

# MANAGING JAPANESE HAIL RISK

Three severe hail events in the past 3 years have shined a spotlight on this risk in Japan. Historically overshadowed by typhoons and earthquakes, hailstorms can generate insured losses of billions of dollars. Insurers are now seeking ways to lower hail risks in Japan through the development of high-resolution hail mapping technology and mitigation measures to safeguard portfolios against future hail events.

## Introduction

Recent hail events over the last 3 years (2022-2024) have revealed the potential of Japanese hailstorms to generate substantial losses (Table 1). This has very much changed the perception that hail was only a minor peril in Japan—before 2022, the costliest hailstorm had been the May 24, 2000 event in the Kanto region, which resulted in insurance claims of JPY 70 billion.<sup>1</sup> Hailstorms in 2022 and 2023 have exceeded that figure for 2 years in a row, resulting in insured losses of approximately JPY 100 billion and JPY 78 billion, respectively.<sup>2</sup> And while the full extent of the 2024 hail loss has yet to be determined, given the extent of the initially reported hail damage,<sup>3</sup> Guy Carpenter estimates that insured losses could exceed JPY 150 billion (approximately USD 1 billion).

In the following section, we summarize Japan's 3 recent hail events, providing insights into the meteorological conditions that gave rise to these storms, examining their hail footprints, and assessing the damage caused.

In the subsequent section, we explore the potential influence of climate change on the frequency and severity of hailstorms in Japan. Recognizing the need for proactive measures, we also introduce some mitigation measures that Japanese insurers are taking to curb the impacts of hail risks. By understanding the underlying factors and adopting appropriate strategies, insurers can better prepare themselves for the challenges posed by hail events and safeguard their portfolios against potential losses.

**Table 1: Severe Hailstorms in Japan since 2000**

Event	Insured Loss Estimate
2000 May Kanto	JPY 70 billion <sup>1</sup>
2022 June Kanto	JPY 100 billion <sup>2</sup>
2023 July Kanto	JPY 78 billion <sup>2</sup>
2024 April Kansai	JPY 125-175 billion <sup>4</sup>

## Key Events

### 2022 June Kanto Hail Event

On June 2, 2022, the Kanto region experienced a significant hail event that damaged cars, residential houses, and crops, primarily in Gunma and Saitama prefectures. This event was triggered by a trough of low pressure and cold air, resulting in highly unstable atmospheric conditions.

The following day, June 3, another trough of low pressure accompanied by cold air passed through the Kanto region, maintaining the highly unstable atmosphere. Our radar hail estimates indicate that the largest estimated hail sizes during these hailstorms ranged from 5 to 6 cm. The northern and

<sup>1</sup> The General Insurance Association of Japan, 2000

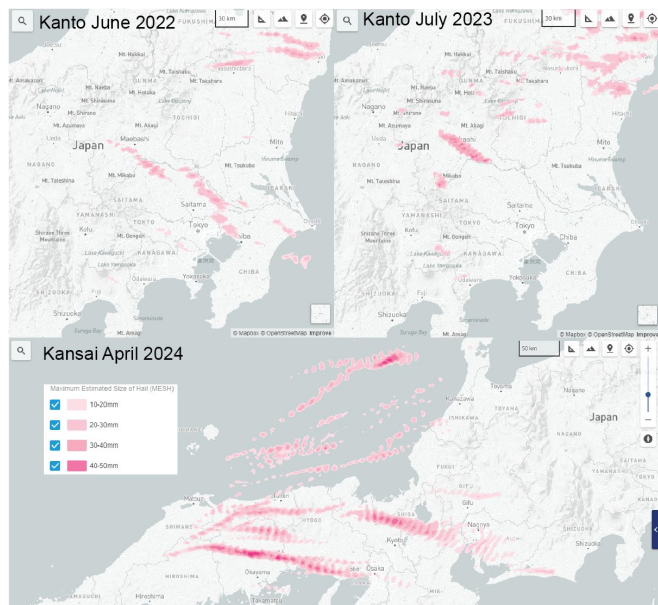
<sup>2</sup> IR reports of three Japanese non-life insurers

<sup>3</sup> Insurance Asia News Article, May 28, 2024: <https://insuranceasianews.com/japan-hail-fall-insurance-payout-reaches-us214m-qiaj/>

<sup>4</sup> Source: Guy Carpenter

eastern Kanto regions, including Saitama, Gunma, Chiba and Fukushima prefectures, experienced damage to crops and agricultural production facilities.<sup>5</sup>

The insured losses from the 2022 hailstorm were approximately JPY 100 billion, making it a close second to Typhoon Nanmadol as the largest natural catastrophe loss of that year. The hail event occurred during the evening rush hour period, when many commuters would have been driving home from work, so the motor insurance portfolio was particularly impacted.



**Figure 1: Hail swaths for 3 major hailstorms in 2022-2024 (radar-estimates). Source: Guy Carpenter**

## 2023 July Kanto Hail Event

On July 31, 2023, an active cloud system with large hailstones and wind gusts affected Gunma Prefecture from approximately 16:30 to 18:30 JST. While the 2022 hail event impacted larger parts of the Kanto region, the 2023 hail event primarily focused its damage on Gunma Prefecture. Our radar hail estimates indicate that the hail intensity in 2023 was greater in certain areas than in 2022, with the largest estimated hail sizes exceeding 6 cm.

The insured losses from the 2023 hailstorm are expected to be approximately JPY 78 billion. Although this loss figure is slightly smaller than the 2022 hail event, it was the most significant single domestic weather-related catastrophe loss of 2023. Like the 2022 event, this hailstorm occurred during rush

hour, impacting the same regions in the northern Kanto region and significantly affecting motor insurance portfolios.

## 2024 April Kansai Hail Event

From the evening of April 16, 2024, to the morning of the 17th, severe thunderstorms accompanied by hail occurred in various parts of western Japan. Radar hail estimates indicate that the largest hailstones reached approximately 6 cm in diameter in Hyogo, Okayama and Shiga prefectures.

Damage reports from the media suggest a significant volume of claims, with the majority coming from the southern-western part of Hyogo prefecture and Shiga prefecture, with damages to cars and residential buildings, particularly roofs, garages, and solar panels.

According to the latest report from the General Insurance Association of Japan (GIAJ), as of April 26, 2024, JPY 33.6 billion in claims payments had already been made within 10 days of the event<sup>6</sup> – about equally split between motor and fire insurance policies in terms of the loss and 2-to-1 in terms of the number of claims.

The number of motor vehicles affected by the hailstorm is at least 180,000, with the highest concentration in Hyogo prefecture, of which, based on the motor hull insurance penetration rate in western Japan, approximately 50% will be insured. In hail events, fire insurance claims are typically fewer in number but higher in severity than motor claims. We estimate the total number of claims will exceed 150,000, and the total insured loss will reach JPY 150 billion (approximately USD 1 billion).

## Directionality and Perspective

### A New Normal?

While climate change may influence the underlying trend of hail risk in Japan, the lack of long-term direct observations of hail, the limited availability of radar data spanning only 20 years, and challenges faced by numerical weather prediction and climate models due to the country's unique topography and the complexity associated with microphysics make it challenging to obtain a reliable trend of hail events and assessments on the impacts of climate change.

The prevailing expectation globally is that ground-level hail frequency may decrease over time, and the severity and size of the hailstones may become larger (Table 2).<sup>7</sup> However, it is essential to acknowledge the significant uncertainty surrounding these projections for Japan, and there is no clear

<sup>5</sup> The National Research Institute for Earth Science and Disaster Prevention, June 23, 2022 (Japanese)

<https://mizu.bosai.go.jp/key/HDDB>

<sup>6</sup> The General Insurance Association of Japan, April 26, 2024  
[https://www.sonpo.or.jp/en/news/2024/h2p8pq0000002bm-att/240527\\_01.pdf](https://www.sonpo.or.jp/en/news/2024/h2p8pq0000002bm-att/240527_01.pdf)

<sup>7</sup> Raupach, T. H. et al. The effects of climate change on hailstorms. *Nat Rev Earth Environ* 2, 213–226 (2021).

indication that these 3 events in the last 3 years represent a “new normal.”

**Table 2: Factors Impacting Future Hail Risks in Japan**

Factors	Direction	Cause
Frequency & Severity	↑ Possible Increase	Increased temperature and low-level moisture support the formation of larger hail.
	↓ Possible Decrease	Increased melting of more minor hail before falling to the ground.
Exposure	? Uncertain	The contraction of the Japanese market may be offset by an increase in unit cost per damage.

## Exposure

The domestic vehicle fleet is projected to peak in the coming decade and gradually shrink while also significantly shifting toward next-generation automobiles (such as EVs) and high-performance engine vehicles over time.<sup>8</sup> This is likely to drive up vehicle repair costs, as parts are more expensive and vehicles are more difficult to repair.<sup>9</sup> The increased unit cost per damage case from hailstorms may offset the overall decrease in the number of exposures.

Statistics from the US show that the leading cause of property losses from hailstorms is damage to roofing, making up nearly 70% of (non-motor) property insurance claims.<sup>10</sup> However, the typical residential roofing materials in Japan—Kawara clay, metal or concrete—differ from the predominance of asphalt composition roofing in the US. Moreover, with Tokyo requiring the installation of solar panels on new homes built after 2025, there is a potential for a significant increase in the number of solar rooftops in urban areas.<sup>11</sup> Assessing the vulnerability of Japanese-style rooftops and solar rooftops to hail damage compared to asphalt roofing presents a challenge, underscoring the importance of conducting engineering studies and post-event surveys to gather relevant data.

<sup>8</sup> Ministry of Environment and Mitsubishi Research Institute, March 25, 2022 (Japanese)

<https://www.env.go.jp/content/000046063.pdf>

<sup>9</sup> Nikkei article, May 23, 2024 (Japanese)

<https://www.nikkei.com/article/DGKKZO80861340S4A520C2EE9000/>

<sup>10</sup> Allen, J. T. *et al.* Understanding Hail in the Earth System. *Rev. Geophys.* **58**, (2020).

## Risk Mitigation

Although guidance on hail mitigation has been slower in catching up with loss trends, Japanese insurers have started taking proactive steps to minimize the impact of hail.

For example, some of the major non-life companies have introduced hail prediction services for automobile, fire, and accident insurance policyholders.<sup>12</sup>

Additionally, some companies have started distributing “hail covers” for personal vehicles that can be attached to the front windshield, roof, and hood of passenger cars, offering an extra layer of protection against hail. With improved forecasting providing additional lead time, individuals can proactively safeguard their vehicles, and implementing these mitigation measures on a large scale could significantly reduce potential losses caused by hailstorms in Japan.

## How Guy Carpenter Can Help

Hail event response poses a significant challenge for Japanese insurers; events typically have narrow footprints and unfold rapidly within minutes or hours. Guy Carpenter offers a solution by providing radar-based hail footprints immediately after significant hail events using the latest hail detection algorithm developed by The University of Queensland in Australia (sponsored by Guy Carpenter).

These footprints show the spatial extent and size of the hail, and insurers can overlay their exposures to gauge the potential portfolio impacts. This information has been seamlessly integrated into GC AdvantagePoint®, our market-leading proprietary geospatial tool at Guy Carpenter.

Guy Carpenter helps our clients manage this complex catastrophe risk and evaluate risk transfer strategies by effectively assessing the magnitude of hail hazards and vulnerabilities, facilitating comprehensive data collection, and fostering transparent risk discussions between insurers and reinsurers.

<sup>11</sup> The Tokyo Metropolitan Government, November 17, 2023

[https://www.kankyo.metro.tokyo.lg.jp/english/climate/solar\\_portal](https://www.kankyo.metro.tokyo.lg.jp/english/climate/solar_portal)

<sup>12</sup> The Japan News, June 26, 2023

<https://japannews.yomiuri.co.jp/society/general-news/20230626-118720/>

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