

Information for Severe Weather Preparedness

by

Japan Meteorological Agency (JMA)

Deshimaru Takuya

JMA

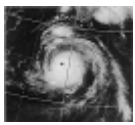
International Workshop on Public Warning

Tokyo Japan, 8 September 2009

# JMA's Meteorological Services

## Observations

Space-based Observation



Upper-air Observation



Radar Observation



Surface Observation



Ocean Observation



International Data Exchange

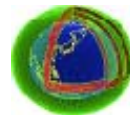


Data Collection

## Analysis, Forecast, Applications

Computer System for Meteorological Services

Numerical Weather Prediction



Collection and Dissemination of Meteorological Data



Local Met. Observatories



Information Issuance

## End User & NMHSs

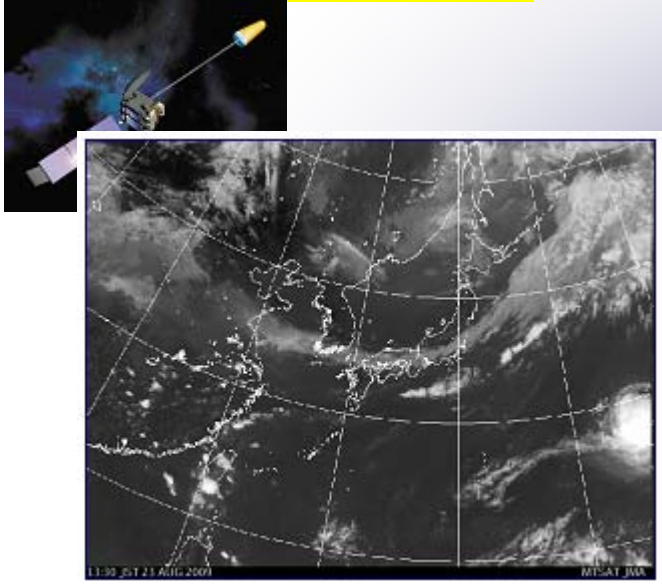
### Products

- Warnings, Advisories
- Typhoon Forecast
- Weather Forecast
- One-week Forecast
- Aeronautical Information
- Marine Information



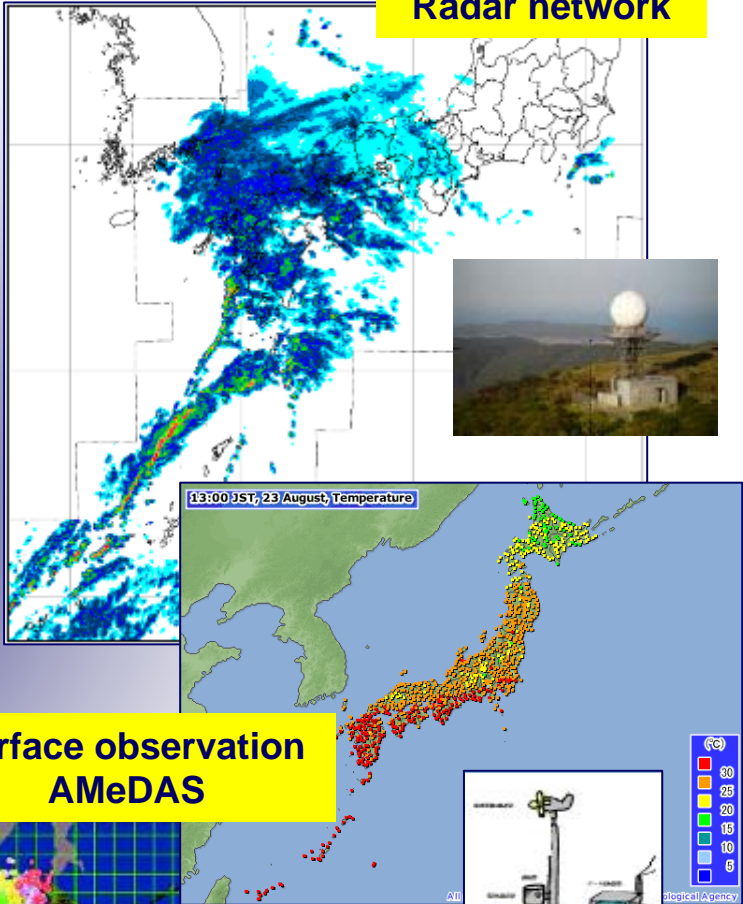
# Observations

Space-based observation

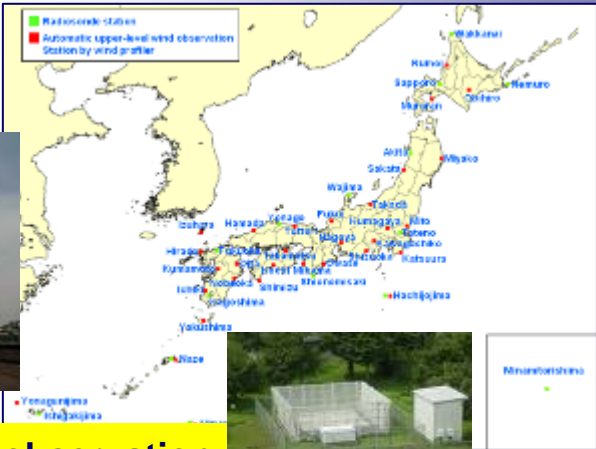
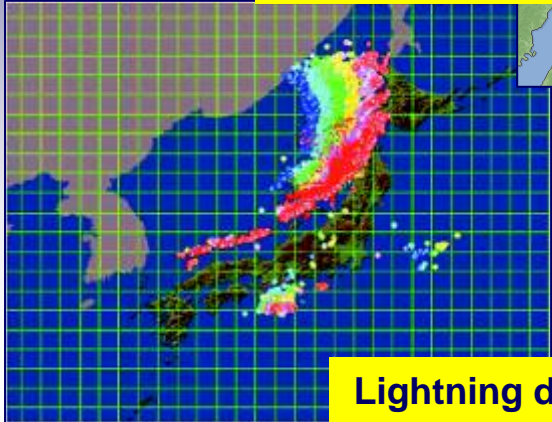


JMA Headquarters

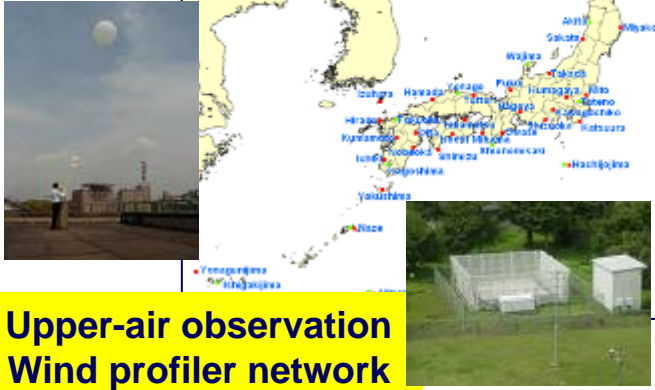
Radar network



Surface observation AMeDAS



Upper-air observation Wind profiler network



# Analysis, Forecast, Applications

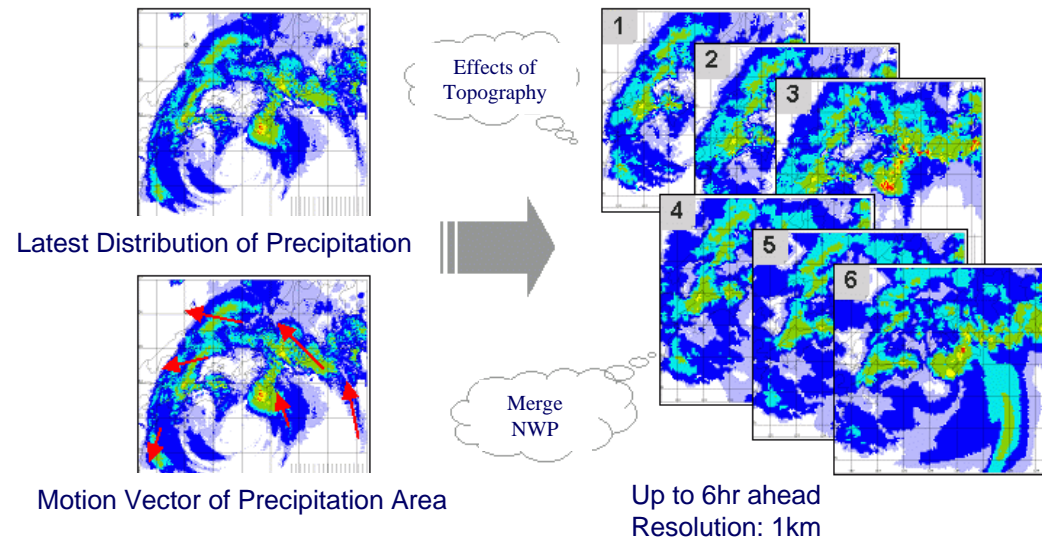
## Medium-range Forecast (3-7days)



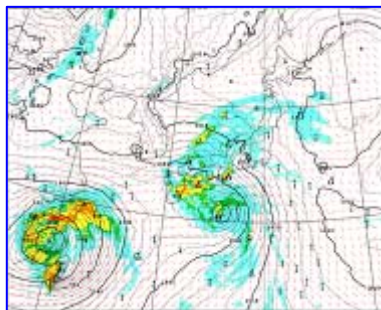
### Global NWP Model (GSM)

Up to 216hr ahead  
 Calculated 6 hourly (00,06,12,18UTC)  
 Resolution: 20km

## Very Short-range Forecast for Precipitation (up to 6 hours)



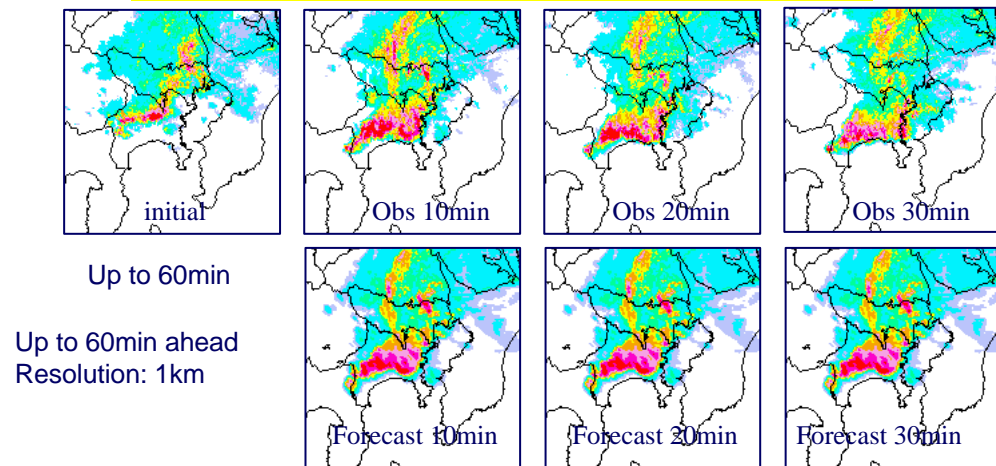
## Short-range Forecast (0-2days)



### Meso-Scale NWP Model (MSM)

Japan and its surrounding areas  
 Up to 15hr ahead (00,06,12,18UTC)  
 or 33hr ahead (03,09,15,21UTC)  
 Resolution: 5km, Non-hydrostatic

## Precipitation Nowcast (up to 60 min)



Up to 60min  
 Up to 60min ahead  
 Resolution: 1km

# Framework of Forecast Operation

National Forecast Center

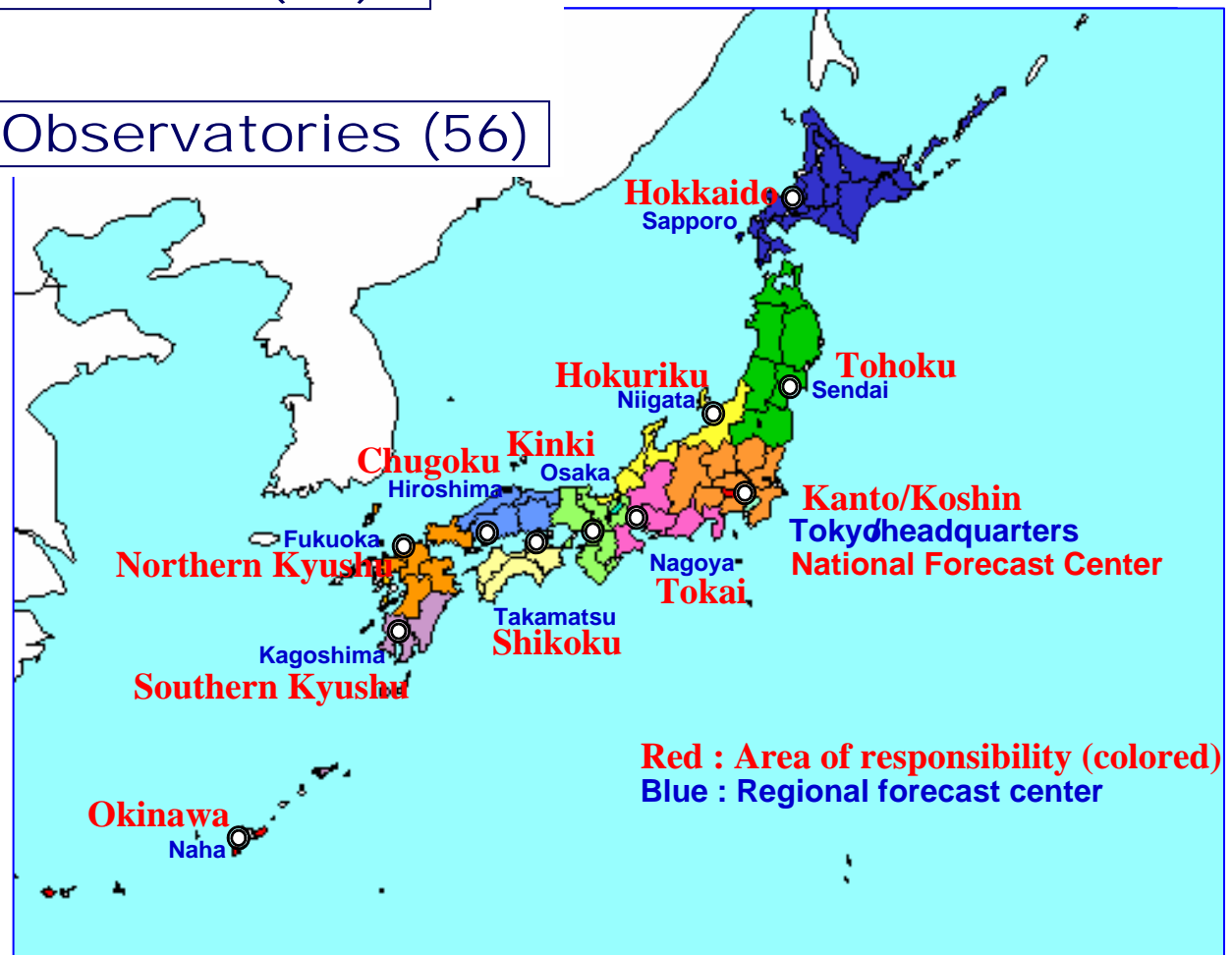


Regional Forecast Centers (11)



Local Meteorological Observatories (56)

LMO is responsible for issuance of information on weather disaster prevention such as warnings/advisories for each prefecture



# Information for Severe Weather Preparedness

## Warning, Advisory and Bulletin Services for Severe Weather

When hazardous weather conditions are expected, JMA delivers various plain messages including warnings, advisories and bulletins to the general public and disaster prevention authorities so that appropriate measures can be taken to mitigate the possible danger. These messages are issued by Local Meteorological Observatories (LMOs) for each of the warning zone in their respective prefectures. A total of 374 warning zones are designated throughout the country as of August 2009 in consideration of their meteorological characteristics and local administrative boundaries. Warnings are issued when weather conditions are expected to be catastrophic and meet warning criteria, while advisories are issued when weather conditions are expected to be disastrous and meet advisory criteria but remain below the warning criteria.

Bulletins give information to supplement warnings and advisories, and are also issued from Regional Forecast Centers (RFCs) or JMA Headquarters according to the scale or severity of the disturbance concerned. They include information not only for severe weather but also for possible disasters. As an example, Sediment Disaster Alerts are issued jointly with municipalities in particular if there is thought to be a high probability of sediment-related disasters due to heavy rain within a few hours. All such information is delivered to the public through the media and directly to disaster prevention authorities from JMA Headquarters and/or RFCs.

bulletins	offices in charge	lead time	target area	responses of disaster prevention authorities
<b>Warning</b>	Local Observatory	up to 6 hours	Warning zone	action*1
<b>Advisory</b>	Local Observatory	up to 12 hours	Warning zone	preparation*2
<b>Weather Information</b>	National Center	a few days – 0* <small>*during severe weather</small>	nation wide	advanced action/preparation*3
	Regional Center		district	
	Local Observatory		prefecture	

Expected responses at local governments

\*1 call out of staff members to patrol danger zone, announce emergency for inhabitants, issue evacuation instruction/directive etc.

\*2 standby of staff members / preparation for weather events

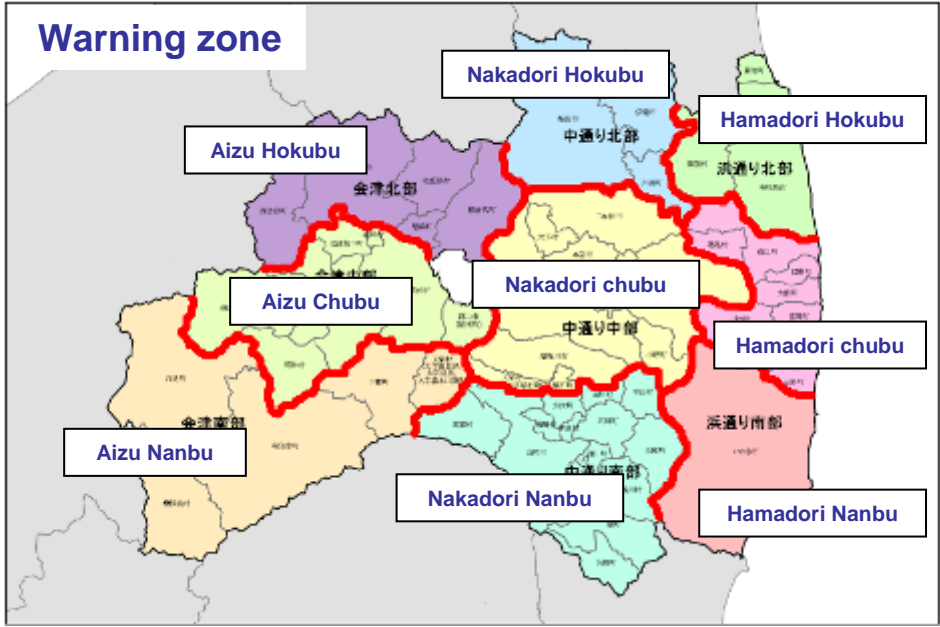
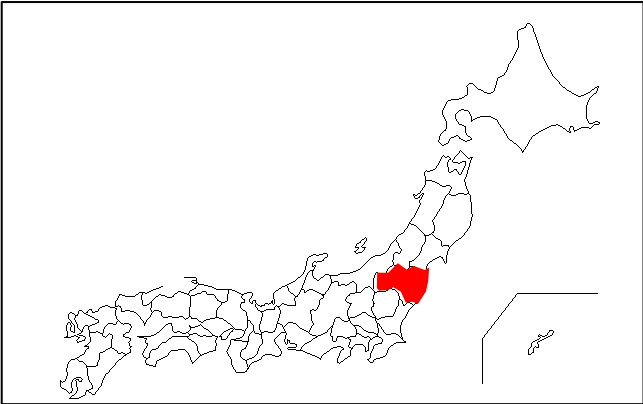
\*3 standby of staff members - action for emergent evacuation

# Warning zone; Target area of Warnings



In case of Fukushima Prefecture  
 Population : 2,052,970  
 Area : 13,782km<sup>2</sup>  
 Forecast zone : 3  
 Warning zone : 9

In the whole Japan  
 Warning zone : 374 (as of 2009)



As from 2010 summer,  
 Warnings and Advisories are issued for  
 each municipalities (cities)  
 Warning zone (374) ⇒ cities (about 1,800)

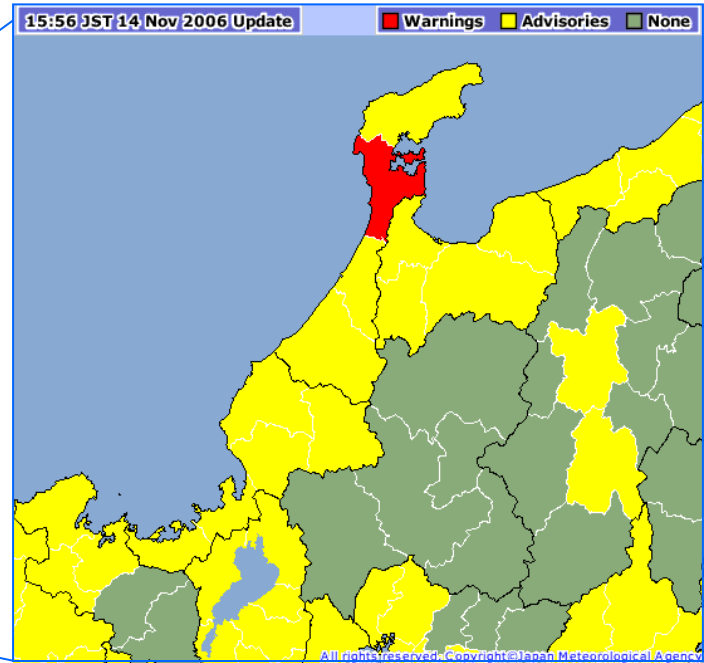
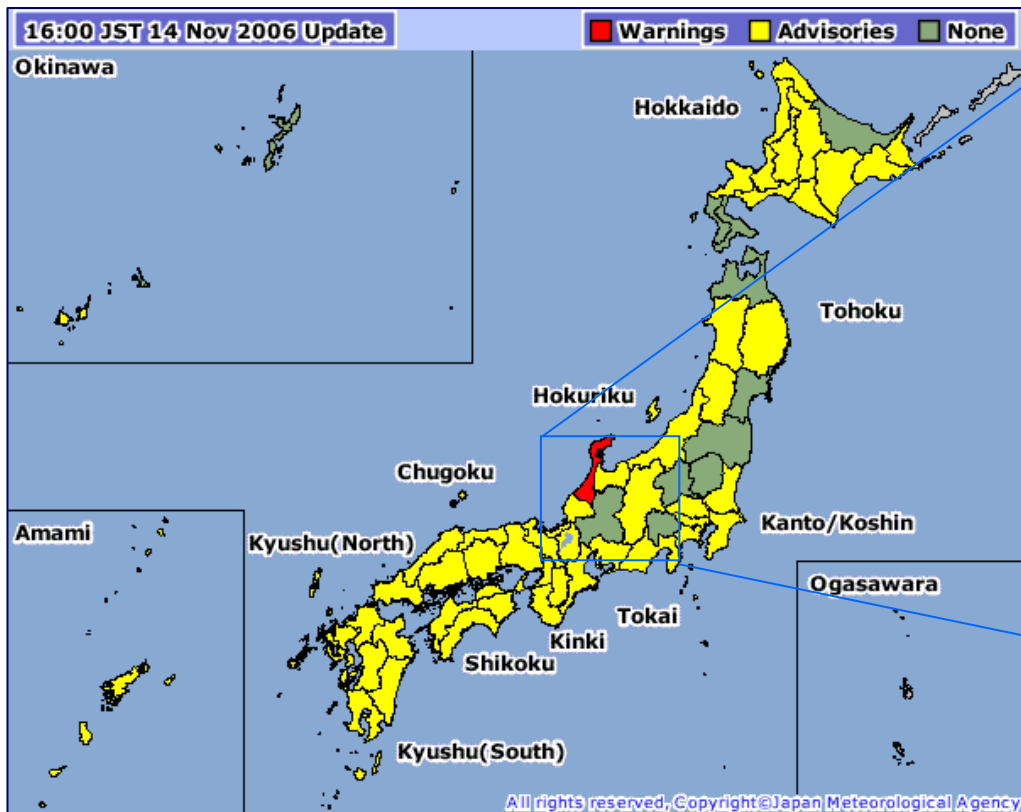
## Meteorological Warnings and Advisories of JMA

Warnings (7)	Advisories (16)	Disasters
<b>Heavy Rain</b>	<b>Heavy Rain</b>	Sediment Disaster; Inundation of houses, load, farming land etc.
<b>Flood</b>	<b>Flood</b>	Flood; Dike break; Washout of bank; Inundation etc. except rivers designated for joint flood forecast
<b>Storm Surge</b>	<b>Storm Surge</b>	Inundation; Damage of ships, shore facilities including ones for fishery etc.
<b>Storm</b>	<b>Gale</b>	Damage of houses, buildings, agricultural crops etc.; Maritime disaster
<b>High Wave</b>	<b>High Wave</b>	Maritime disaster; Inundation; Damage of ships, shore facilities including ones for fishery etc.
<b>Heavy Snow</b>	<b>Heavy Snow</b>	Traffic disturbance; Damage of houses etc.
<b>Snow-storm</b>	<b>Snow-storm</b>	Traffic disturbance; Damage of houses, buildings etc.; Maritime disaster
	<b>Thunderstorm</b>	Disasters caused by Thunderbolt, hail, gust (tornado, downburst)
	<b>Dense Fog</b>	Traffic disturbance, Maritime disaster
	<b>Frost</b>	Damage of agricultural crops in early/late winter
	<b>Dry Air</b>	Fire disaster; Forest fire
	<b>Avalanche</b>	Avalanche except steep mountain areas
	<b>Low Temperature</b>	Water pipe freeze-up and break; Damage of agricultural crops
	<b>Snow-melting</b>	Flood, Sediment disaster, Inundation
	<b>Ice Accretion</b>	Significant accretion of ice on electric power cable, communication wire, vessel's body
	<b>Snow Accretion</b>	Significant accretion of snow on electric power cable, communication wire

\*Warning/Advisory for Ground-loosening and Inundation are included in ones for Heavy Rain



# Display on JMA Website



Prefecture	Sub-prefecture region		Current Warnings and Advisories				
Ishikawa	Kaga	Kaga hokubu	Heavy rain	Thunderstorm	Gale	High waves	Flood
		Kaga nambu	Heavy rain	Thunderstorm	Gale	High waves	Flood
	Noto	Noto hokubu	Heavy rain	Thunderstorm	Gale	High waves	Flood
		Noto nambu	Heavy rain	Flood	Thunderstorm	Gale	High waves
Fukui	Reihoku	Reihoku hokubu	Thunderstorm	Gale	High waves		
		Reihoku nambu	Thunderstorm	Gale	High waves		
		Okuetsu	Thunderstorm				
	Reinan	Reinan tobu	Thunderstorm	Gale	High waves		
		Reinan seibu	Thunderstorm	Gale	High waves		

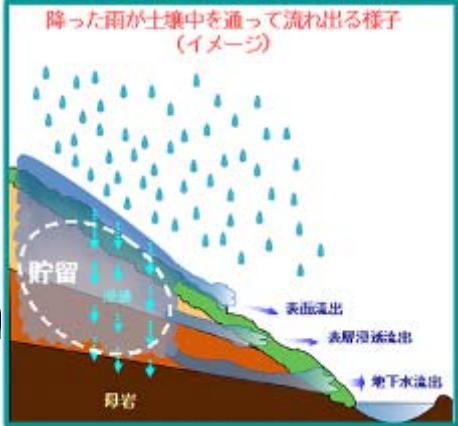
# Sediment Disaster Alert

For mitigation of sediment disasters

**LMO/JMA  
(Forecaster)**



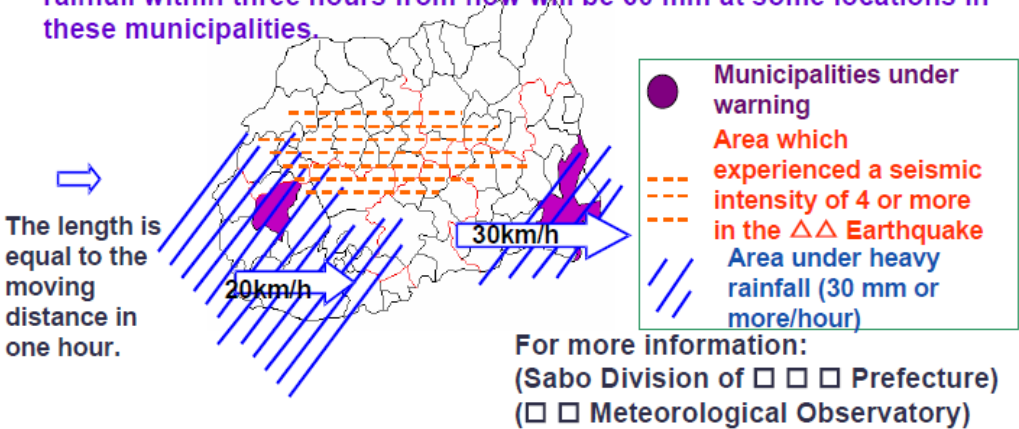
**Prefecture  
(Sabo; Erosion and sediment control )**



Soil V

## Sediment Disaster Alert

**Joint announcement by Prefecture and Meteorological Observatory**  
**Municipality under warning: ○○ City, ××Town**  
 Within two hours from now, the risk level of a sediment-related disaster will increase significantly due to heavy rain. Take every caution in and around the sediment-related disaster hazard area. The maximum hourly rainfall within three hours from now will be 60 mm at some locations in these municipalities.



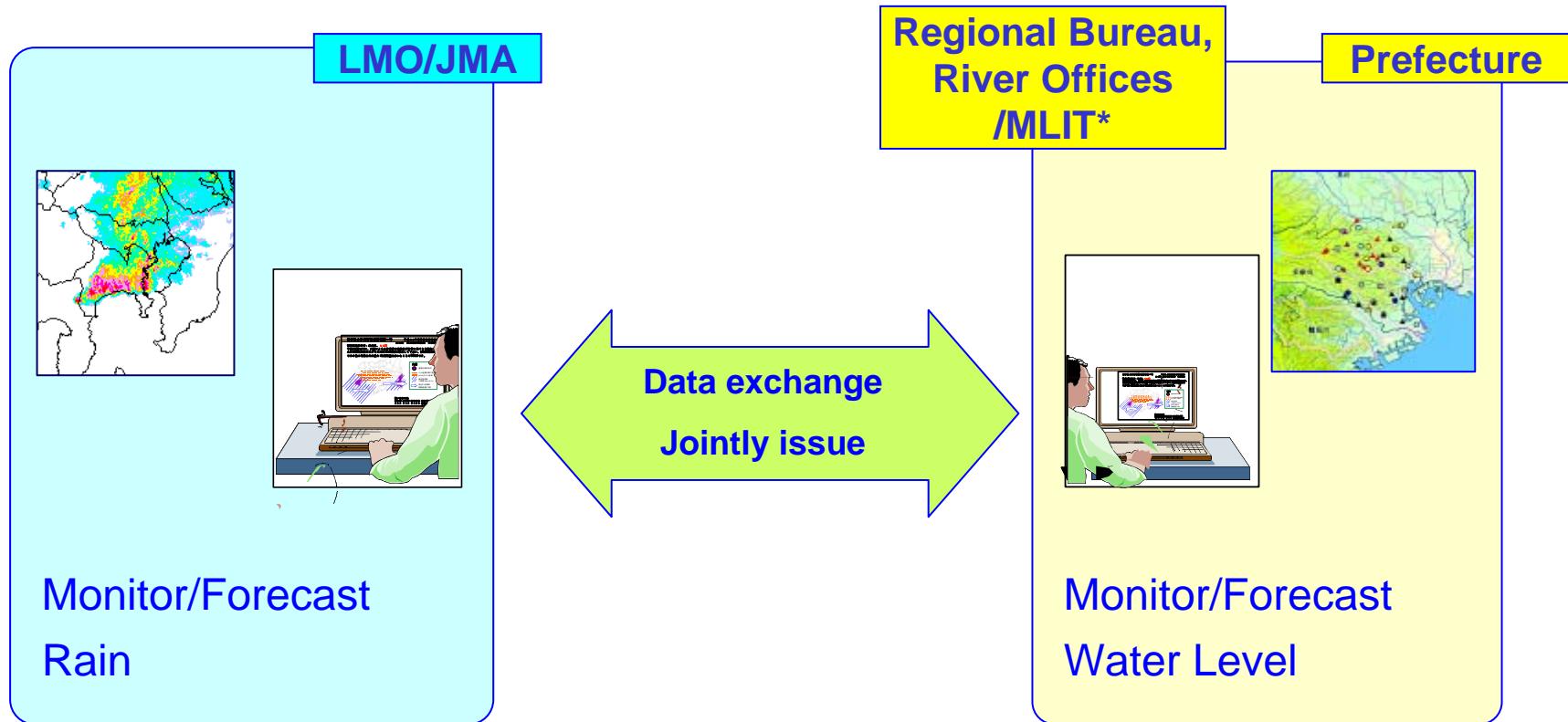
An example of sediment-related disaster warning information

- Alert on sediment disaster for each city
- Expected rainfall intensity
- Graphical information in addition to plain text warning

**Local Authorities  
(City and others)**

# Flood Warnings and Advisories

Joint flood forecast with hydrological services for designated rivers



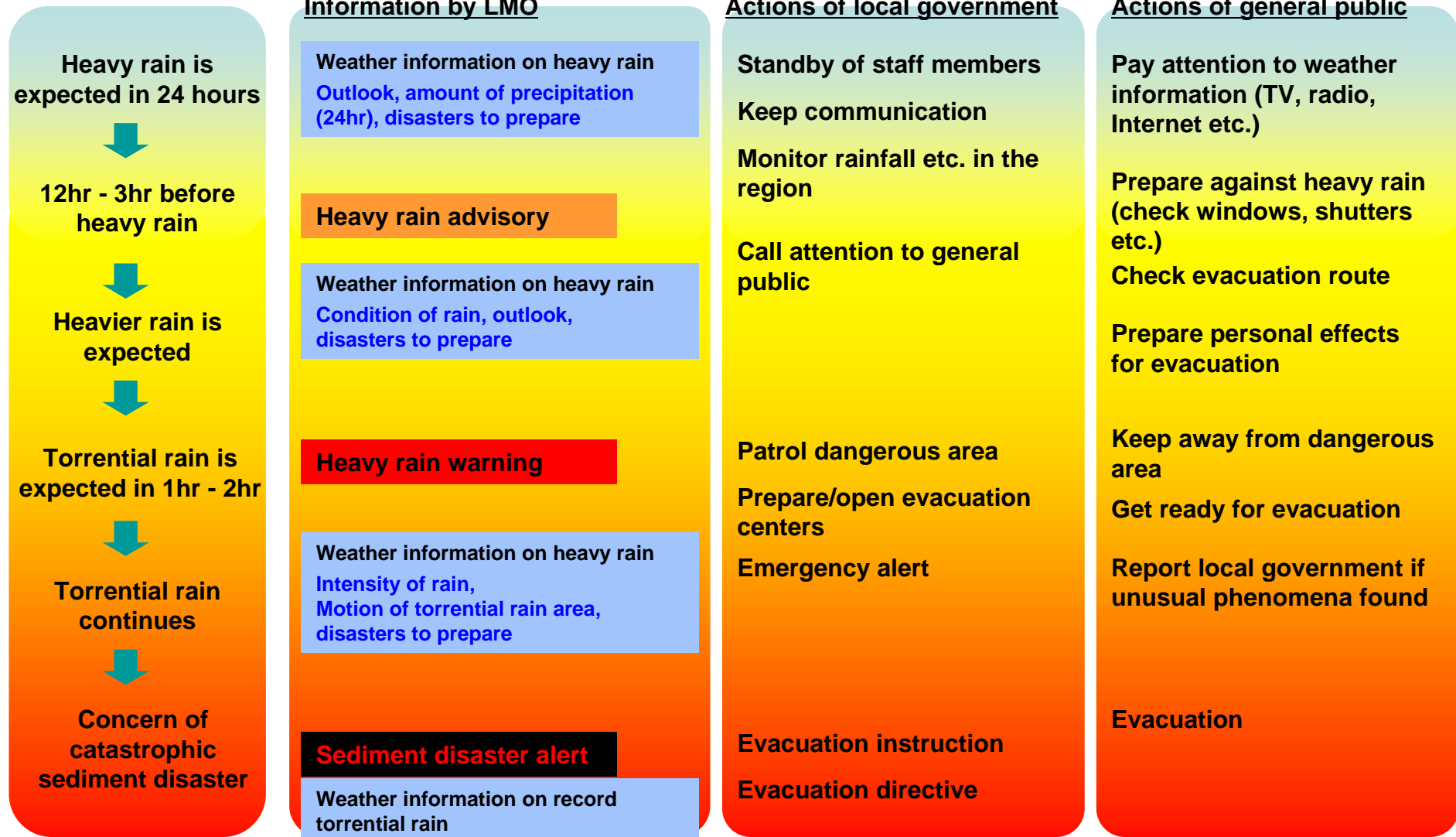
Flood Alert Information / Flood Risk Information

for 256 rivers (MLIT), 98 rivers (prefectures)  
(30 May 2009)

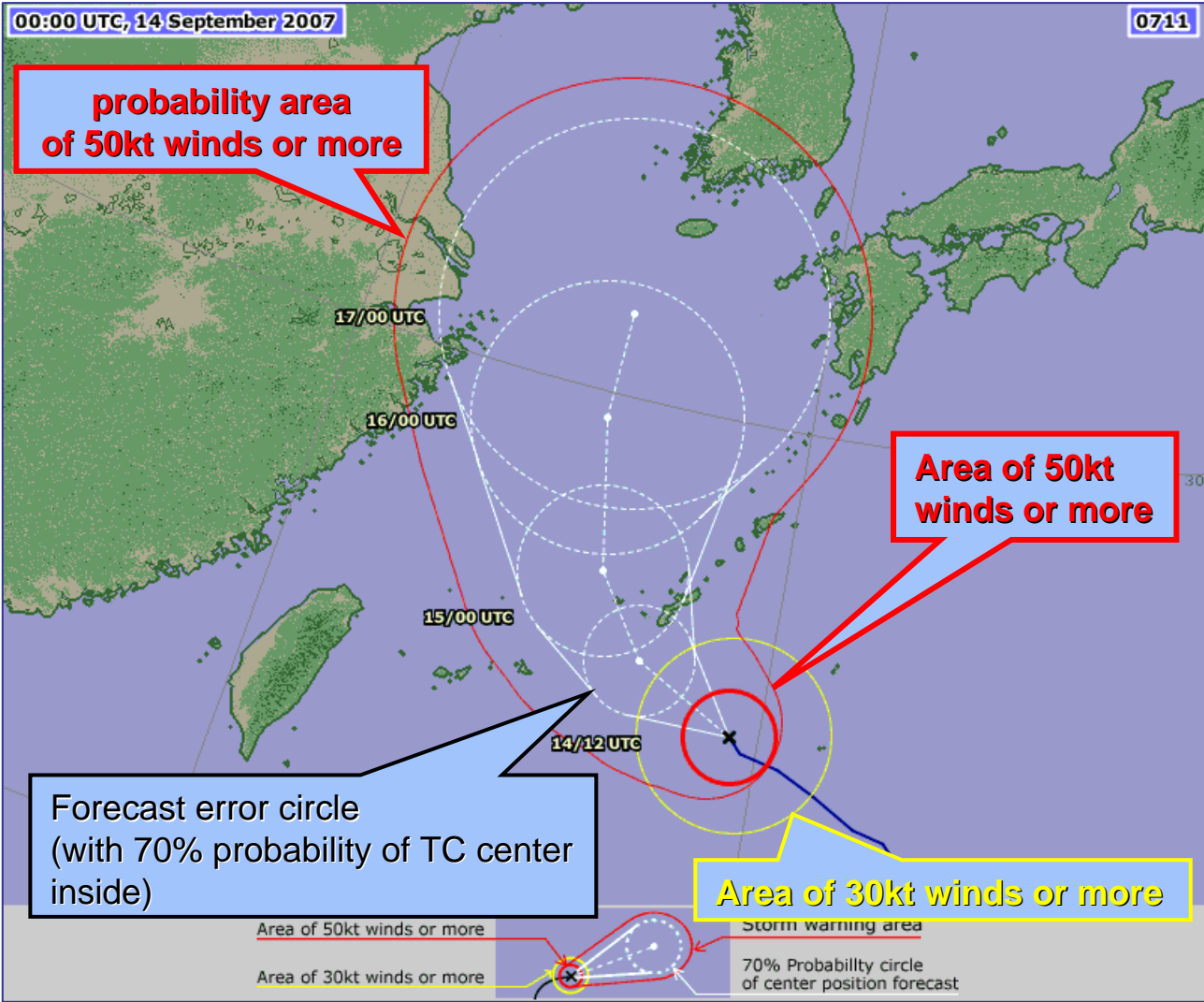
\* MLIT: Ministry of Land, Infrastructure, Transport and Tourism

# Time-series of information and required actions

## (In case of heavy rain)

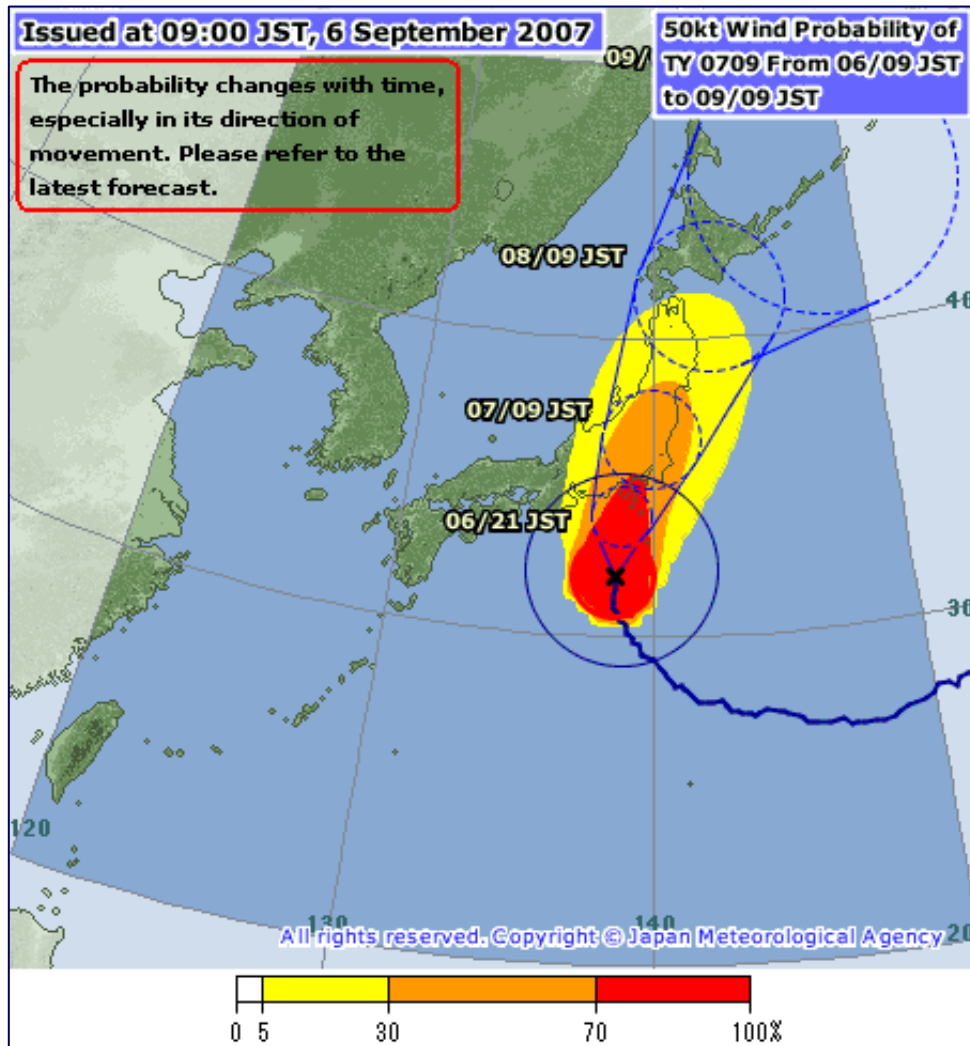


# Typhoon Analysis and Forecast



JMA is responsible for the analysis and forecast of tropical cyclones in the western North Pacific as the Regional Specialized Meteorological Center (RSMC) Tokyo - Typhoon Center, one of six tropical cyclone RSMCs within the framework of the World Weather Watch (WWW) Programme of the World Meteorological Organization (WMO). JMA issues tropical cyclone information three hourly when a tropical cyclone (with maximum sustained wind speed of 34 knots or more) exists or is expected to exist in the western North Pacific including the South China Sea. The information, provided in text-style and graphic imagery, includes analysis and forecast of tropical cyclone's location, intensity and movement up to 72 hours ahead. If a tropical cyclone is expected to hold maximum sustained wind of 34 knots or more in the next 72 hours, its location and movement up to 120 hours ahead are also issued six hourly. When a tropical cyclone exists in the vicinity of Japan, the information is issued on an hourly basis.

# Typhoon Analysis and Forecast



**50kt Wind Probability Forecast**

STS 0704 (MAN-YI)  
 Issued at 00:00 UTC, 10 July 2007  
 RSMC TROPICAL CYCLONE ADVISORY  
 NAME STS 0704 MAN-YI (0704)

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ANALYSIS  
 PSTN 100000UTC 12.0N 138.4E FAIR  
 MOVE W SLOWLY  
 PRES 980HPA  
 MXWD 050KT  
 GUST 070KT  
 30KT 240NM

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FORECAST  
 24HF 110000UTC 15.6N 135.0E 90NM 70%  
 MOVE NW 12KT  
 PRES 960HPA  
 MXWD 065KT  
 GUST 095KT  
 48HF 120000UTC 19.8N 131.3E 150NM 70%  
 MOVE NW 14KT  
 PRES 945HPA  
 MXWD 075KT  
 GUST 105KT  
 72HF 130000UTC 24.1N 129.1E 220NM 70%  
 MOVE N 12KT  
 PRES 935HPA  
 MXWD 085KT  
 GUST 120KT

**Analysis/forecast bulletin**

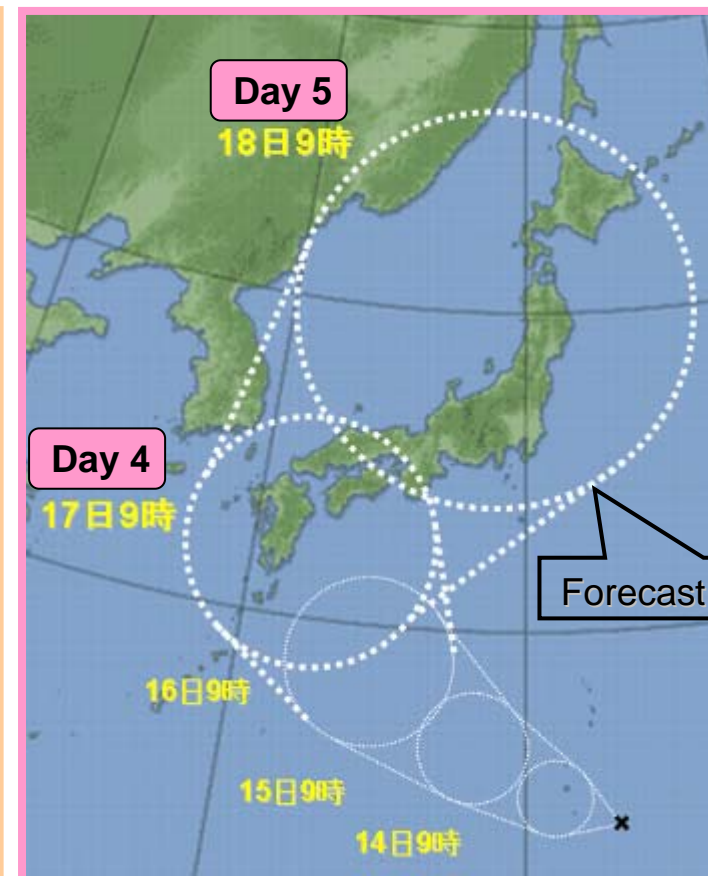
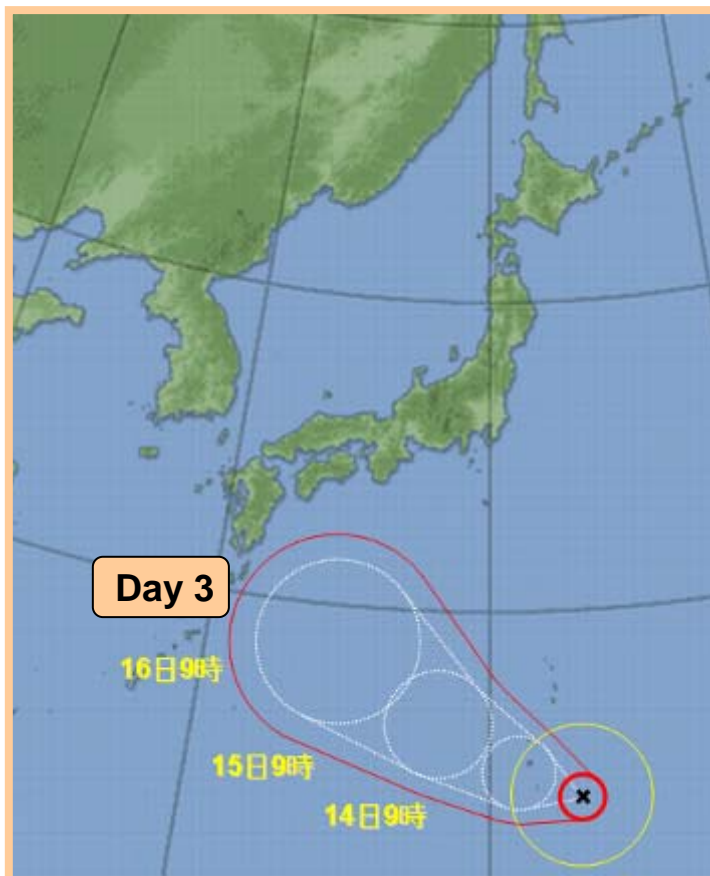
# Typhoon 5-day Track Forecast

4 times/day (00, 06, 12, 18 UTC)

**3-day track & intensity forecast** issued about 50 minutes after the analysis

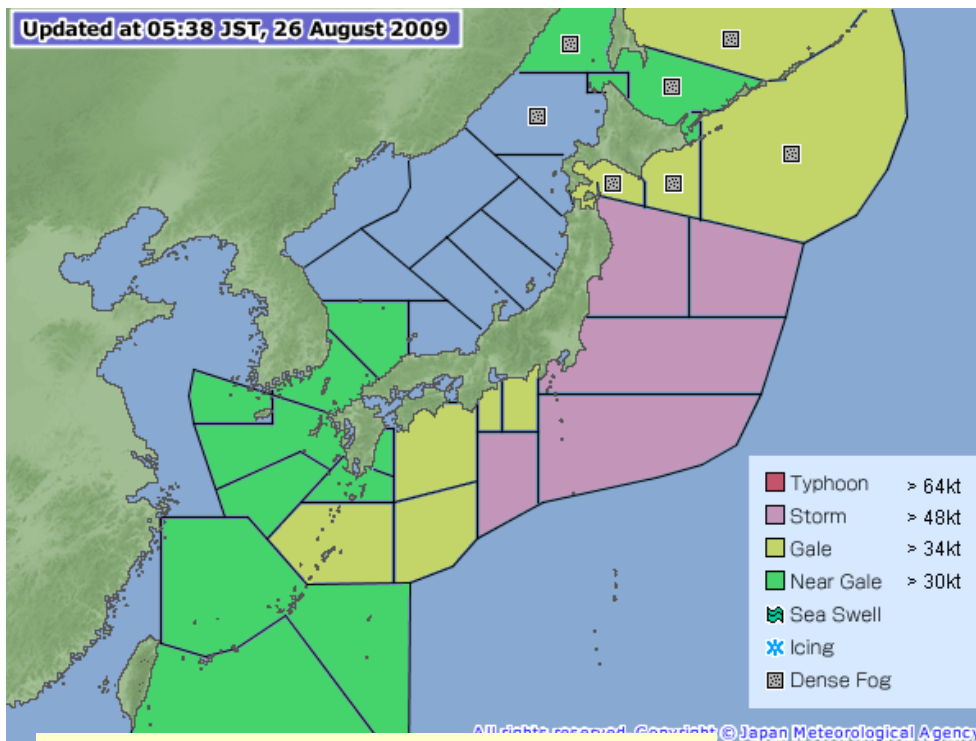
If expected to retain tropical storm intensity or higher (more than 34 knots) in the next 3 days

**5-day track forecast** issued about 90 minutes after the analysis



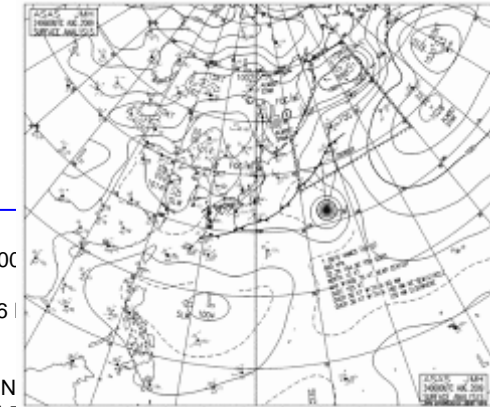
# Marine Warnings

Marine meteorological forecasts and warnings such as those for gales, storms, typhoons and fog are provided for the safety and efficiency of shipping, fisheries and offshore activities. JMA is responsible for the sea area enclosed by the equator, the 60-degree-north latitude line, the 100-degree-east longitude line and the 180-degree-east longitude line for the operational marine meteorological information service within the framework of GMDSS (Global Marine Distress and Safety System). In the winter season, sea ice forecasts and bulletins are also issued for the Sea of Okhotsk.



## Marine Warnings around Japan

Marine Warnings within 300NM from seashore of Hokkaido, Honshu, Sikoku, Kyushu, and Okinawa islands of Japan are disseminated by international NAVTEX service, medium-frequency radio broadcast system of GMDSS.



WWJP25 RJTD 240600  
 WARNING AND SUMMARY 240600  
 WARNING VALID 250600.  
 WARNING IS UPDATED EVERY 6 HOURS.  
 GALE WARNING.  
 DEVELOPING LOW 998 HPA  
 AT 55N 176E BERING SEA MOVING  
 WINDS 30 TO 35 KNOTS WITHIN 500 MILES OF LOW SOUTHEAST SEMICIRCLE  
 AND 300 MILES ELSEWHERE.  
 WARNING.  
 DENSE FOG OBSERVED LOCALLY OVER SEA OF OKHOTSK NORTHERN PART  
 OF SEA OF JAPAN.  
 WARNING.  
 DENSE FOG OBSERVED LOCALLY OVER WATERS BOUNDED BY 36N 150E 46N  
 150E 55N 162E 60N 163E 60N 180E 38N 180E 38N 160E 36N 150E.  
 SUMMARY.  
 LOW 1000 HPA AT 51N 150E ALMOST STATIONARY.  
 LOW PRESSURE AREA 1004 HPA NEAR 18N 132E WEST SLOWLY.  
 HIGH 1014 HPA AT 36N 121E ESE SLOWLY.  
 HIGH 1014 HPA AT 42N 127E SE 15 KT.  
 STATIONARY FRONT FROM 29N 130E TO 30N 135E 31N 138E 32N 142E 35N 148E  
 37N 150E 40N 155E 43N 160E 44N 165E.  
 REMARKS.  
 TYPHOON 0910 VAMCO (0910) 960 HPA AT 32.2N 154.9E : SEE TROPICAL  
 CYCLONE WARNING.  
 JAPAN METEOROLOGICAL AGENCY.=

## High Seas Forecast

Marine Warnings and Forecasts over high seas in JMA's area of responsibility are disseminated by Inmarsat SafetyNET.



# How meteorological products delivered to users?

