

A Damaging Marine Events Dataset for the Canary Islands (1980-2025)

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Introduction

Coastal zones combine high ecological productivity with intense human occupation. Globally, around 40% of the population lives in coastal areas, and on islands this share can reach 97%. This creates extreme exposure to marine hazards such as coastal flooding. Moreover, while hazard assessments are common at global scales, many islands still lack the high-resolution data required for disaster risk reduction planning.

In the Canary Islands, coastal flooding has mainly been studied using buoy records and wave modelling, focusing on storm-marine conditions. Yet coastal flooding can be driven by multiple interacting processes, including storm surges, wave overtopping, tides, sea-level rise, and tsunamis. As a result, damaging events do not always correspond to extreme sea-level conditions and may therefore be underrepresented in conventional datasets. In addition, existing studies have often focused on specific areas, limiting the understanding of risk patterns at the scale of the entire archipelago.

This study compiles a dataset of damaging coastal events in the Canary Islands (1980–2025), based on press archives and insurance claim records. The dataset aims to support a risk-oriented characterization of coastal flooding impacts through the identification of hotspots, the estimation of return intervals, the analysis of affected structures and the assessment of seasonal trends.

Results

486 Damage points

My maps

Hotspots were identified using a 1-km hexagonal grid based on geocoded press-recorded events and grid cells with more than five reported damages were selected. Return intervals were calculated at the postal-code scale by incorporating Insurance Compensation Consortium

Hotspots and return interval

Spatial distribution of coastal-damage hotspots and return intervals across the Canary Islands based on the combined press and insurance records



Thirteen municipalities account for more than half of the recorded damages



Return intervals vary widely across postal codes, ranging from <3 years to >40 years



A clear increase in damaging events is observed since the 1990s



A marked seasonal pattern is detected, with most events occurring in winter



Uneven damage distribution: roads and recreational areas are most affected, while impacts on industrial infrastructure are limited

Discussion

Combination of uneven urbanization, maritime climate, and coastal orientation.

Likely driven by archive digitization quality and missing CCS records pre-1996.

Associated with Atlantic storms
NNW-NW swell (Dec–Mar)
W–NW mixed sea-swell (Nov–Apr)

Consistent with Canary exposure: tourism/residential dominance and limited industrial development

Work in process

Hotspot case studies and exposure changes over time

Physical and meteorological characterization of damaging events

Development of damage curves

Methods

Press archive inventory (1980-2025)

Digital newspaper repositories from the University of La Laguna (Maresía) and the University of Las Palmas de Gran Canaria (JABLE) were queried for the period 1980–2025. A preliminary keyword sensitivity test was conducted using terms such as “temporal marítimo” (maritime storm) and “golpe de mar” (local colloquial expression for wave overtopping or heavy seas). The final query selection “daños” (damages), “oleaje” (wave conditions) was based on optimizing the ratio of relevant to total retrieved records.

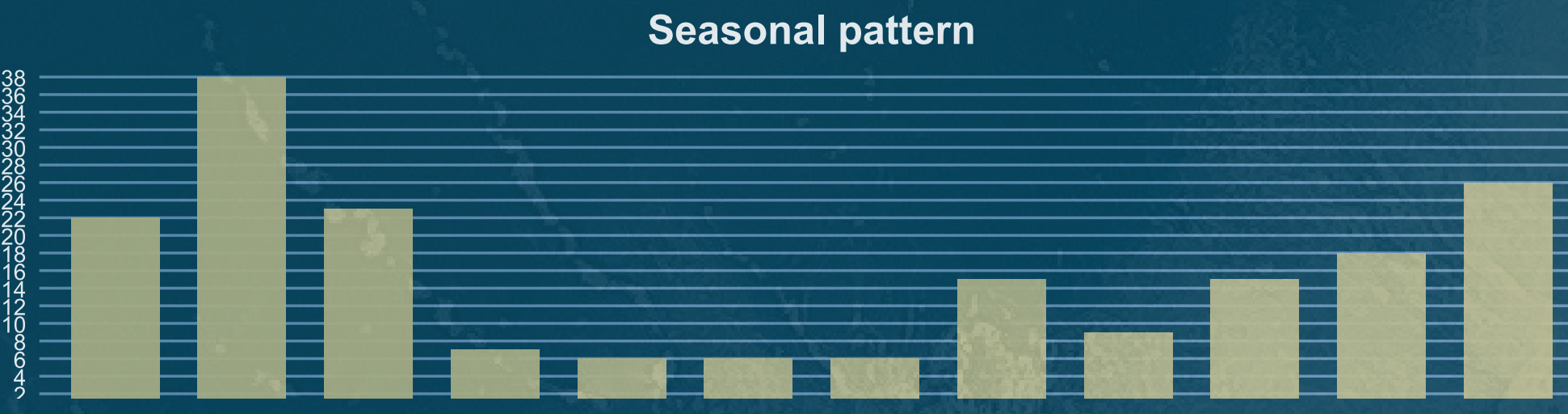
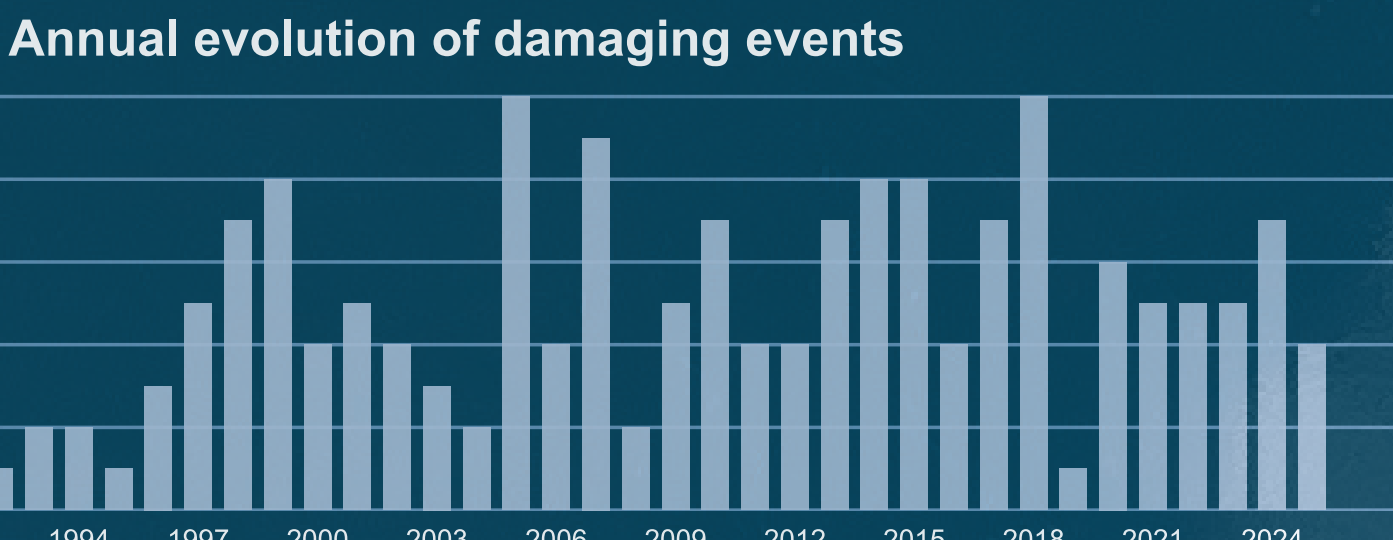
This process yielded 2 659 and 2 565 reviewed articles from JABLE and Maresía, respectively. Inclusion criteria were restricted to wave-induced coastal events producing material damage to infrastructure or assets.

Insurance Consortium records (1996–2024)

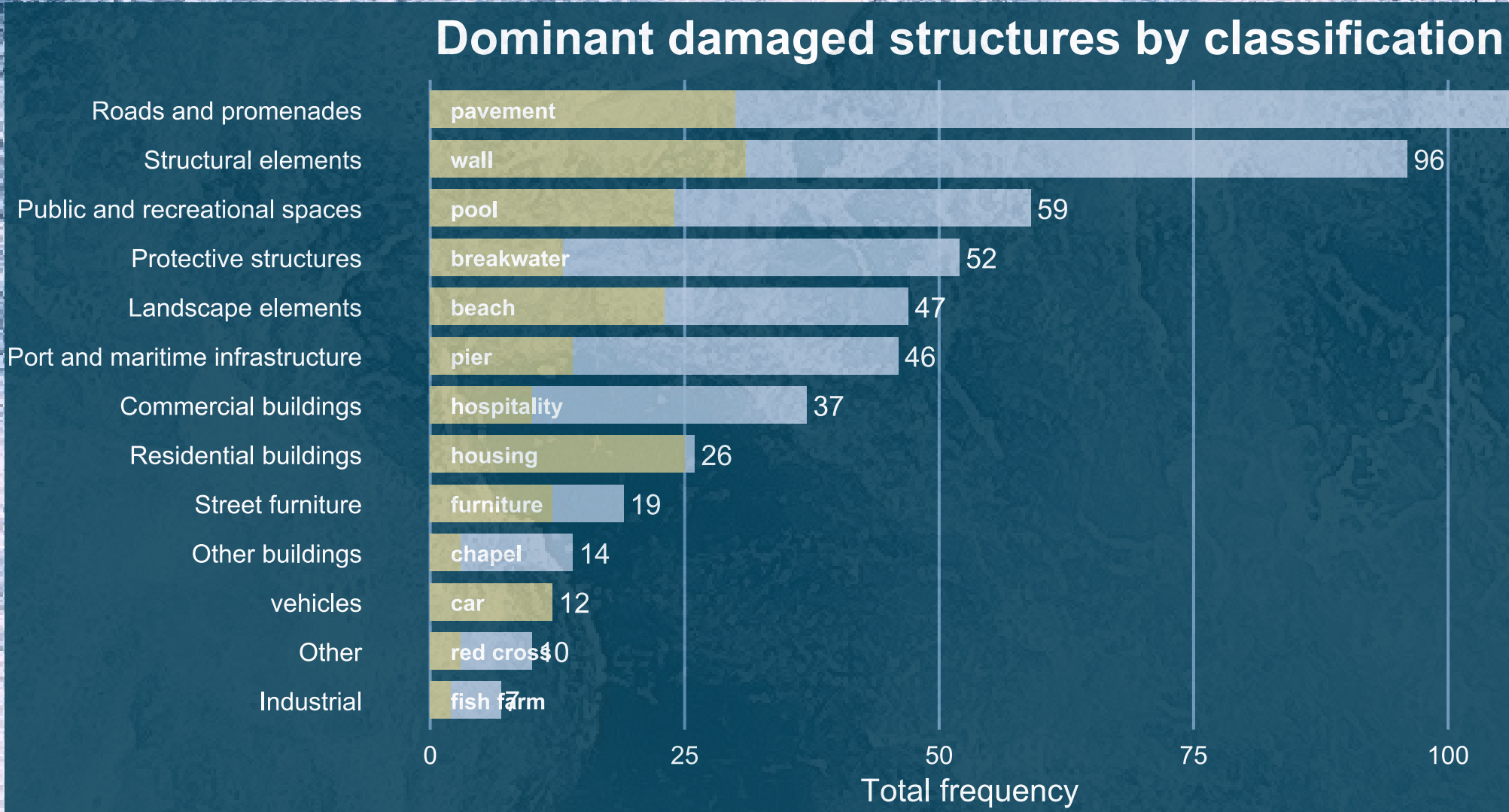
These records were cross-referenced with the insurance claims inventory from the Spanish Insurance Compensation Consortium (Consortio de Compensación de Seguros; CCS, 1996–2024) using a 7-day temporal window and matching postal codes. Consecutive reports referring to the same storm episode were aggregated into a single damaging event to avoid overcounting, and duplicate records with the same date and postal code were removed.

531 Damaged structures

ID	date	damages description	newspaper link
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Annual and seasonal distribution of recorded damaging events. The upper panel shows the annual evolution in the number of events. The lower panel illustrates the seasonal pattern.



Horizontal bars represent the total frequency of impacts recorded for each infrastructure category, while highlighted labels indicate the most recurrent damaged element within each class

Find out more



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