

Flood Forecast for Designated Rivers

Legal Framework of Flood Forecast and Warning

All rivers in Japan

JMA Flood Warning and Advisory (Both for general and flood control purposes)

[General] Clause 1 in Article 13 of Meteorological Service Act

[Flood control] Clause 1 in Article 14-2 of Meteorological Service Act, Clause 1 in Article 10 of Flood Control Act

Rivers managed by the
Minister of
Land, Infrastructure, Transport and
Tourism

Joint flood forecast with WDMB※

Clause 2 in Article 14-2 of
Meteorological Service Act
Clause 2 in Article 10 of Flood
Control Act

Rivers managed by
prefectural governors

Joint flood forecast with prefectures

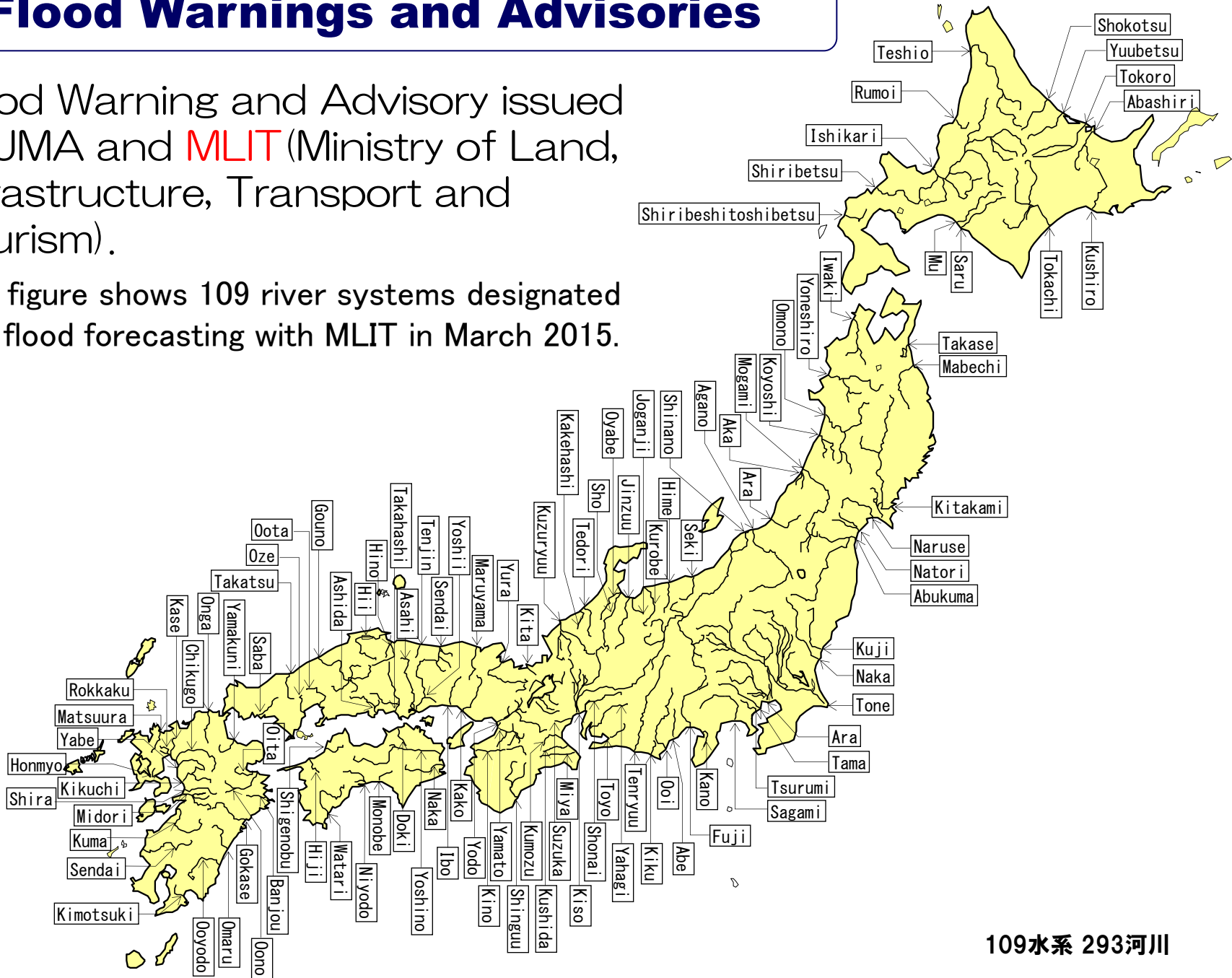
Meteorological Service Act -
Clause 3 of Article 14-2,
Flood Control Act - Clause 1 of
Article 11

※WDMB = Water Disaster Management Bureau 水管理・国土保全局

Flood Warnings and Advisories

Flood Warning and Advisory issued by JMA and **MLIT** (Ministry of Land, Infrastructure, Transport and Tourism).

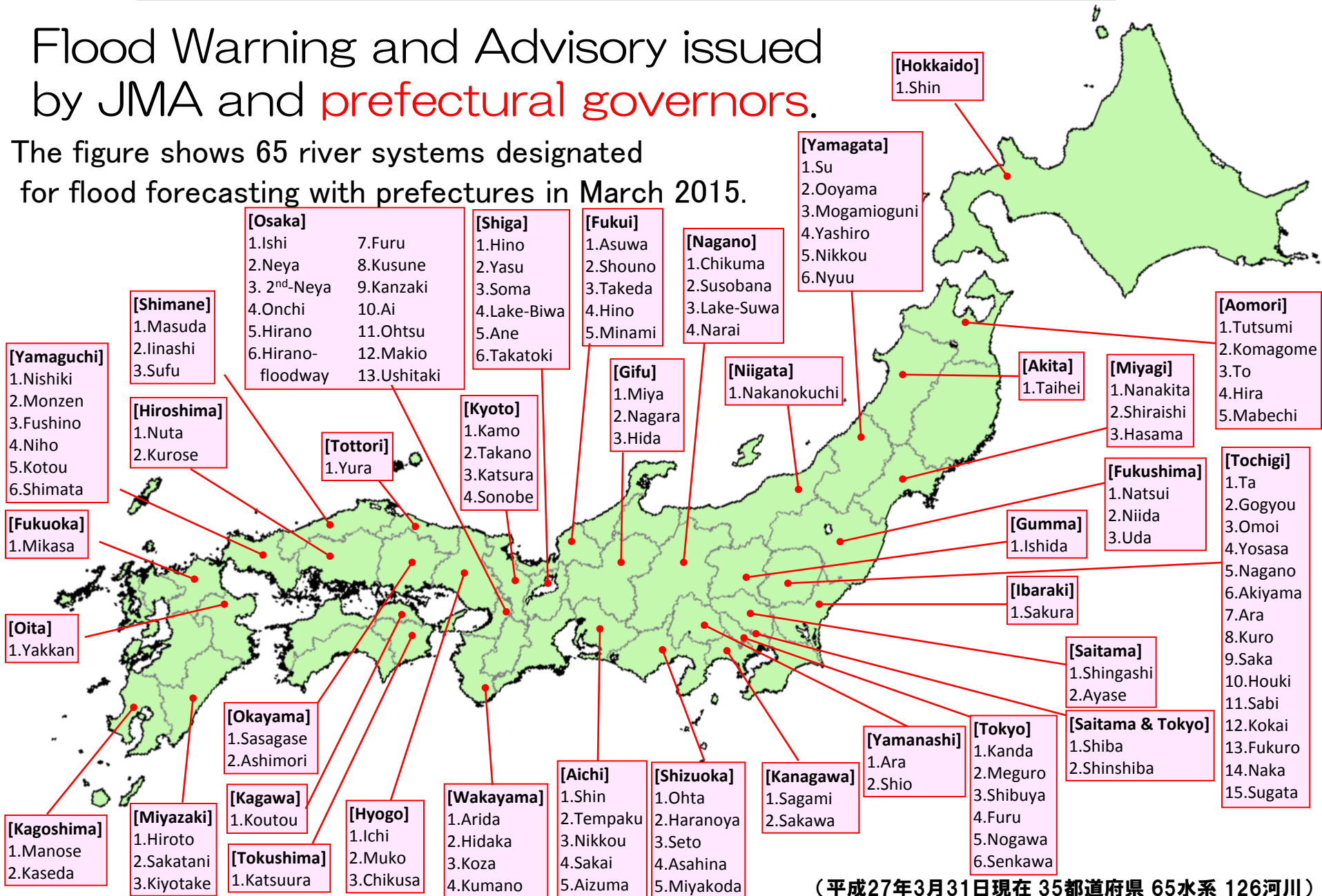
The figure shows 109 river systems designated for flood forecasting with MLIT in March 2015.



Flood Warnings and Advisories

Flood Warning and Advisory issued by JMA and **prefectural governors**.

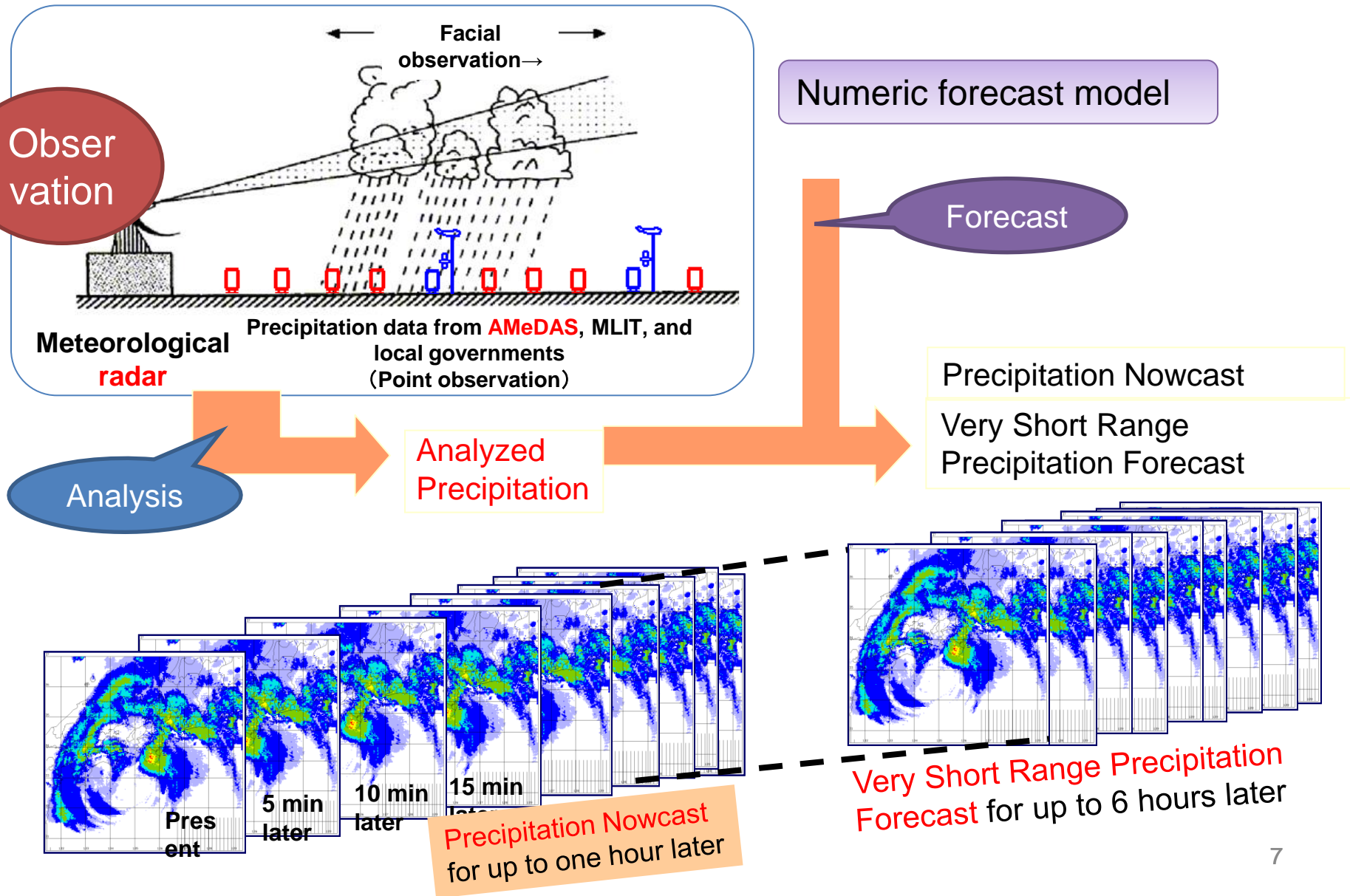
The figure shows 65 river systems designated for flood forecasting with prefectures in March 2015.



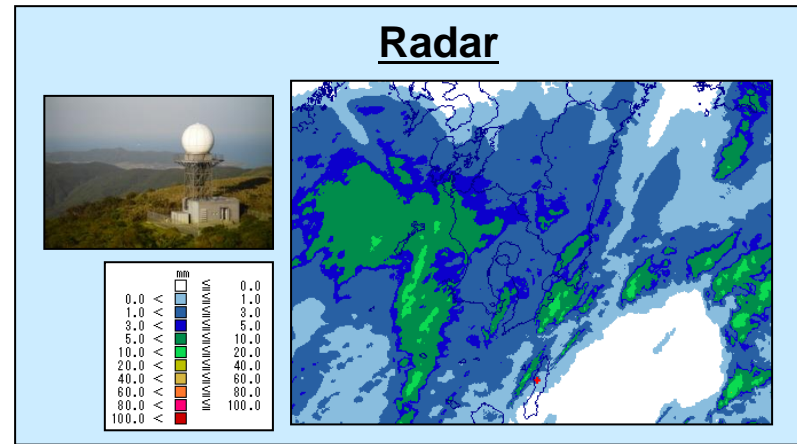
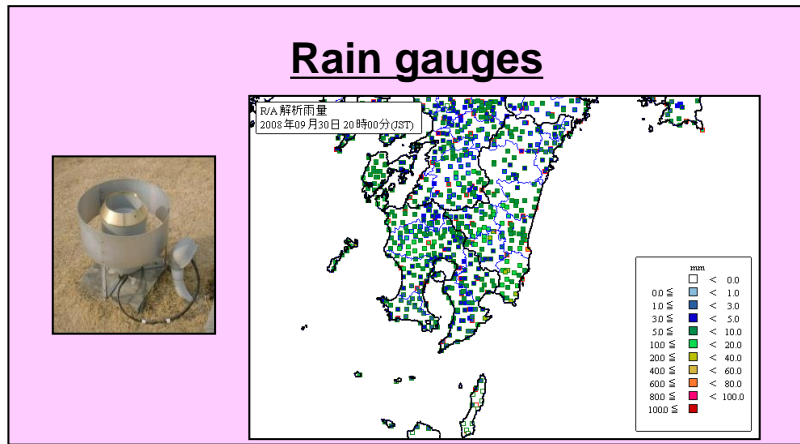
Data for Use

- ☆ Analyzed Precipitation (解析雨量)
- ☆ Very Short Range Precipitation Forecast (降水短時間予報)
- ☆ Precipitation Nowcast (降水ナウキャスト)
- ☆ Runoff Index (流域雨量指数)

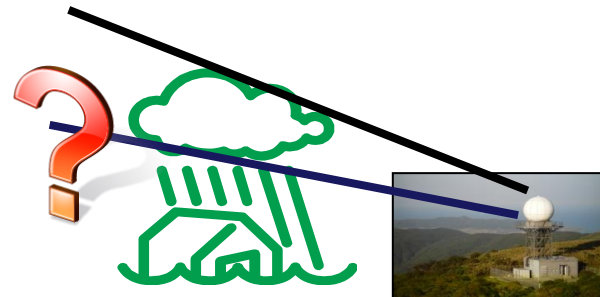
Precipitation Forecast for Flood Forecast



Precipitation observation equipment

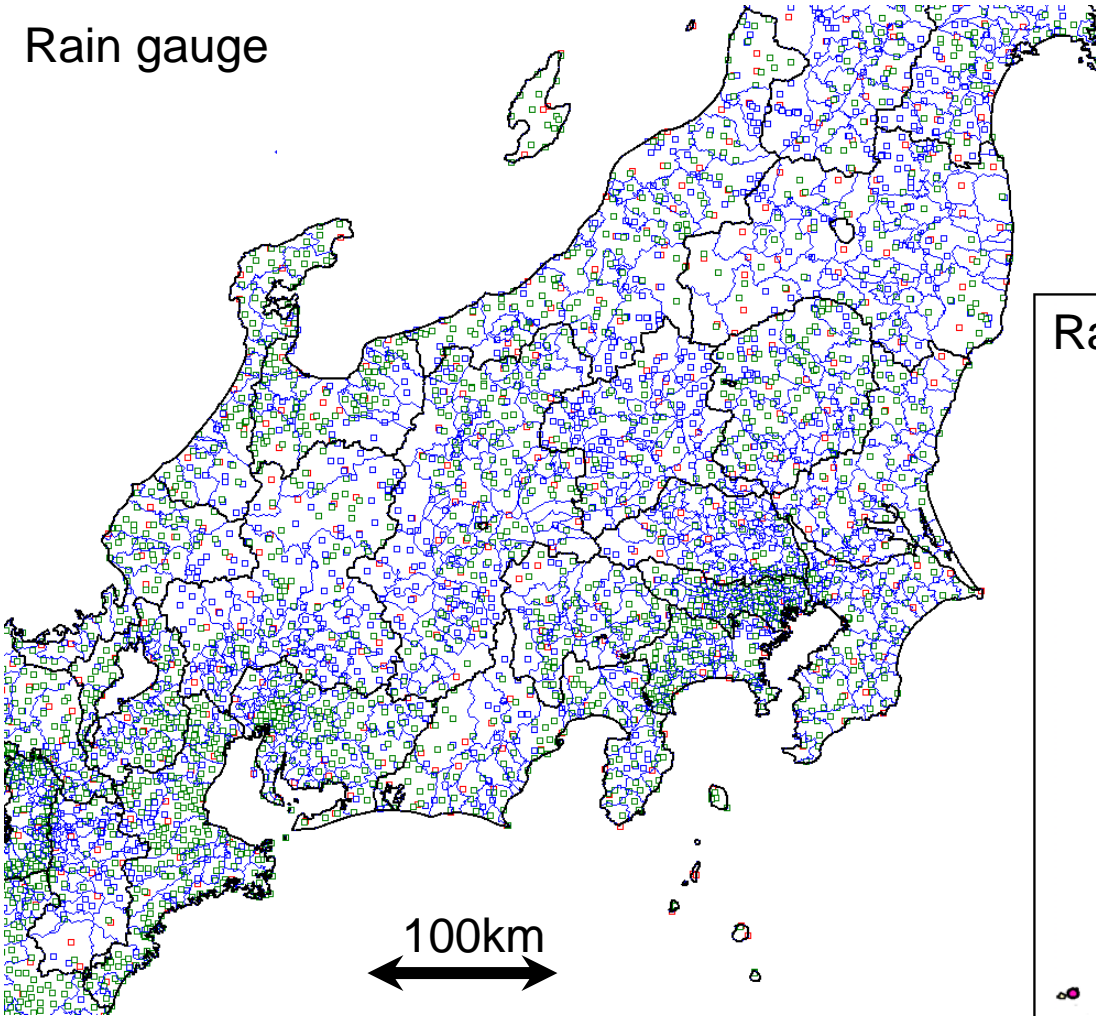


	Rain gauges	Radar
Advantages	Can measure actual amounts of precipitation.	Can observe large areas with spatially continuous , higher spatial resolution than the raingauge network.
Dis-advantages	Can observe precipitation at single points only.	May produce readings different from precipitation observed on the ground, as it measures the amount of rain overhead.



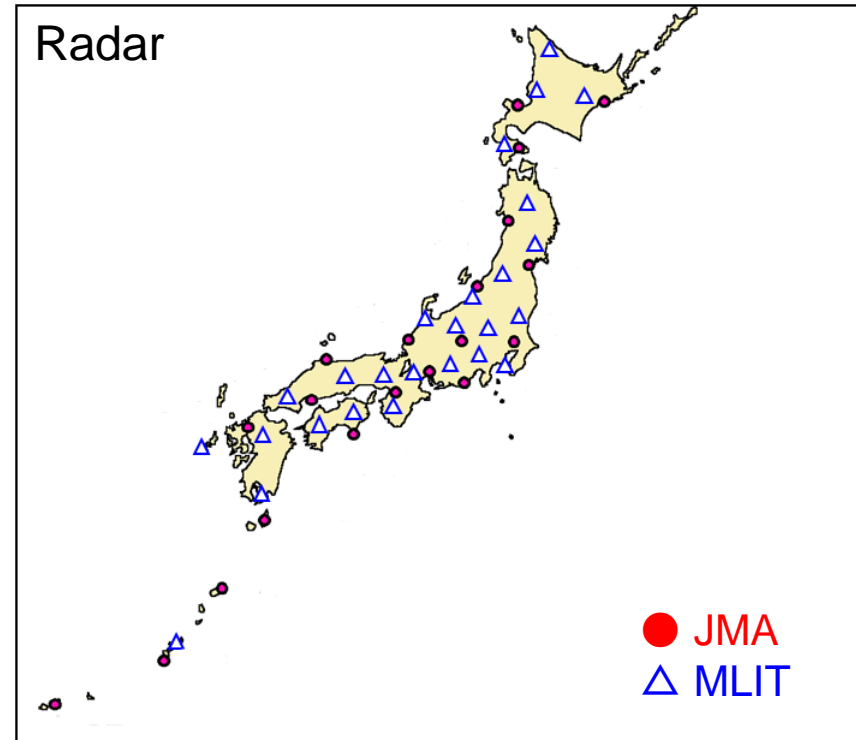
Precipitation observation equipment

Rain gauge

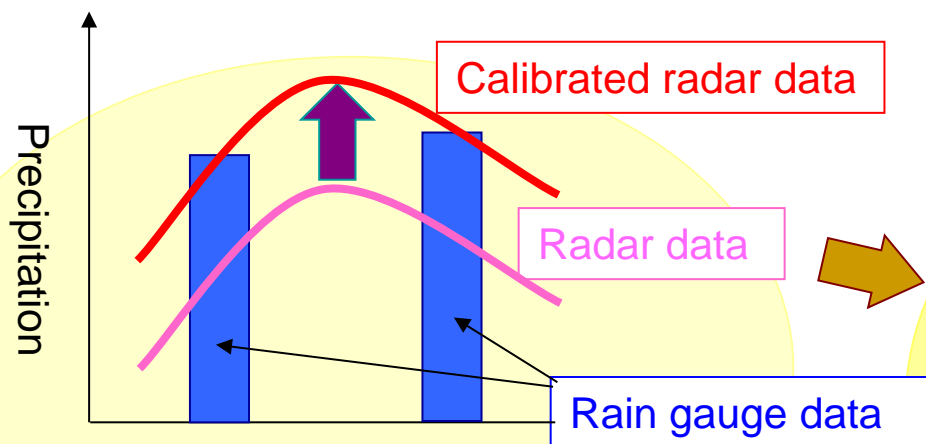


- JMA
- Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
- Local government

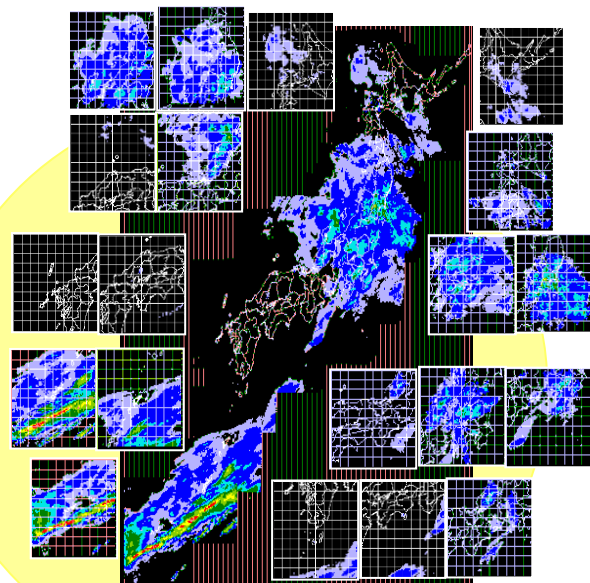
Radar



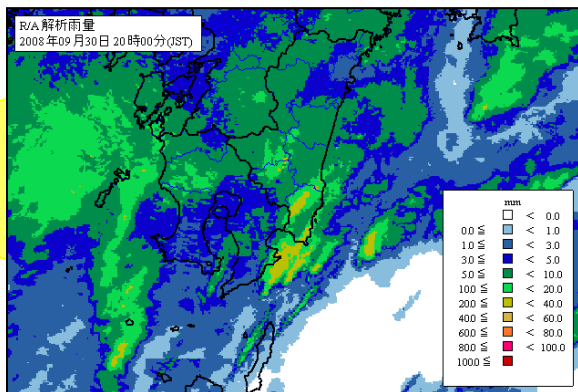
Analyzed precipitation



Precipitation amounts observed by radar generally does not agree with those observed by rain gauges, and radar data are therefore calibrated with rain gauge data.



The calibrated radar data are then made into a single composite data set.



Analyzed Precipitation

Radar/Rain gauge-Analyzed Precipitation data depicts precipitation with high dimensional accuracy, and is issued **every thirty minutes** with a spatial resolution of **1 km**.

Very Short Range Precipitation Forecast

Hourly, 1km grid, 1-h precipitation forecast
up to 6 hours every 30 minutes

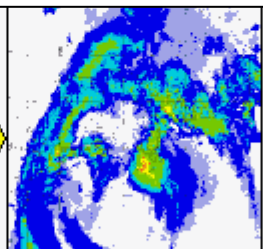
Radar

- 1km grid spacing
- spatially continuous



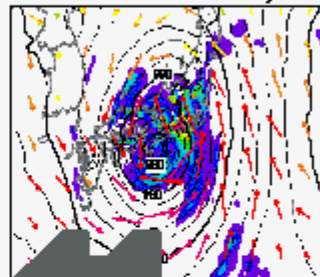
Analysis

Analyzed
precipitation



Hourly, accurate,
1km grid 1-h
precipitation

MSM (Mesoscale NWP Model)



Forecast

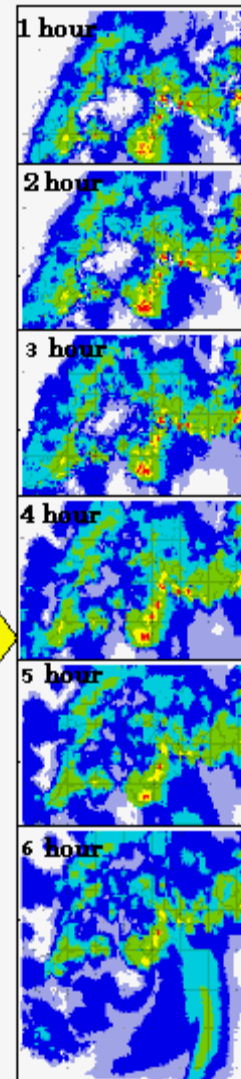
The linear extrapolation method
is used for forecasting 1-h
precipitation up to 6 hour by
taking into account of the
dissipation and development by
the orographic effect.

The **extrapolation** and **MSM
precipitation forecast** are merged
according to their relative
accuracy to produce VSRF

AMeDAS (nearly 17km spacing)
+
Rain gauges (other agencies)

~10,000
data

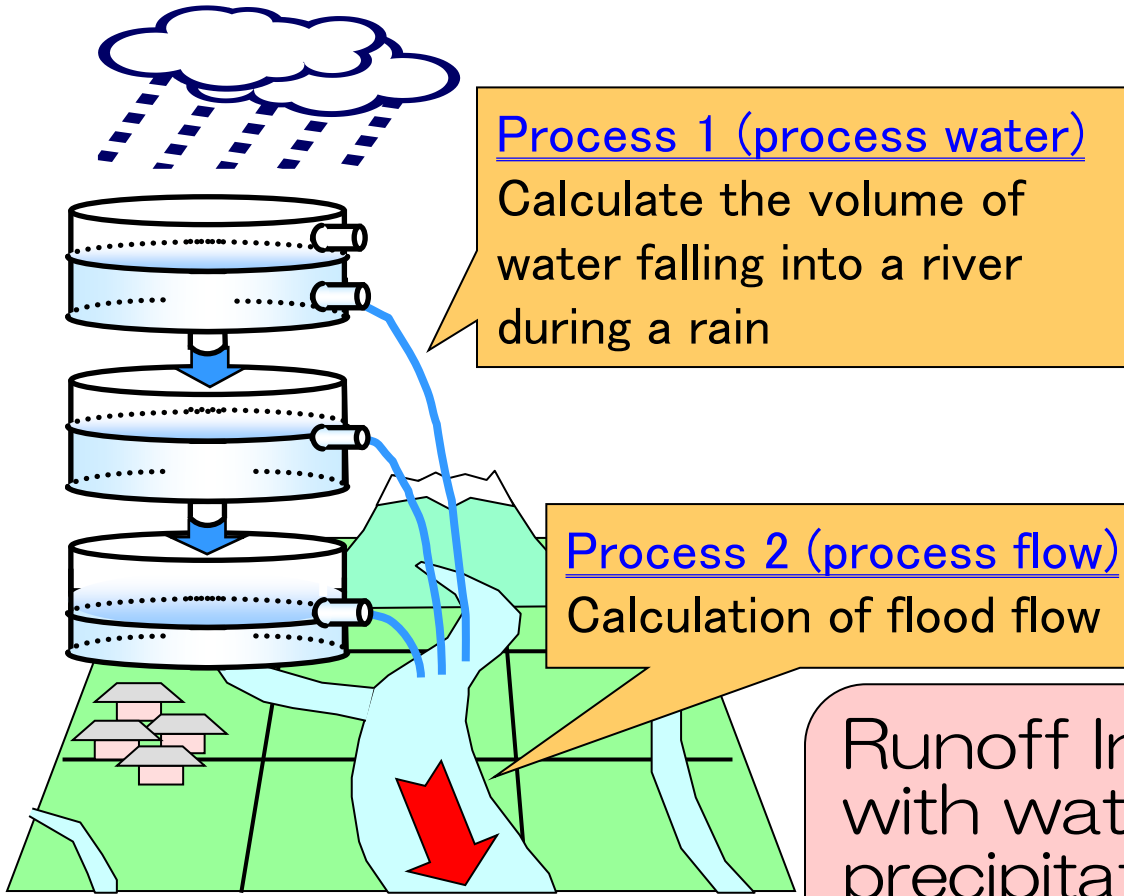
VSR Precipitation Forecast



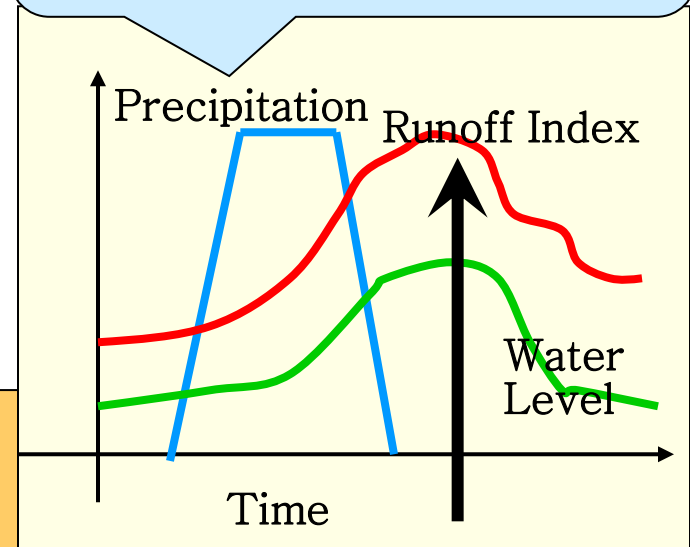
Runoff Index (RI)

Input

- Analyzed Precipitation
- Very Short Range Precipitation Forecast

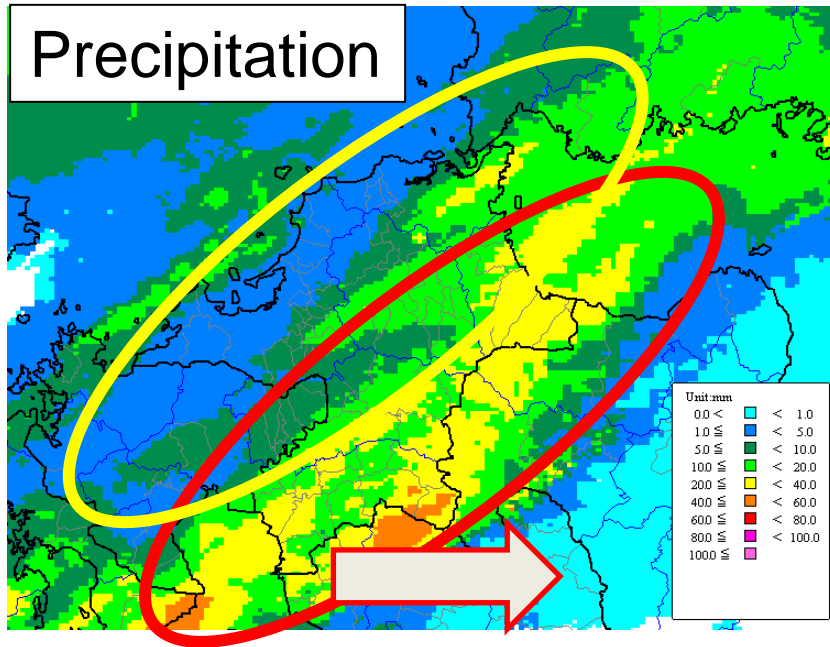


Precipitation in the basin **do not coincide** with the level of water in a river.

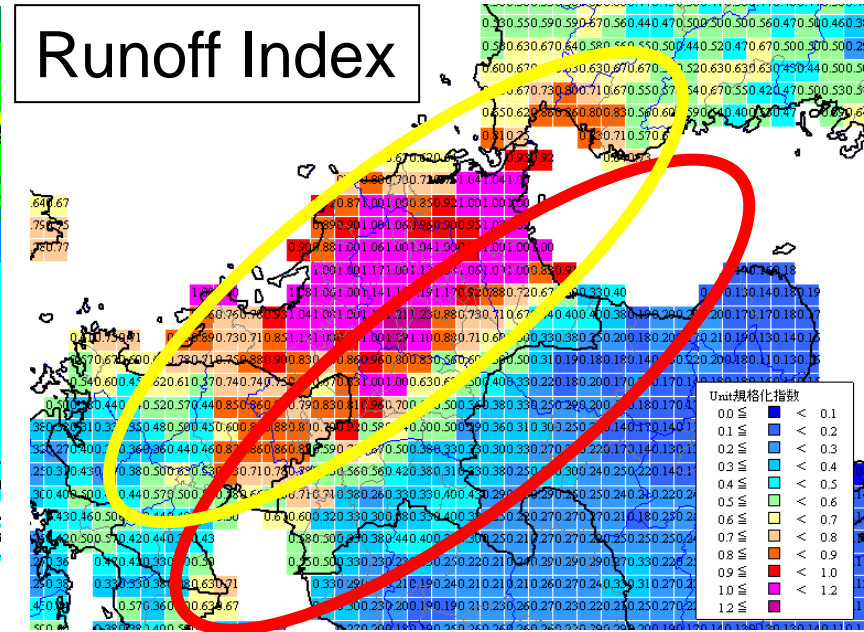


Runoff Index corresponds with water level better than precipitation. It has more direct linkages with **natural disasters**.

Indication of Disaster Risks



Movement
of rain clouds



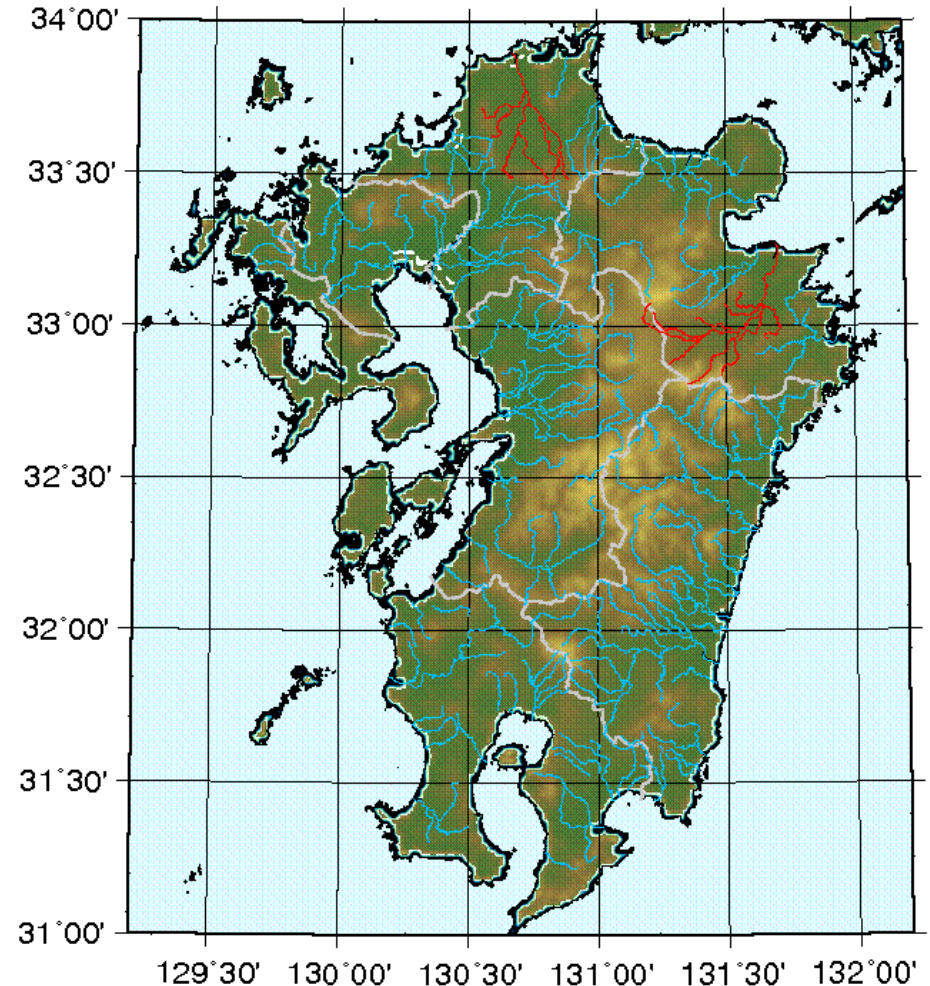
Facial indication of flood
risks

Flood risks are high even after the rain clouds pass.

Runoff Index (RI)

Properties of RI

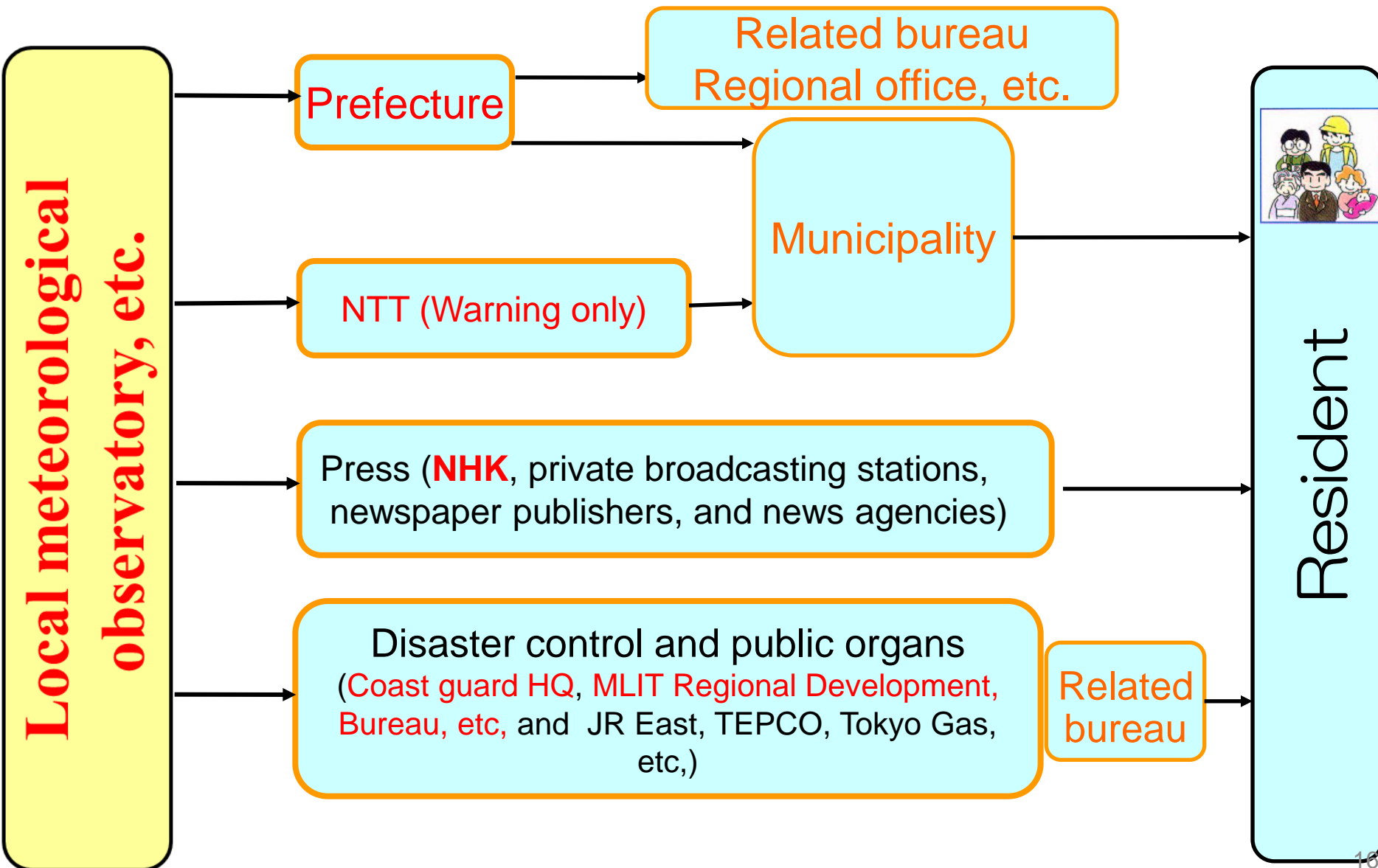
- RI is calculated on the basis of precipitation from Analyzed Precipitation and Very Short Range Precipitation Forecast
- 3,000 rivers in Japan (more than 15km) are divided to 5km meshes
- Calculation of prediction is produced every 30 minutes to 6 hours
- These data are presented on the website in the form of maps (for monitoring)



Rivers with a length of more than 15 km (Kyushu)

Information Transmission

Meteorological Information Transmission Routes for Warning, Advisory, and Other



THANK YOU



Japan Meteorological
Agency
& "HARERUN"₁₇