

Impact-based Forecasting Connected to Typhoon-related Disaster Risk Reduction

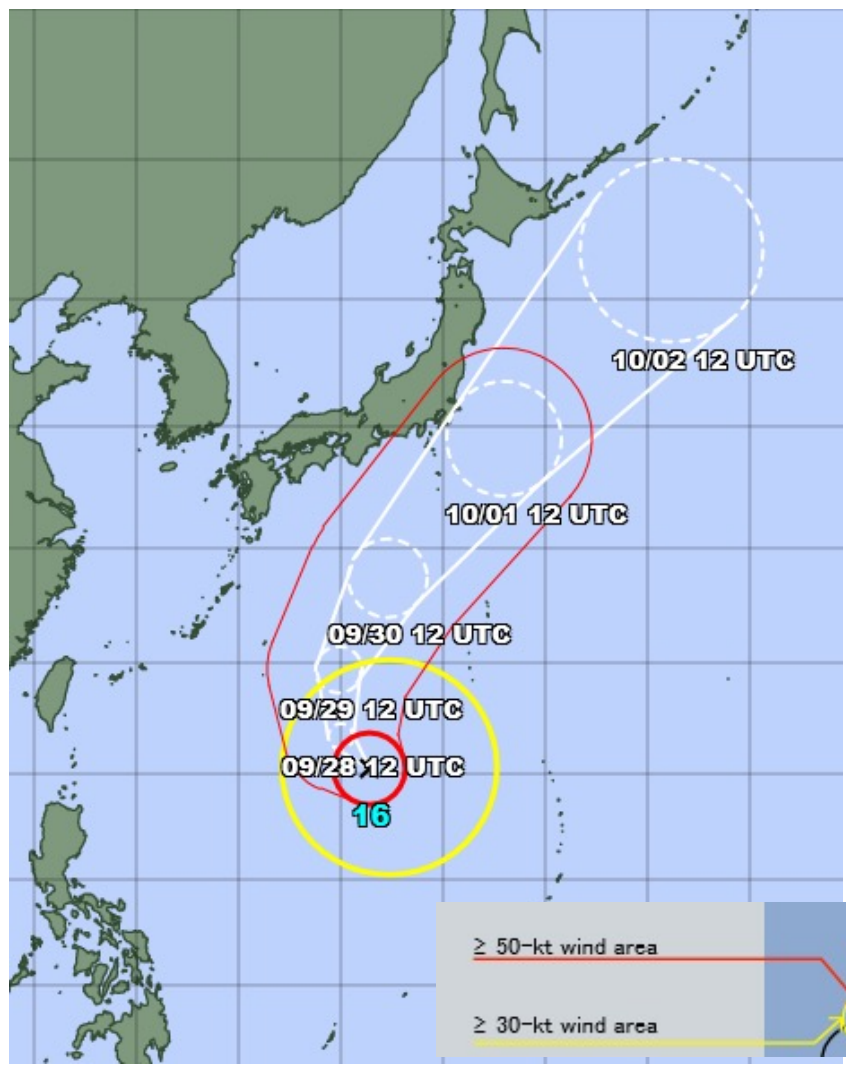
16th Integrated Workshop
ESCAP/WMO Typhoon Committee
2-3 December 2021

HOSOMI Takuya
Tokyo Typhoon Center
Japan Meteorological Agency



Effective Information Related to Tropical Cyclones

We will introduce various ways to prepare for an upcoming hazard based on impact-based forecasts provided by JMA, focusing on the lifetime of a tropical cyclone.



≥ 50 -kt wind area		Storm warning area
≥ 30 -kt wind area		70% probability circle of center position forecast

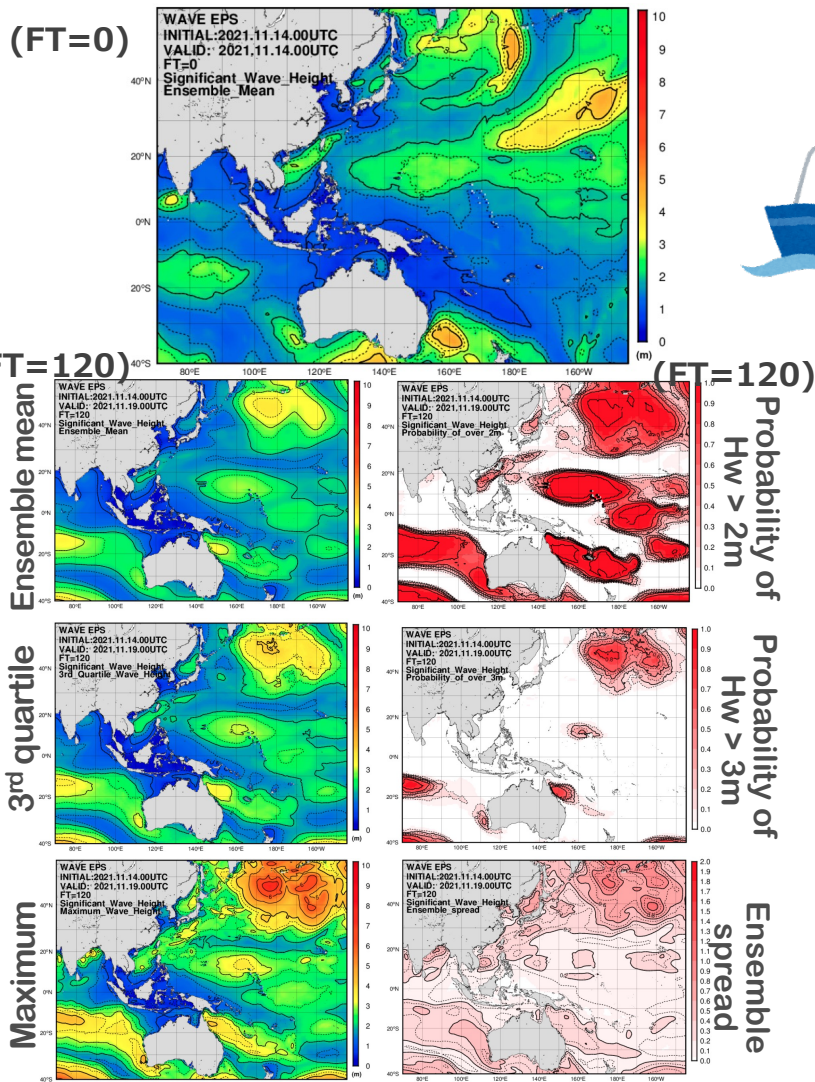


Probabilistic forecast maps

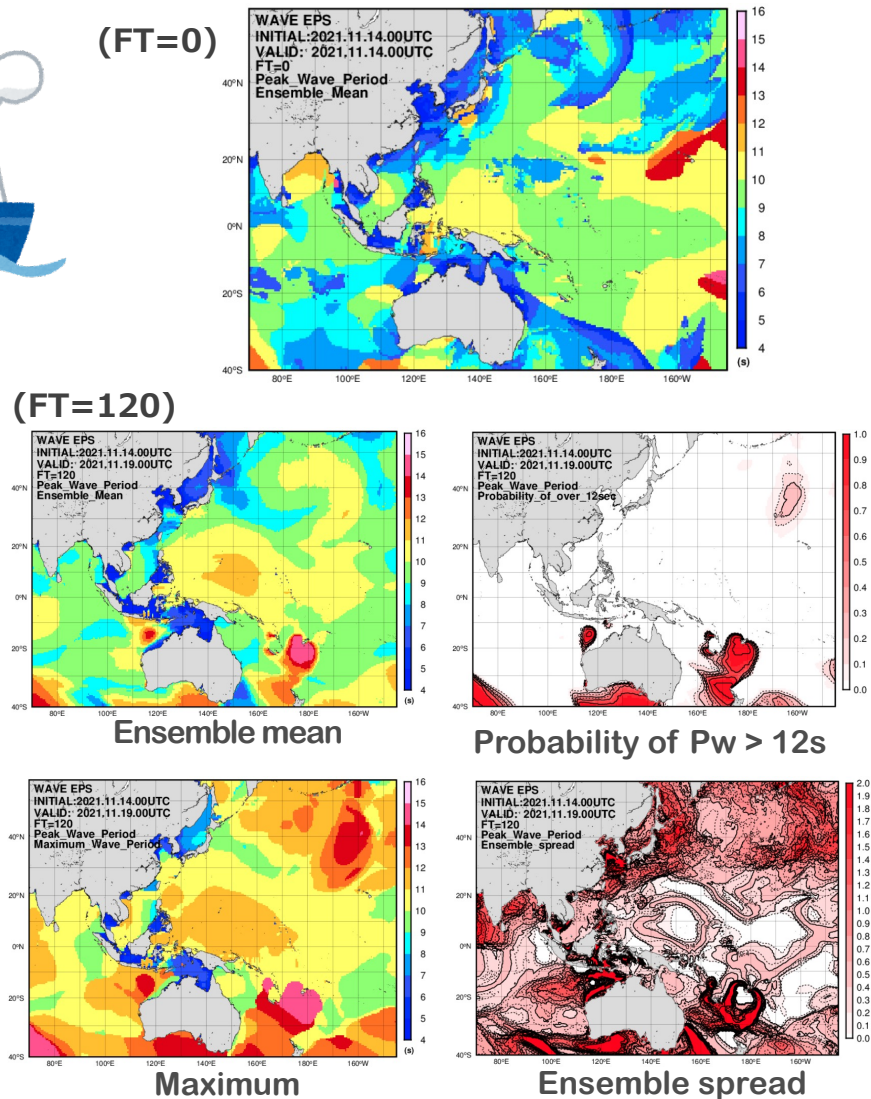
For marine navigation safety



Wave Height Prediction



Wave Period Prediction





50-kt wind probability products

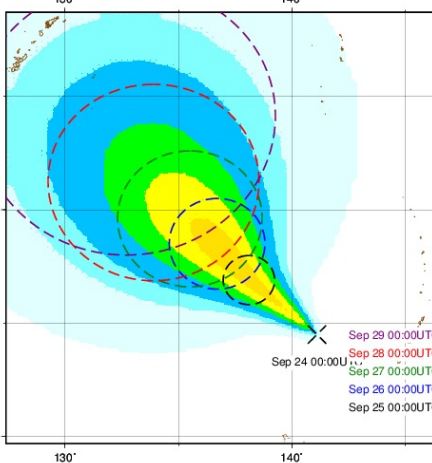
Areas of probability of 50-kt wind or more are provided in colored maps

➤ 50-kt wind probability

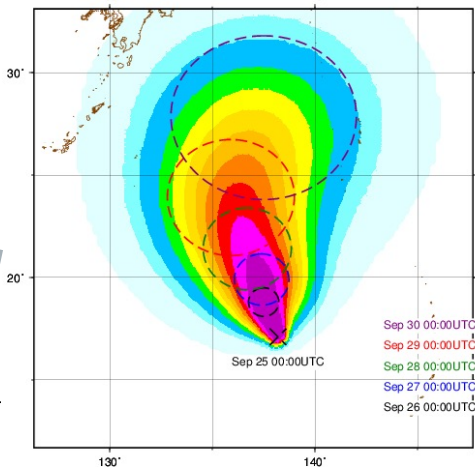
NTP* Website

*Numerical Typhoon Prediction

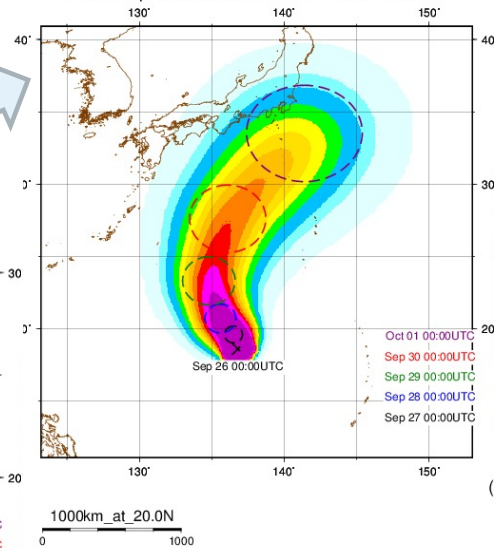
T2116 Storm Winds Probability
Initial: Sep 24 00:00UTC 2021 FT=000-120hours



T2116 Storm Winds Probability
Initial: Sep 25 00:00UTC 2021 FT=000-120hours



T2116 Storm Winds Probability
Initial: Sep 26 00:00UTC 2021 FT=000-120hours



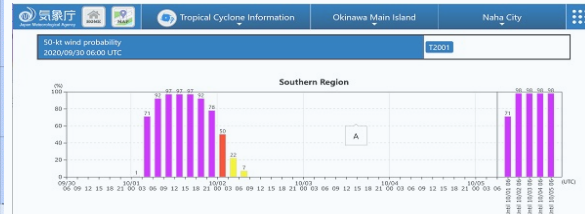
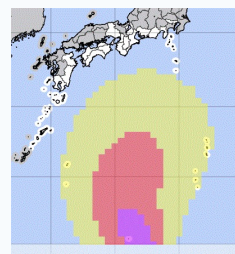
1000km_at_20.0N

← high possibility

← low possibility

(%)

3-hourly probabilities for a specific area



sample

JMA Official Website



Probability of Warning-class Phenomenon

Probability information for the risk of severe weather phenomena that may have significant impacts to the area are given up to 5 days ahead.

Southern ○○ Prefecture	Probability of warning issuance								
	3 Sun	4 Mon			5 Tue	6 Wed	7 Thu	8 Fri	
	18-24	0-6	6-12	12-18	18-24				
Heavy rain	[Mid]		-			-	-	[Mid]	-
Storm(Gale)	-		[High]			-	[Mid]	[High]	-
High waves	-		[High]			-	[Mid]	[High]	-

From today to tomorrow

From day after tomorrow to five days ahead

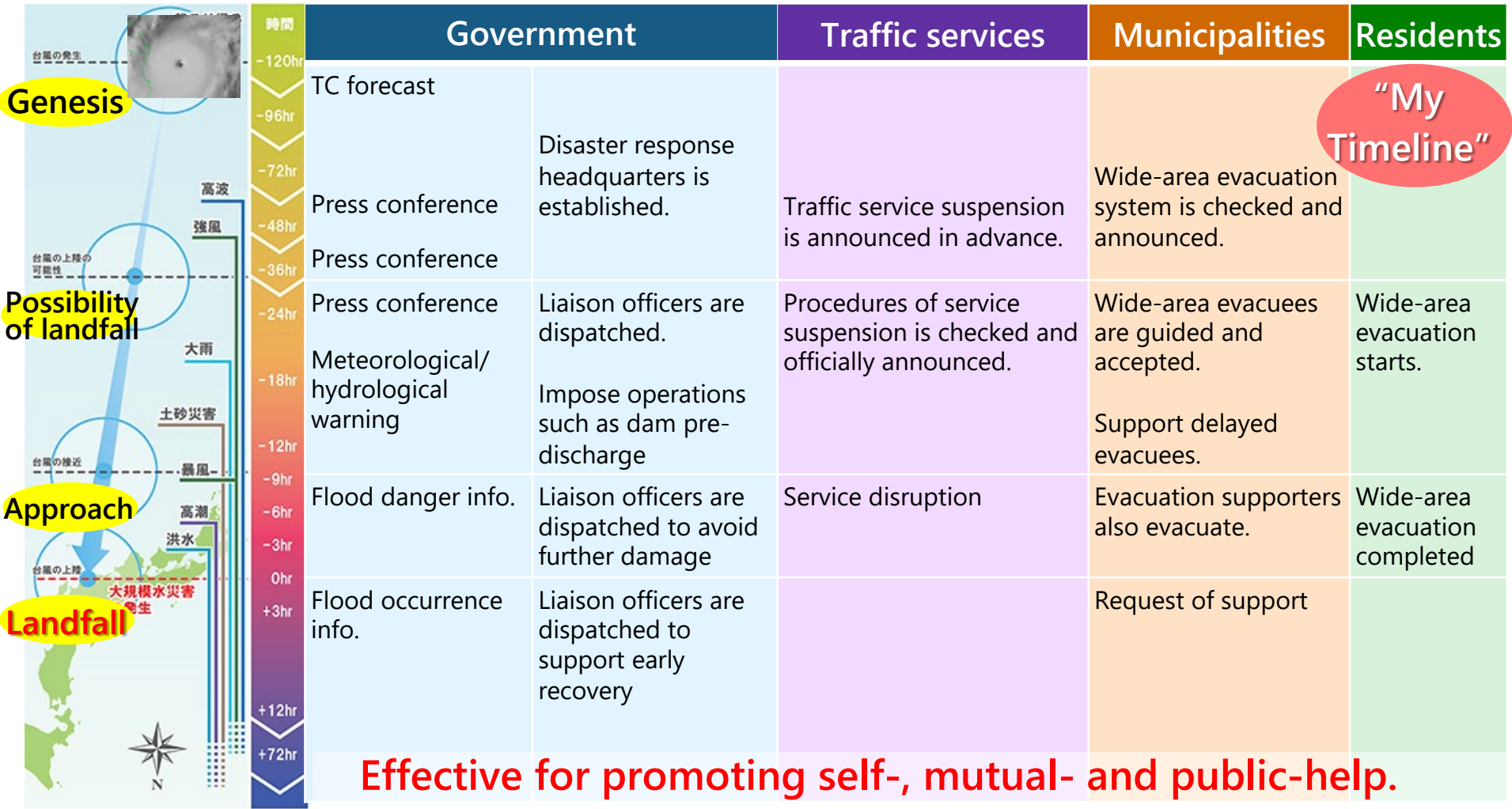
Before six o'clock in the evening – Provide probability of warning issuance tonight, or early the next morning, to avoid evacuation in the middle of the night

Provide probability of warning issuance up to five days ahead to support the preparation needed for DRR stakeholders



Timeline for DRR stakeholders – when, who and what

Actions to be taken by the government, other organizations and residents



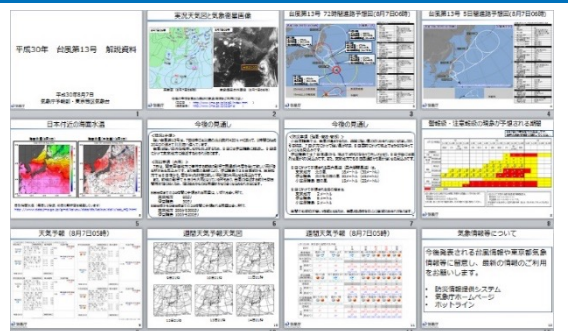


JMA takes all possible actions to support municipalities and encourage the public towards early evacuation

- (1) Press conferences
- (2) Briefing to municipalities
- (3) Delivering "JETT" as needed



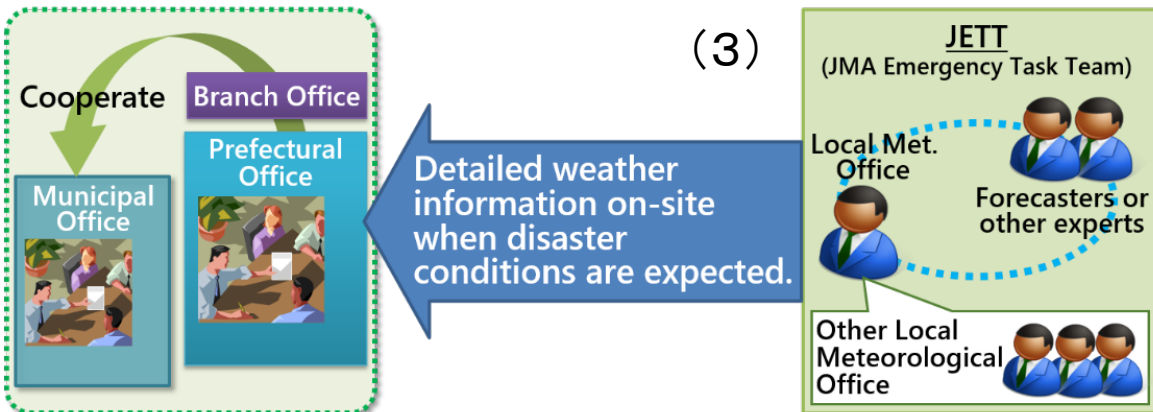
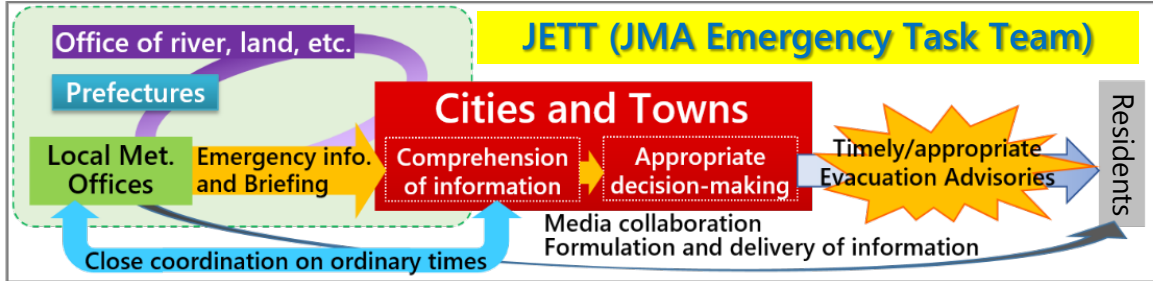
(2) Briefing to municipalities



(2) Various kinds of information (graphs, charts, etc.) are used during briefing



(1) Press Conference

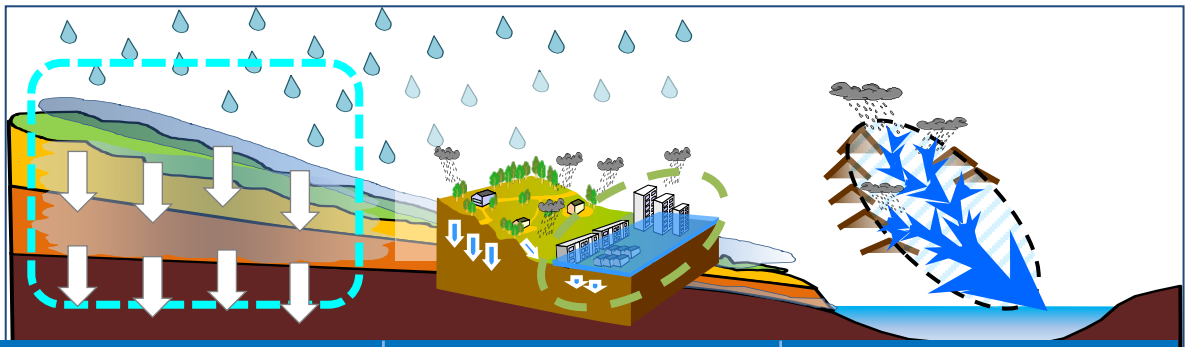




Real-time Risk Map

To initiatively check your current situation of risk possibility

- Five risk levels colored from light blue to purple
- Determining risk-level by "Index"; ex. Soil water index – the water amount accumulated in the soil considered together with the rainfall amount in target areas



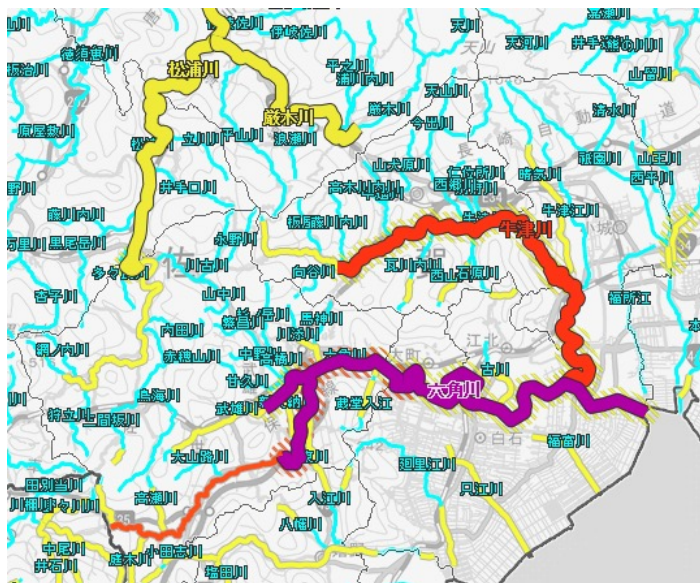
	Landslide (2015-)	Inundation (2017-)	Flood (2017-)
Risk Map Real-time Flood Risk Map Extreme risk High risk [Level 4 eq.] Warning [Level 3 eq.] Caution [Level 2 eq.] Low Check weather bulletin Flood Warnings and Advisories for designated rivers Information on flooding [Level 5 eq.] Information on potential flooding [Level 4 eq.] Information to provide a warning on flooding [Level 3 eq.] Information to call attention to flooding [Level 2 eq.] Check weather bulletin			
Related Disaster			
Resolution/Update Interval/Lead time/Index used for warning criteria	1 km/10 min/2 hours/ soil water index	1 km/10 min/1 hour/ surface water index	1 km/10 min/3 hours/ runoff index



Real-time Risk Map

Continuous effort in progress to improve usability of Risk Maps

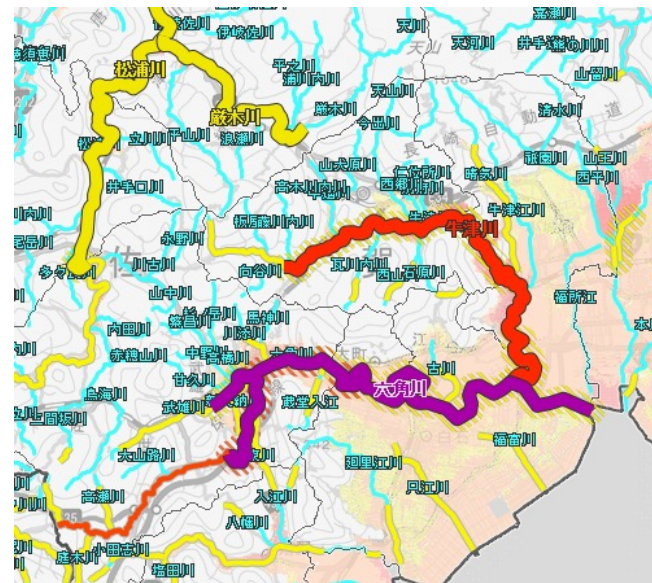
Flood



Click, and



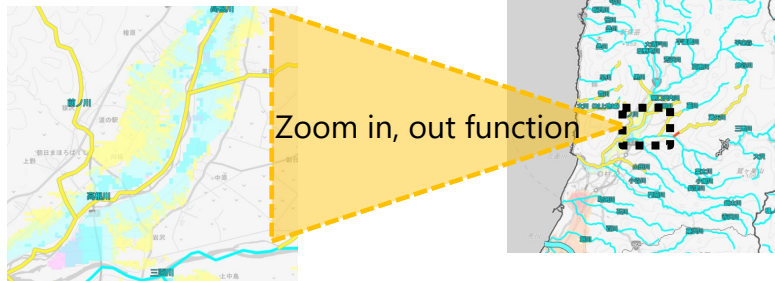
change screen



Inland Flooding Warning



- Warning [Level 3 eq.]
- Advisory [Level 2 eq.]

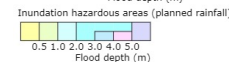
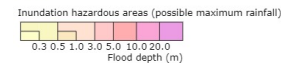


Zoom in, out function

- Flood Warnings and Advisories for designated rivers
- Information on flooding [Level 5 eq.]
 - Information on potential flooding [Level 4 eq.]
 - Warning on flooding [Level 3 eq.]
 - Information to call attention to flooding [Level 2 eq.]
 - Check weather bulletin

- Real-time Flood Risk Map
- Extreme risk
 - High risk [Level 4 eq.]
 - Warning [Level 3 eq.]
 - Caution [Level 2 eq.]
 - Check weather bulletin

- Inland flooding caused by rising water levels in main rivers
- Warning [Level 3 eq.]
 - Advisory [Level 2 eq.]



https://www.jma.go.jp/bosai/#area_type=class20s&area_code=1310300&pattern=rain_level

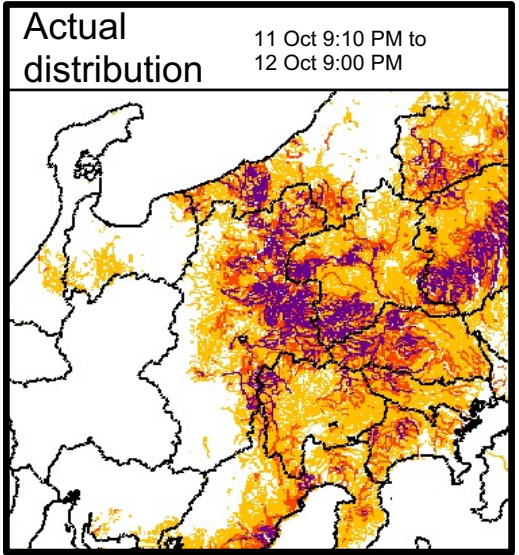
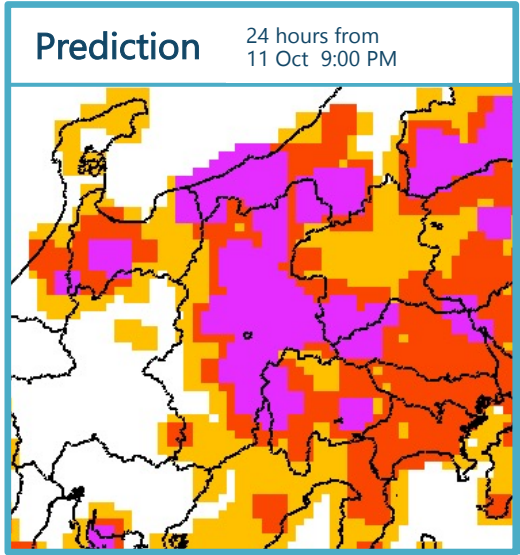


Real-time Risk Map – Further Improvement

Longer forecast

- To call for caution against heavy rain at an earlier stage, JMA has developed a Maximum Risk Map with a longer lead time (approximately one day).
- Considering the uncertainty with longer forecasts, for the time being, the product will be used only during press conferences for tropical cyclones that may cause phenomena which largely exceeds the warning criteria.

Comparison between the prediction of the maximum risk of flood 24 hours in advance (left) and the actual Maximum Risk Map (right) [Typhoon Hagibis in 2019]



■ ... Exceed warning criteria largely (prediction)
■ ... Exceed warning criteria (prediction)
■ ... Exceed advisory criteria (prediction)

■ ... Exceed warning criteria largely
■ ... Exceed warning criteria
■ ... Exceed advisory criteria

Thank you

