recorded)

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Analysis on switching of cold drinks for hot drinks (autumn 2017)

◆ We compared sales of 31 Tokyo vending machines in which cold drinks were replaced with hot drinks at different times (15 units before October 17th and 16 thereafter) in collaboration with soft drink industries.
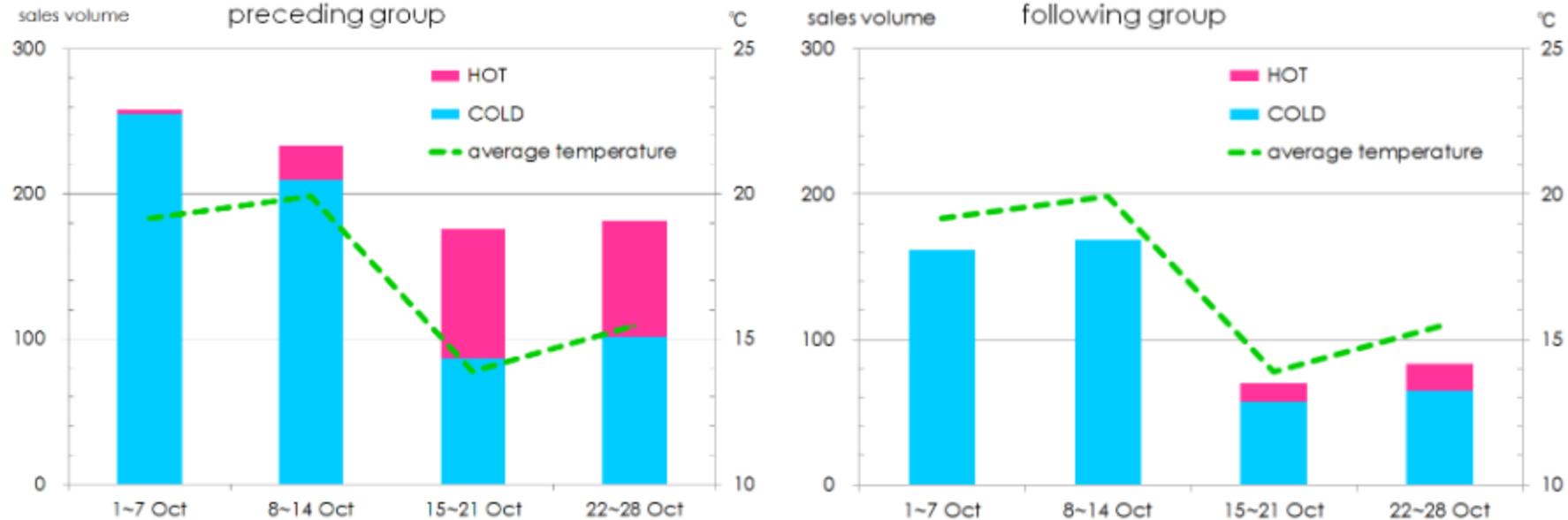
Sales of outdoor vending machines and average temperatures in Tokyo for October 2017.
Bars represent sales (left axis) and dashed lines represent average atmospheric temperatures (right axis).

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Joint research with NARO

◆ We are researching best practices to predict earlier climate risks on agriculture using one-month and three-month forecasts.

Developing models for Growth prediction

Climate prediction

JMA

Japan Meteorological Agency

Collaboration!

NARO

National Agriculture and Food Research Organization

Three-month forecast briefings for private weather companies

◆ Long-range forecasts are not well-known and not well-used unlike short-range forecasts.

◆ JMA has conducted online monthly briefings of three-month forecast for forecasters in private weather companies.

◆ We intend to encourage the use of long-range forecasts in a variety of industries.
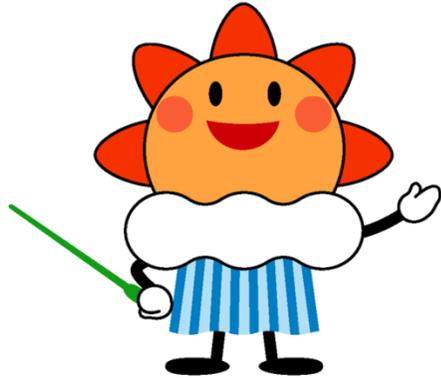
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private weather forecasters

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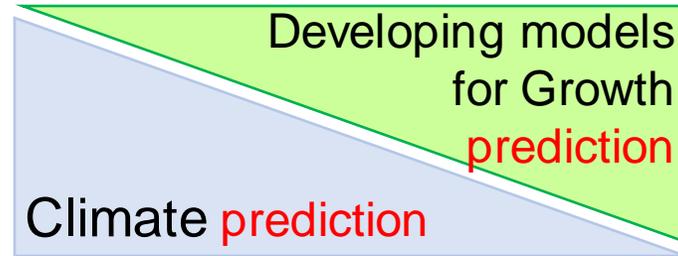4. Our further efforts
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Summary

◆ Adverse effects from global warming and extreme weather conditions are called climate risks, and climate risk management involves understanding and taking effective actions against them.

◆ Two-week temperature forecast is increasingly put into practical use in Japan.

◆ JMA has been promoting the use of more long-range forecasts such as one-month and three-month forecasts.

・Joint research with NARO
・Three-month forecast briefings for private weather companies

We intend to encourage the use of long-range forecasts in a variety of industries.

Our website

◆ For more information, please visit our web site. We introduce our best practices.

- https://www.data.jma.go.jp/risk/en/index.html

Best Practices in CRM

- JMA conducts joint research with the National Agricultural and Food Research Organization (NARO) to promote the use of climate information. New agricultural-meteorological products are made available on the website, which is accessible to registered users only. (Read more)

- JMA conducts collaborative research with a private apparel association toward the development of best practices in climate risk reduction based on expertise in both sectors. (Read more)

- JMA conducts collaborative research with a private drugstore association toward the development of best practices in climate risk reduction based on expertise in both sectors. (Read more)

- JMA conducts collaborative research with a private electrical appliance association toward the development of best practices in climate risk reduction based on expertise in both sectors. (Read more)

- JMA conducts collaborative research with the Japan Soft Drink Association (JSDA) toward the development of best practices in climate risk reduction based on expertise in both sectors. (Read more)

- JMA provides maximum temperature forecast data covering the period up to two weeks ahead to support electricity generation planning in summer and winter.

- The incidence of heat illness has increased rapidly due to a greater number of extremely hot days resulting from global warming and natural climate fluctuations. JMA issues heat illness-related information based on short-range and medium-range forecasts.

See the leaflet (PDF 3.9MB) in detail.

Thank
You !!

Extra materials

About GFCS

Our vision: "To enable better management of the risks of climate variability and change and adaptation to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale."

The Global Framework for Climate Services (GFCS) accelerates and coordinates the technically and scientifically sound implementation of measures to improve climate-related outcomes at national, regional and global levels. As a framework with broad participation and reach, GFCS enables the development and application of climate services to assist decision-making at all levels in support of addressing climate-related risks.

The implementation of GFCS has five components:

- Observations and Monitoring
- Climate Services Information System
- Research, Modelling and Prediction
- User Interface Platform
- Capacity Development

GFCS focuses on developing and delivering services in five priority areas, which address issues basic to the human condition and present the most immediate opportunities for bringing benefits to human safety and wellbeing:

- Agriculture and Food Security
- Disaster Risk Reduction
- Energy
- Health
- Water

https://gfcs.wmo.int/about-gfcs

How could we use two-week temperature forecast?

Everyday life

When traveling or having an outdoor event, you can prepare your clothes early.
In times of sudden rise in temperature, you can make measures against heat stroke early.

Agriculture

By taking measures against high and low temperatures in advance, damage to agricultural products can be reduced.
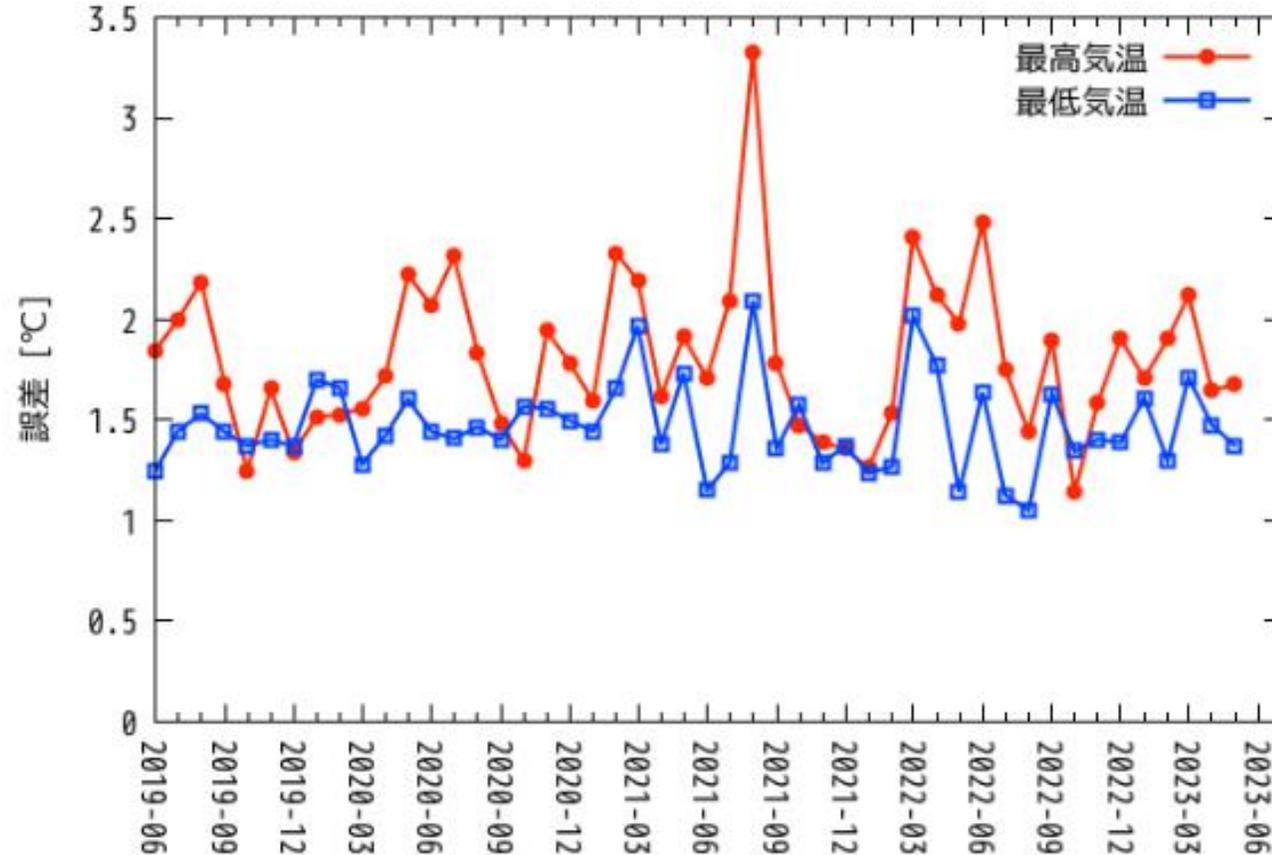
Product sales

By forecasting the needs of products with fluctuations in demand due to temperature, it can be useful for ordering products and inventory adjustments, etc.

Verification results of two-week temperature forecast

Difference from observed temperature and two-week forecast temperature

- daily maximum temperature
- daily minimum temperature

https://www.jma.go.jp/jma/kishou/know/kisetsu_riyou/accuracy/twoweek/