Storms & Floods

How Disasters Occur 2

Local Severe Rain

Sandwiched between the Asian continent and the Pacific Ocean, rainy season and autumn rain fronts often stagnate over Japan, causing frequent rainfall. Heavy rains can occur over vast areas when a low-pressure system accompanying a typhoon or front passes near Japan. Local severe rain occurs when thunderclouds form repeatedly in the same place due to the effects of fronts, low atmospheric pressures, and terrain that induces rain. In such cases, intense rain can continue for several hours, resulting in rainfall from a hundred to several hundred millimeters in a small area.

When local severe rain is likely to occur:

When a **weather front isn't moving** (especially around the **end of rainy season**)

When a **typhoon** is **approaching** or has **made landfall**

In unstable atmospheric conditions with constant **thundercloud formation** (especially during the sunny **summer season**)

What happens when local severe rain occurs?

River levels may increase and lead to **flooding**.

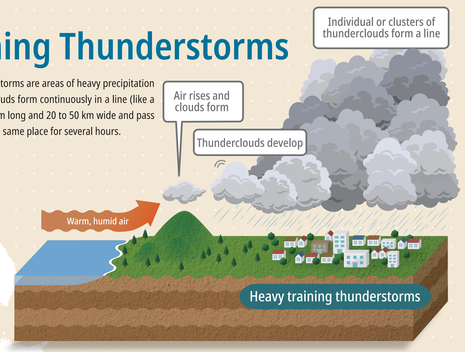
Above- and below-floor flooding may occur.

Roads may **flood**.

Drains and sewer pipes can overflow and underground spaces **may flood**.

Training Thunderstorms

Training thunderstorms are areas of heavy precipitation where thundereclouds form continuously in a line (like a train) 50 to 300 km long and 20 to 50 km wide and pass over or stay in the same place for several hours.



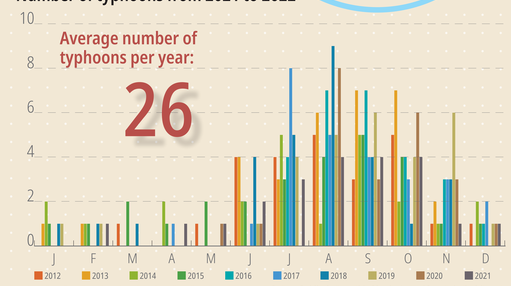
Source: Japan Meteorological Agency website

Typhoons

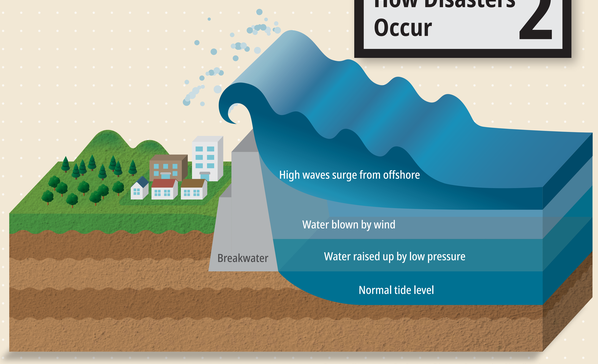
Typhoons mainly develop over seas with high surface water temperatures, such as the Philippine Sea and ocean areas near the equator. Updrafts generate thunderclouds that gather together in large numbers to create a vortex (with max wind-speeds exceeding 17m/s). They are most common in August and September and can cause considerable damage in Kumamoto Prefecture when they pass through.

Typhoon Bart (#18), 1999:
Collapse of Nishi-Otemon Gate, Kumamoto Castle
(Provided by: Kumamoto Nichinichi Shimbun)

Number of typhoons from 2021 to 2022



Source: Public data provided by the Japan Meteorological Agency



Source: Kumamoto Prefecture Disaster Prevention Handbook

Storm Surges

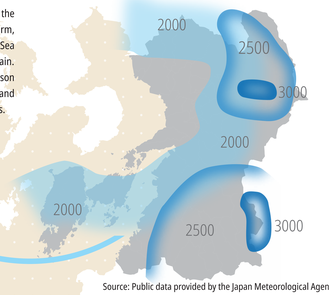
A storm surge is a phenomenon in which the sea level rises higher than usual due to an approaching typhoon or low-pressure system.
Storm surges are caused by two main factors: rising water levels in areas of lower pressure, and winds blowing water into certain areas.
When high waves occur during a storm surge, they can sometimes reach areas they would not normally be able to reach, potentially causing extensive damage.

In 1999, Typhoon Bart (#18) caused flooding due to high tides in the Matsuai district of the former town of Shiranui (now Uki).
(Provided by: Kumamoto Nichinichi Shimbun)

Weather in Kumamoto

Kumamoto Prefecture is located to the west of the Kyushu Mountains, making it prone to warm, humid weather coming in from the East China Sea that can lead to downpours and local severe rain. Rainfall is especially high during the rainy season (about 40% of annual rainfall falls in June and July), which often causes landslides and floods.

Annual Precipitation Map of Kumamoto Prefecture (normal year values in mm)



Source: Public data provided by the Japan Meteorological Agency

Source: Public data from the Ministry of Internal Affairs and Communications Statistics Bureau

Landslides

Landslides can occur due to heavy rain, melting snow, earthquakes, and volcanic eruptions. Special caution is necessary during periods of heavy rain, such as during a typhoon or rainy season. Residents should pay attention to weather and local evacuation information and evacuate when necessary.

Historical landslides in Kumamoto Prefecture

Year	Name	Overview
2003	2003 Minamata Severe Rains (local severe rain in southern Kumamoto Prefecture in July 2003)	Landslides in Fukagawa-Shinyashiki and Hogawachi Atsumari districts of Minamata (19 dead)
2012	2012 Widespread Flooding in Kumamoto	Landslides and river flooding centered around Aso region (25 dead or missing).

(Includes deaths and missing persons due to non-landslide disasters as well.)

2012 Widespread Flooding in Kumamoto:
Landslide in Ichinomiya, Aso City
(Provided by: Kumamoto Nichinichi Shimbun)

Debris Flow

Occurs when mountainside/riverbed stones and sediment are swept downstream all at once due to prolonged or local severe rain.

Warning signs:

- Mountains rumbling
- River water suddenly becoming muddy or trees are being washed away
- Smell of rotten soil
- Despite continuous rain, water level in river dropping
- Can hear sound of trees splitting and stones colliding

Deep-Seated Landslide

Occurs when part or all of a slope slowly moves downhill due to the influence of groundwater and gravity.

Warning signs:

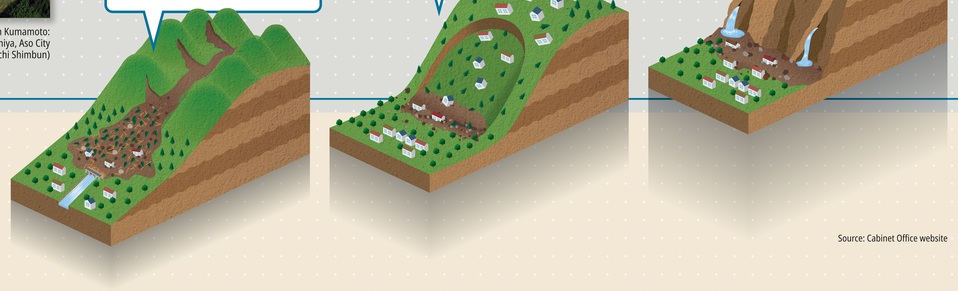
- Ground cracking or sinking
- Water coming out of cliff or slope face
- Water in wells or streams becoming muddy
- Ground or mountains rumbling
- Trees leaning
- Cracks or steps forming in ground

Steep-Slope Failure

Occurs when the ground surface near a slope loosens due to water penetration or an earthquake and the slope suddenly collapses.

Warning signs:

- Cracks forming in cliffs
- Pebbles falling down from above
- Water coming out of cliff face
- Spring water stops
- Spring water becoming muddy
- Ground rumbling



Source: Cabinet Office website