



Online web-based demonstrator

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Deliverable 5.2 – Online web-based demonstrator

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Executive summary

The COMPASS web demonstrator available at <https://uc.compass-climate.eu/> presents an interactive, story-driven environment designed to communicate the results of the COMPASS project in an accessible and visually intuitive manner. The platform translates complex climate attribution analyses into understandable narratives that connect hazards, exposure, vulnerability, impacts, and decision-making processes. The demonstrator acts as a bridge between scientific modelling outputs and stakeholder-oriented communication, supporting policy makers, practitioners, civil protection authorities, and the wider public in understanding the cascading nature of climate-related risks.

The demonstrator builds upon the methodological framework developed within COMPASS and specifically synthesizes results from Deliverable D4.1 “Hazard and Impact Synthesis and Attribution for Phase I use case” as well as the storyline-oriented analyses prepared within Deliverable D4.3. The platform presents a collection of interactive case study stories covering multiple regions and hazard types, including coastal flooding, compound storms, droughts, heatwaves, tropical cyclones, and cascading socio-economic impacts. These storylines demonstrate how climate change interacts with exposure, vulnerability, governance, and societal conditions to shape disaster outcomes.

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1. Introduction

The overarching objective of COMPASS is to develop “a harmonized and flexible methodological framework for attributing climate and impact to complex extreme events, including compound, sequential, and cascading hazards”. The demonstrator operationalizes this concept by transforming technical attribution workflows into graphical storylines that enable users to explore both the scientific evidence and the broader societal context of extreme events. The platform combines quantitative attribution results with qualitative narratives, thereby supporting both probabilistic and storyline-based approaches to event attribution.

The demonstrator further illustrates the diversity of COMPASS use cases across geographical regions and hazard typologies. The presented stories include European coastal and riverine flooding events, compound winter storms in the United Kingdom, drought and heatwave conditions, tropical cyclones affecting East Africa, and cascading multi-hazard crises in Honduras. These examples highlight how climate-related hazards can combine spatially, temporally, and socially, producing impacts that cannot be understood through single-hazard approaches alone.

A key component of the demonstrator is its emphasis on decision relevance. Each storyline connects scientific evidence with practical implications for adaptation, disaster risk reduction, preparedness, and resilience planning. By integrating maps, graphics, timelines, explanatory text, and interactive navigation, the demonstrator provides a user-friendly interface for exploring complex attribution analyses without requiring specialist technical knowledge.

The web demonstrator therefore represents an important operational output of the COMPASS project, showcasing how advanced climate attribution science can be communicated effectively to support informed decision-making and improve understanding of compound climate risks across different sectors and regions.

2. Use Case Storylines

The COMPASS web demonstrator presents a series of interactive storyline-based use cases illustrating the relationship between climate hazards, exposure, vulnerability, impacts, and adaptation responses. The current demonstrator includes the following case studies:

2.1. Extra-tropical cyclone Xynthia, France 2010

This storyline focuses on the extra-tropical cyclone Xynthia, which affected the western coast of France in February 2010. The case study explores the interaction between extreme wind conditions, storm surge, coastal flooding, and societal vulnerability. The storyline demonstrates how a combination of high tide conditions, coastal exposure, inadequate protection measures, and demographic factors contributed to severe impacts, including fatalities and major economic losses. The story also highlights post-event adaptation measures and changes in coastal risk management.

Use case story available at: <https://uc.compass-climate.eu/stories/france>

2.2. United Kingdom Winter Storms

This use case analyses the severe winter storms affecting the United Kingdom during 2013–2014. The storyline presents compound interactions between intense rainfall, storm surge, coastal flooding, fluvial flooding, and wind impacts. Particular attention is given to the Somerset flooding events and the role of climate change in

altering the probability and intensity of such compound extremes. The storyline further discusses the implications for flood risk management and infrastructure resilience.

Use case story available at: <https://uc.compass-climate.eu/stories/uk>

2.3. United Kingdom Drought Heatwave 2022

This storyline examines the compound drought and heatwave conditions experienced in the United Kingdom during 2022. The demonstrator explains the meteorological drivers of prolonged heat and precipitation deficits, together with impacts on water resources, ecosystems, agriculture, infrastructure, and public health. The storyline emphasizes how climate change has increased the likelihood and severity of such events while also illustrating interactions between environmental stressors and societal vulnerability.

Use case story available at: <https://uc.compass-climate.eu/stories/uk-2>

2.4. Cyclones Idai and Kenneth, Mozambique

This use case focuses on the sequential tropical cyclones Idai and Kenneth that affected Mozambique and neighbouring regions in 2019. The storyline presents cascading impacts related to wind damage, storm surge, coastal flooding, river flooding, and humanitarian crises. The demonstrator highlights the compounding nature of consecutive cyclones occurring within a short time period and discusses the role of vulnerability, infrastructure limitations, and socio-economic conditions in shaping disaster outcomes.

Use case story available at: <https://uc.compass-climate.eu/stories/mozambique-2>

2.5. Tropical Cyclone Freddy 2023

The Cyclone Freddy storyline examines one of the longest-lasting tropical cyclones ever recorded. The story explores extreme rainfall, flooding, landslides, and prolonged humanitarian impacts across East Africa. The demonstrator illustrates the interaction between climate hazards and existing vulnerability conditions, while also presenting attribution analyses related to changing cyclone behaviour and rainfall intensity under climate change.

Use case story available at: <https://uc.compass-climate.eu/stories/mozambique>

2.6. Consecutive tropical cyclones Eta and Iota in Honduras

This storyline investigates the cascading impacts of Tropical Storms Eta and Iota in Honduras during 2020. In addition to rainfall and flooding, the analysis incorporates non-climatic drivers including COVID-19 impacts, poverty, displacement, and social instability. The use case demonstrates the COMPASS approach to integrating qualitative and quantitative attribution methods, showing how climate-related disasters interact with broader societal crises to amplify impacts and reduce resilience.

Use case story available at: <https://uc.compass-climate.eu/stories/honduras>

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