

# Smart Technologies for Water-related Disaster Risk Reduction

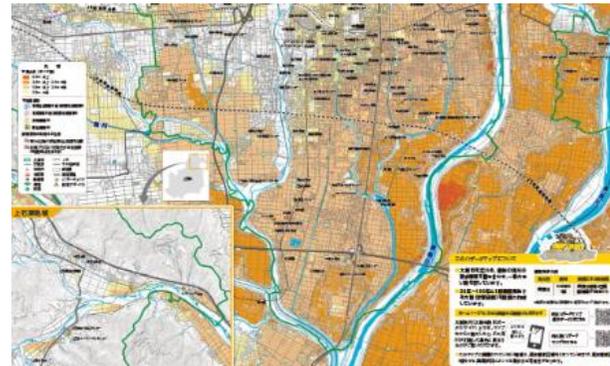
International Training Workshop on Smart Cities for  
Building Inclusive, Resilient, Livable, and Sustainable Cities and Communities  
in Asia and the Pacific

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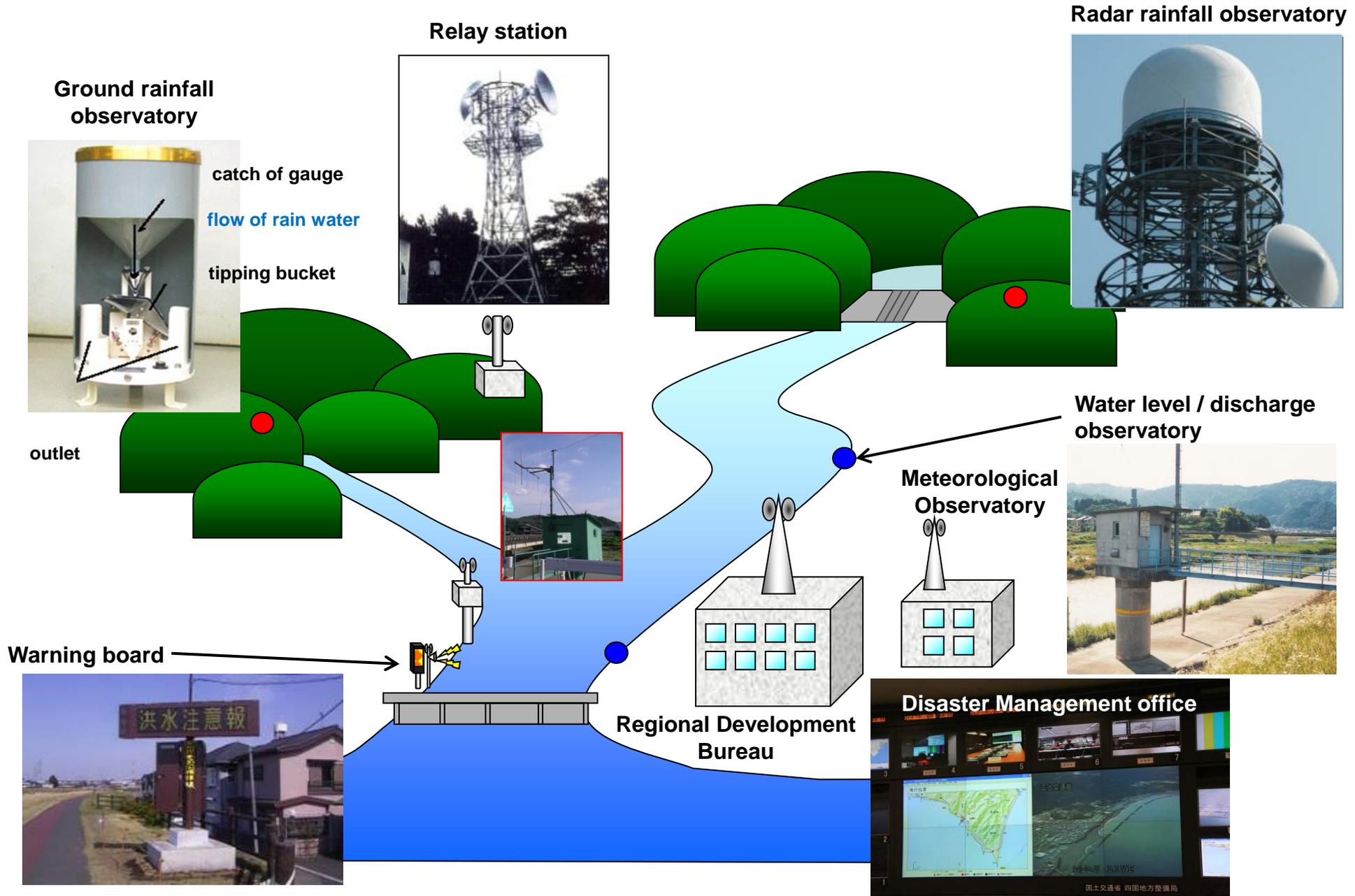
Director, Mie River and Road Office,  
Chubu Regional Development Bureau,  
Ministry of Land, Infrastructure, Transport, and Tourism, Japan (MLIT)

TOKIOKA Toshikazu

- Infrastructure development and maintenance
- Emergency response and disaster recovery
- Multi-stakeholder coordination and cooperation
- Risk assessment and visualization
- Hydrological observations and monitoring
- Early warning and information sharing



# Hydrological observation in Japanese rivers

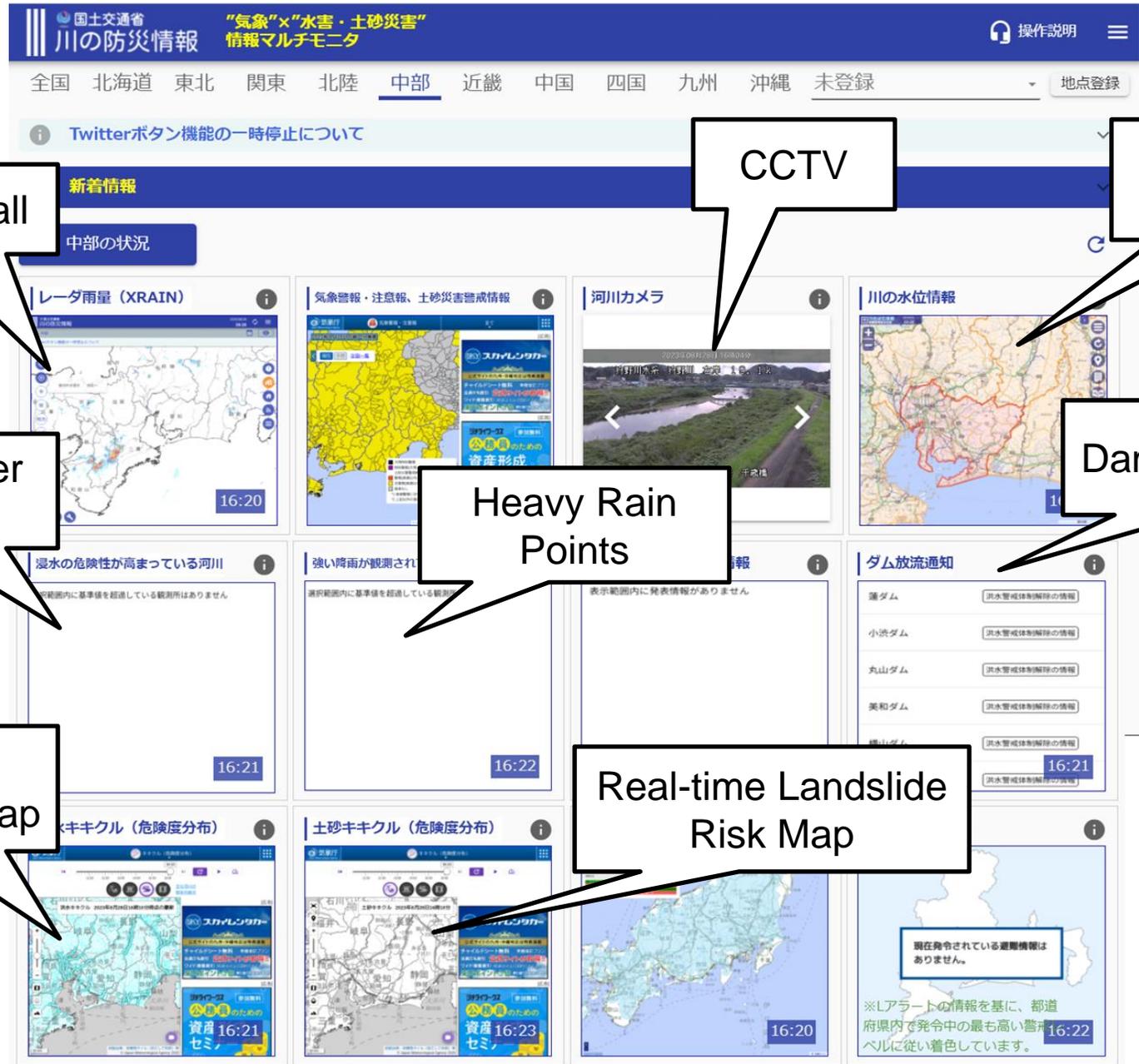


## Number of observation stations in Japan (as of Mar. 2018)

Administrator	Rain gauge station	Water gauge station
River and disaster management bureau, MLIT	3,490	1,934
Japan Meteorological Agency	1,302	—
Prefectures	5,189	4,634
Total	8,691	6,568

## Frequency of observations

Type	Frequency
Ground rainfall observation	<ul style="list-style-type: none"> <li>hourly</li> <li>10 min (flood time, etc.)</li> </ul>
Radar rainfall observation	<ul style="list-style-type: none"> <li>C-band: 5 min to 10 min</li> <li>X-band: 1 min to 2 min</li> </ul>
Water level observation	<ul style="list-style-type: none"> <li>hourly</li> <li>10 min (flood time, etc.)</li> </ul>
Discharge observation	<ul style="list-style-type: none"> <li>Low flow measurement: 36+ times / yr</li> <li>Flood flow measurement: 10 floods / yr</li> </ul>



The screenshot displays the MLIT Open Database interface for river disaster information. The main navigation bar includes the MLIT logo, the title "川防災情報" (River Disaster Information), and a subtitle "「気象」×「水害」土砂災害 情報マルチモニタ" (Weather x Water Disaster / Landslide Disaster Information Multi-Monitor). The region is set to "中部" (Chubu). The interface features several data panels:

- レーダ雨量 (XRAIN):** Radar rainfall map showing precipitation intensity over the region.
- 気象警報・注意報、土砂災害警戒情報:** Weather warnings and landslide disaster alert information, including a "スコールセンター" (Squall Center) alert.
- 河川カメラ:** CCTV camera feed showing a river scene.
- 川の水位情報:** River water level information map.
- ダム放流通知:** Dam discharge notification table listing dams like 蓮ダム, 小洗ダム, 丸山ダム, and 美和ダム.
- 土砂キキクル (危険度分布):** Landslide risk map showing hazard distribution.

Radar Rainfall

CCTV

River Water Level

Flood Danger Rivers

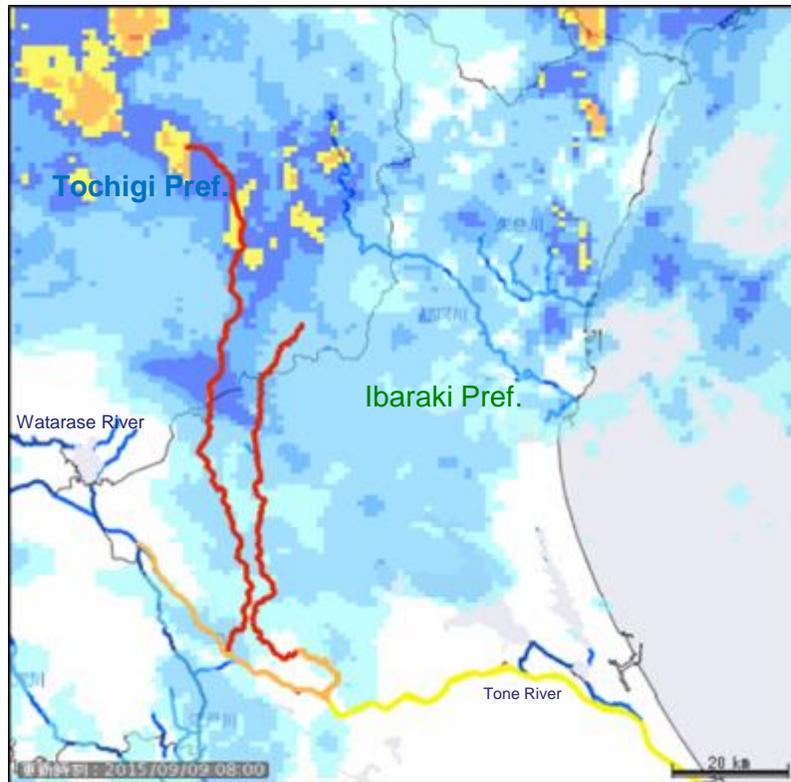
Heavy Rain Points

Dam Discharge

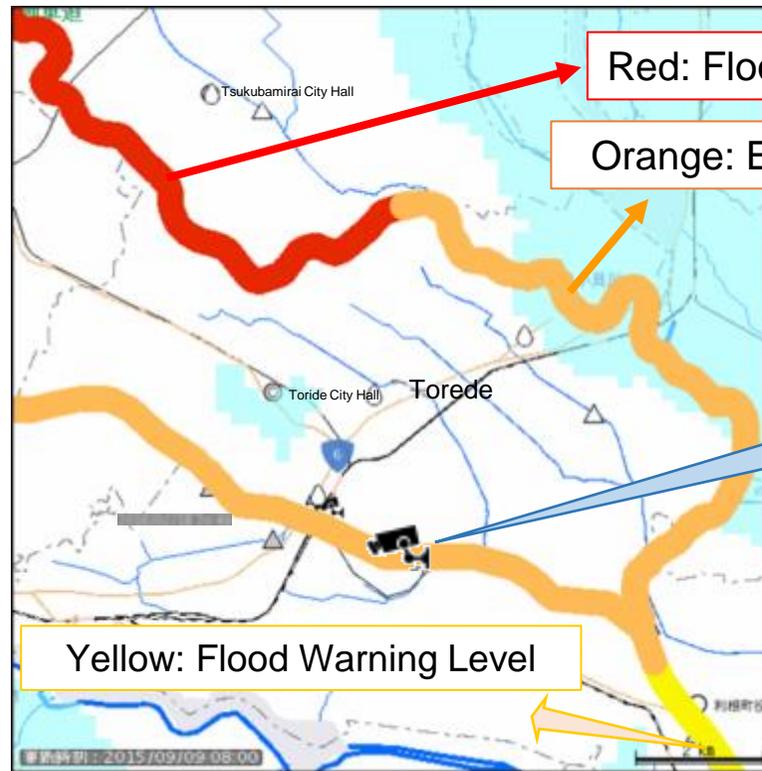
Real-time Flood Risk Map

Real-time Landslide Risk Map

- River water levels are observed every 10 min and colored and displayed according to the danger levels.
- The real-time river video can be seen by clicking on the camera icon.



Prefecture View



Municipality View

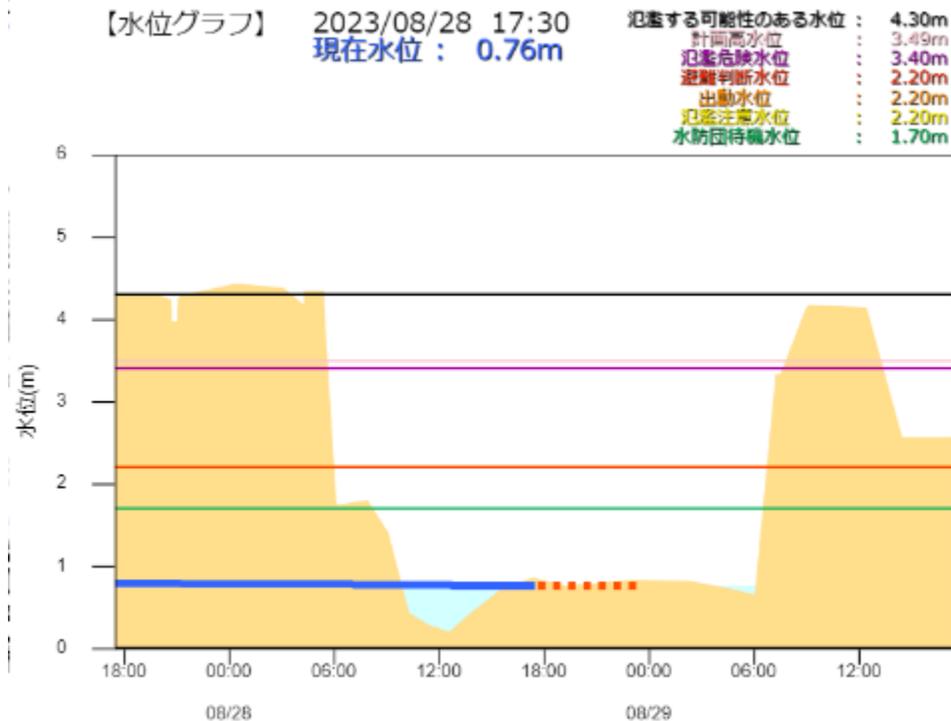
Red: Flood Danger Level

Orange: Evacuation Decision Level

Yellow: Flood Warning Level



Camera Image



## Classification

Flood Danger Level

Level for evacuation of all residents

Evacuation Decision Level

Level for evacuation of vulnerable people

Flood Corps Mobilization Level

Level at which flood corps are mobilized

Flood Caution Level

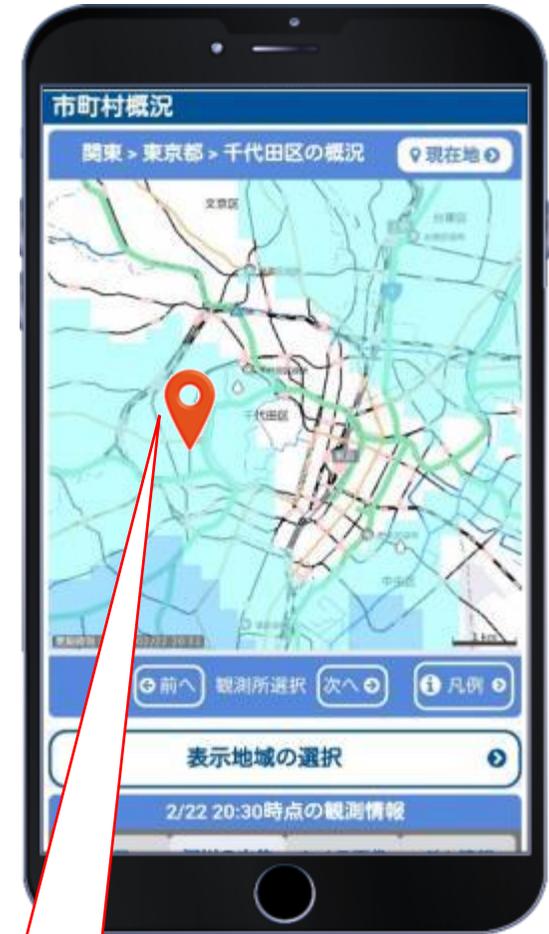
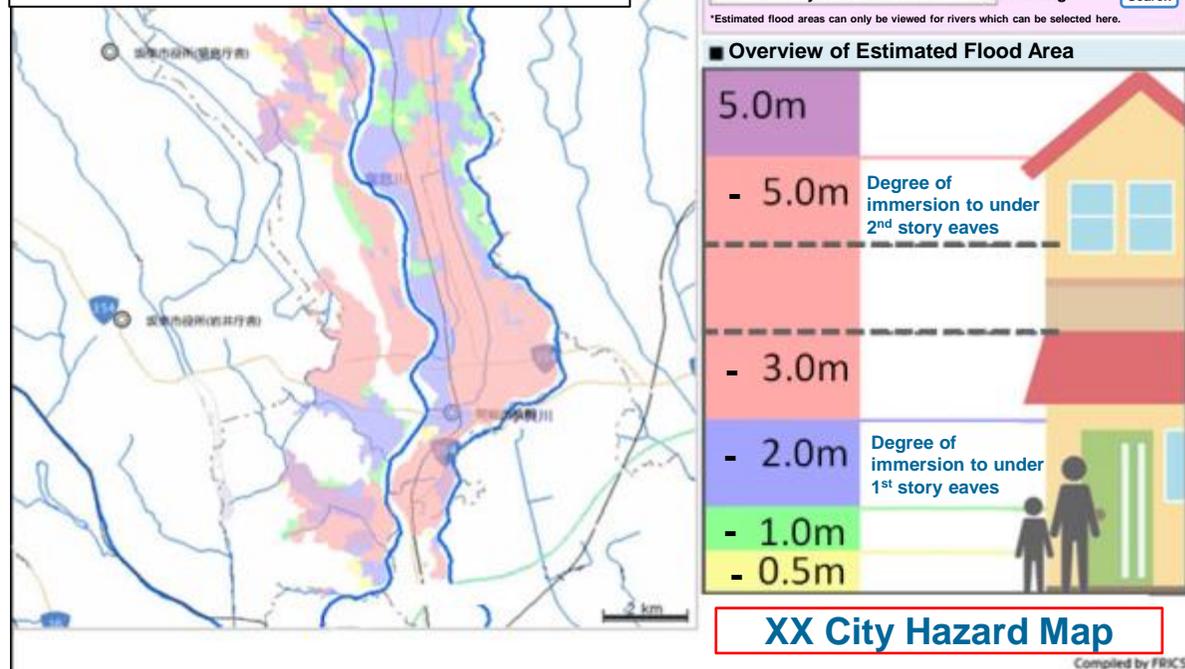
Level at which caution should be exercised for the river flooding

Flood Corps Alert Level

Level at which flood corps are placed on stand-by

Understand the risk of flooding in the event of a flood in estimated flood areas

Map of Estimated Flood Area

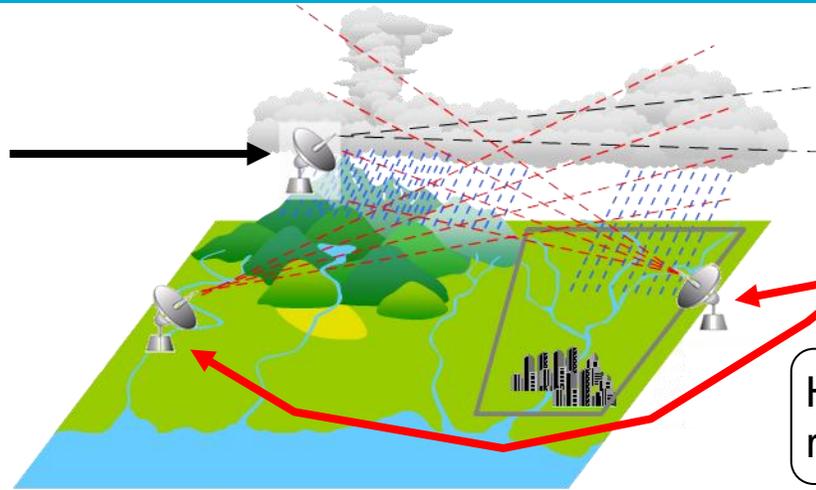


Using GPS, you can view the conditions where you are.



C-band radar

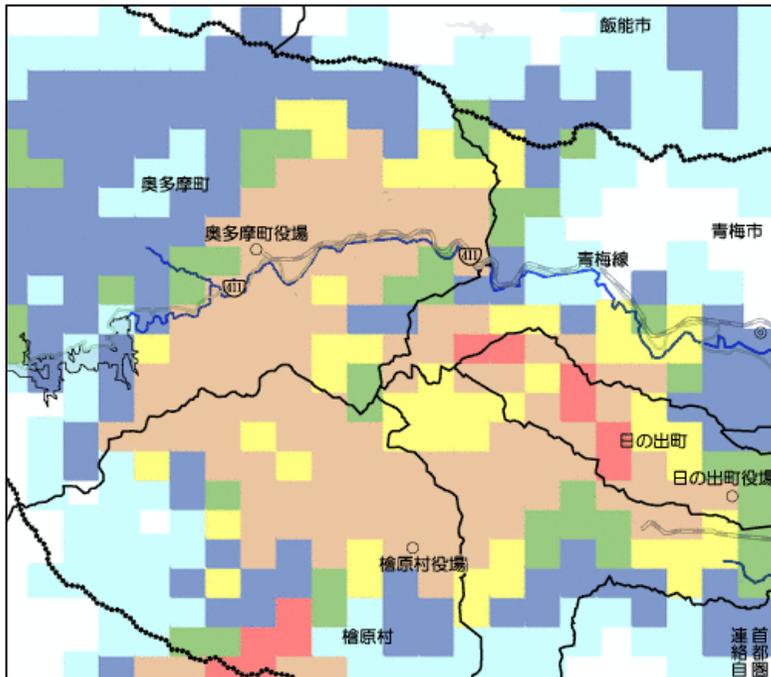
Monitoring broad area



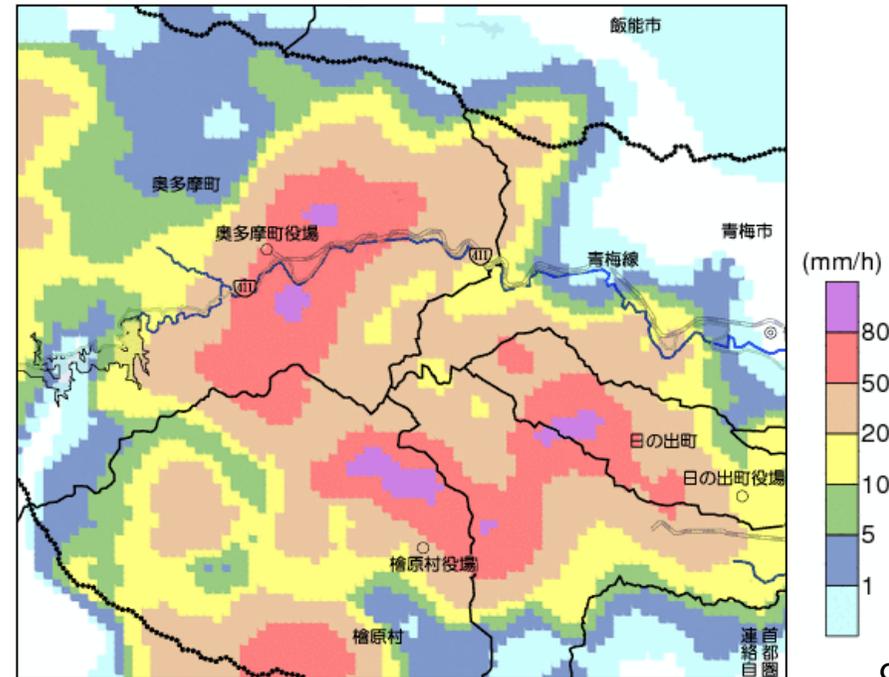
XRAIN ( X-band polarimetric RAdar Information Network )

High-frequency and high-resolution monitoring

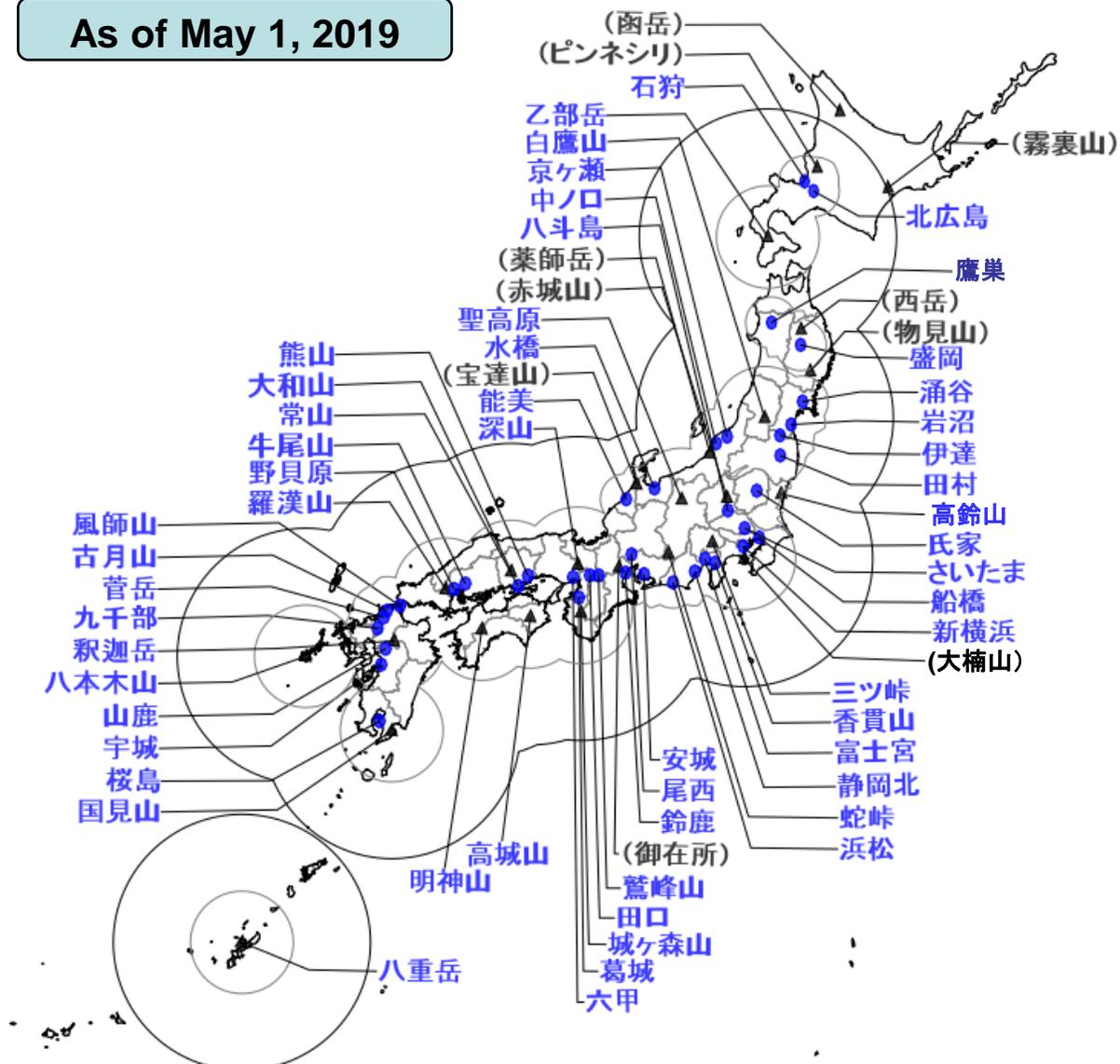
Conventional Radar (C-Band Radar)  
(1 km grid, 5 mins update cycle)



X-band MP radar  
(250 m grid, 1 min update cycle)



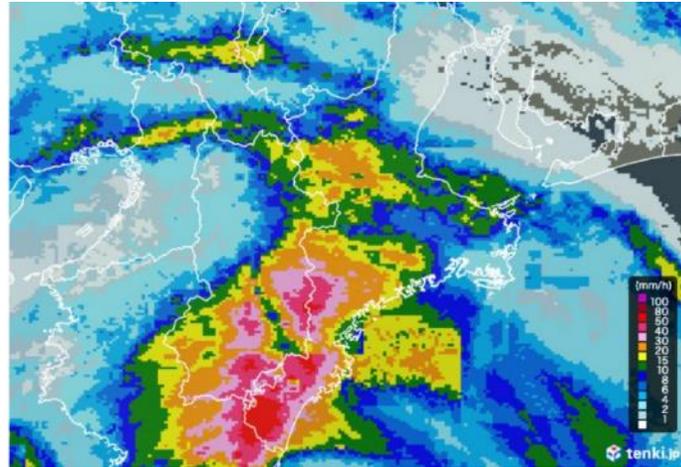
As of May 1, 2019



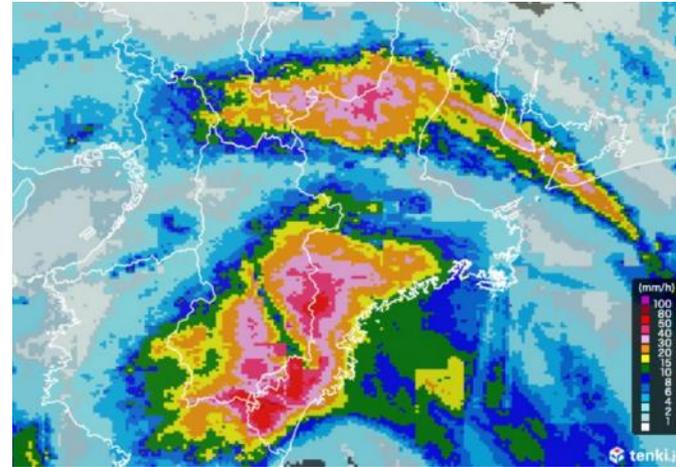
- X-band 39 units
- ▲ C-band 26 units

[Legend]  
 Blue: MP radar rain gauge  
 (Black): CMP undeveloped rain gauge  
 Ash circles: Quantitative observation range  
 Black circles: Qualitative observation range

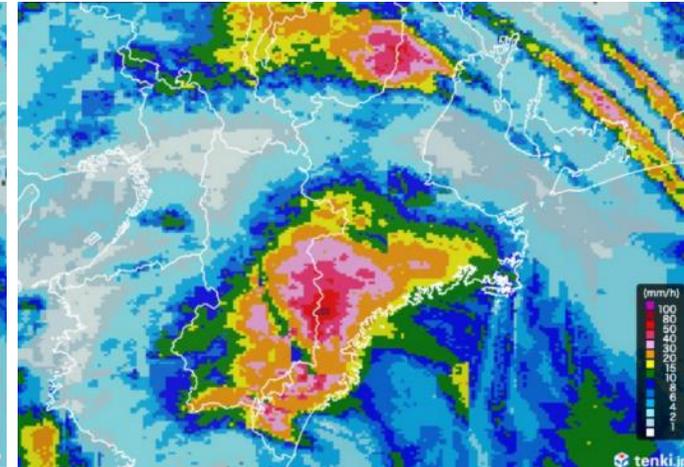
Present



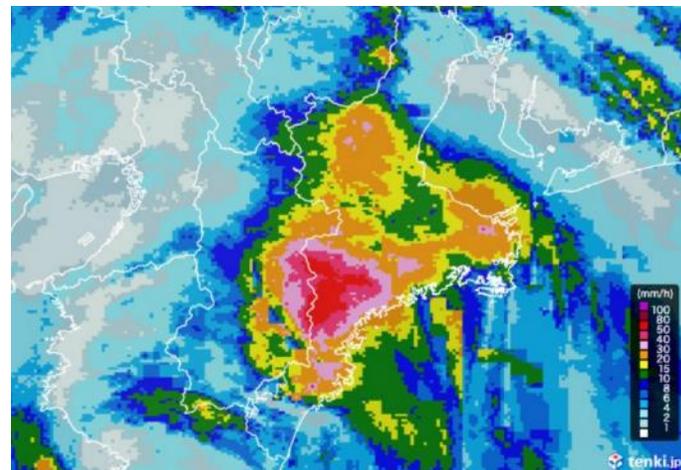
1 hour later



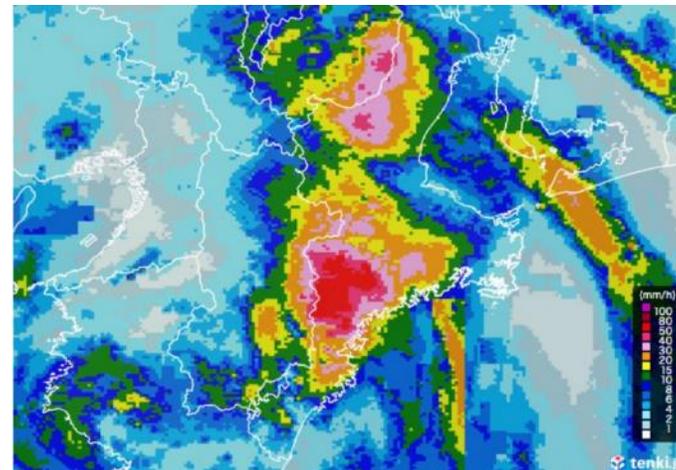
2 hour later



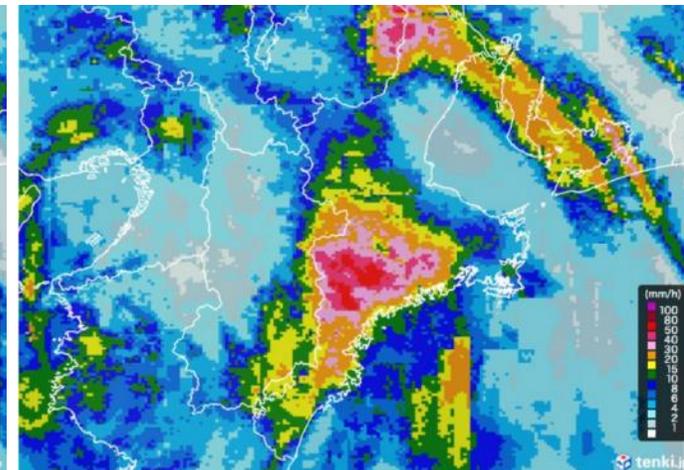
3 hour later



4 hour later



5 hour later



Rainfall prediction is carried out by Japan Meteorological Agency(JMA)

# Water level predictions by rainfall predictions and river discharge simulation

