

The COMPASS project

An update on the project's progress

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11 February, Potsdam

Deltares



Funded by the
European Union

The COMPASS project has received funding from the European Union's HORIZON Research and Innovation Actions Programme under Grant Agreement No. 101135481

Introducing the project

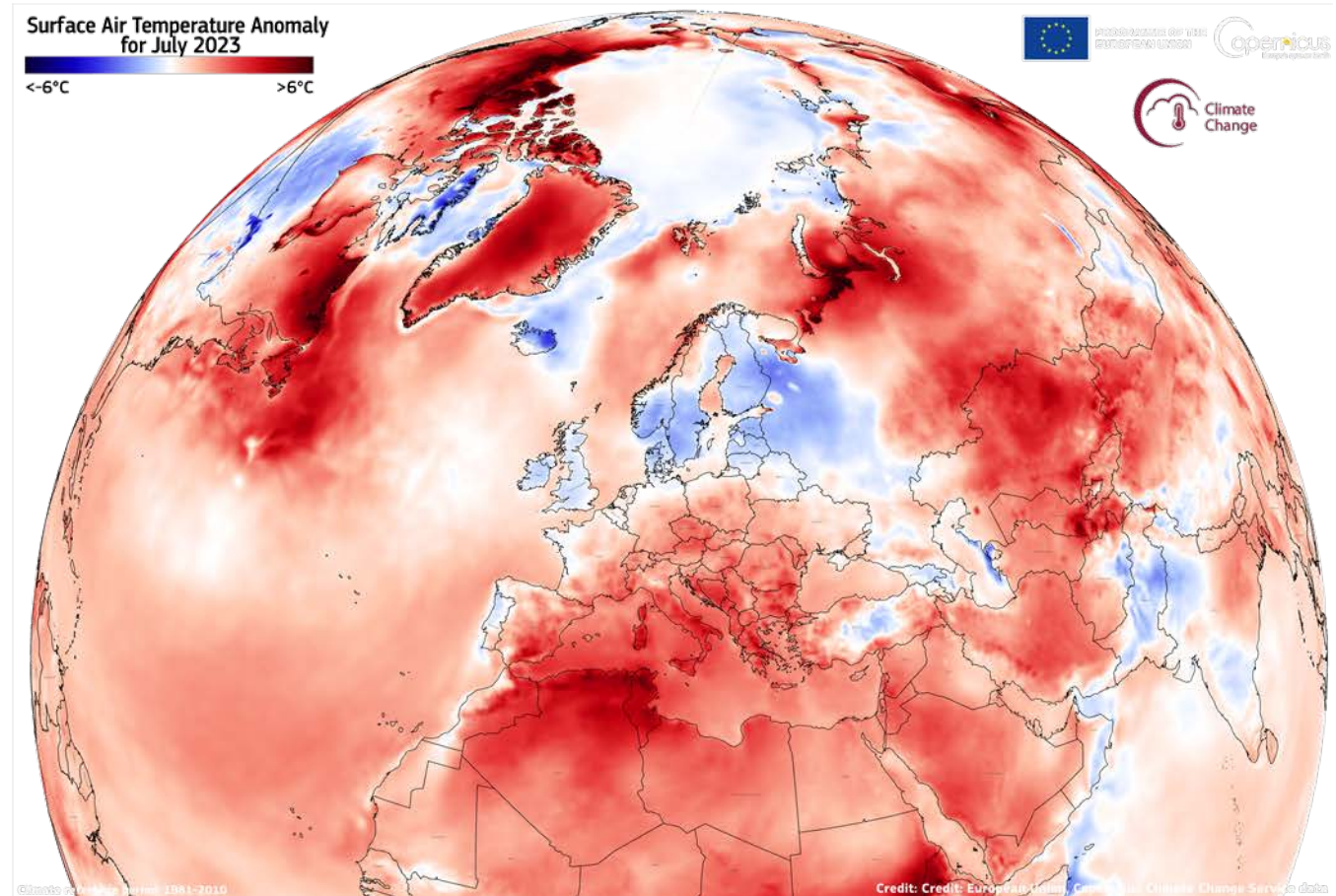
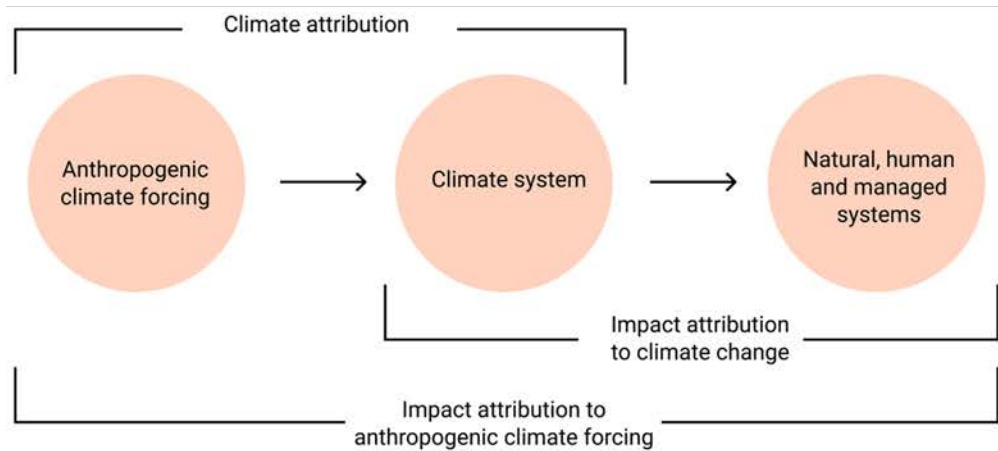
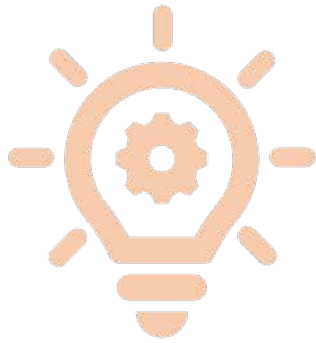
COMPoud extremes Attribution of climate change: towardS an operational Service

The overarching goal of COMPASS is to develop a **harmonised methodological framework** for climate and impact attribution of various **complex extremes** that includes compounding, sequences and cascading hazard events

Deltares



Expected outcome



Climate attribution of extreme events

Studies of almost 750 events and trends reveal the impact of climate change on extreme weather.

Explore the studies either via the map or by the panel of controls below.

Switch view:

Finding Event type

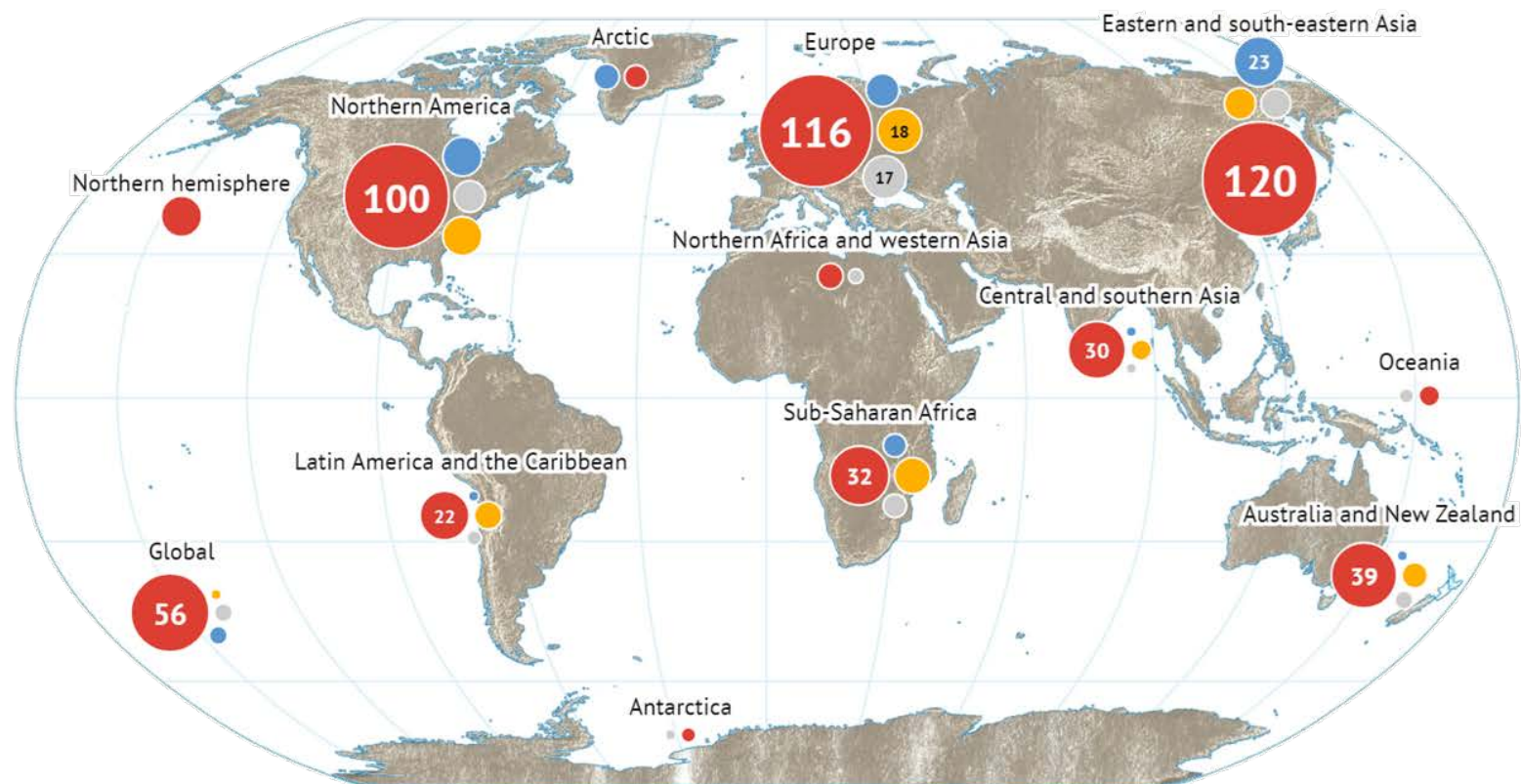
How did climate change influence the weather event:

More severe or likely	547
Had no influence	71
Less severe or likely	64
Inconclusive	53

Explore further:

Choose a country... ▾

Last updated 18 November 2024
[Get the data \(.csv\)](#)



Limitation of climate attribution

Studies are typically based on **single meteorological driver**
(temperature or rainfall)

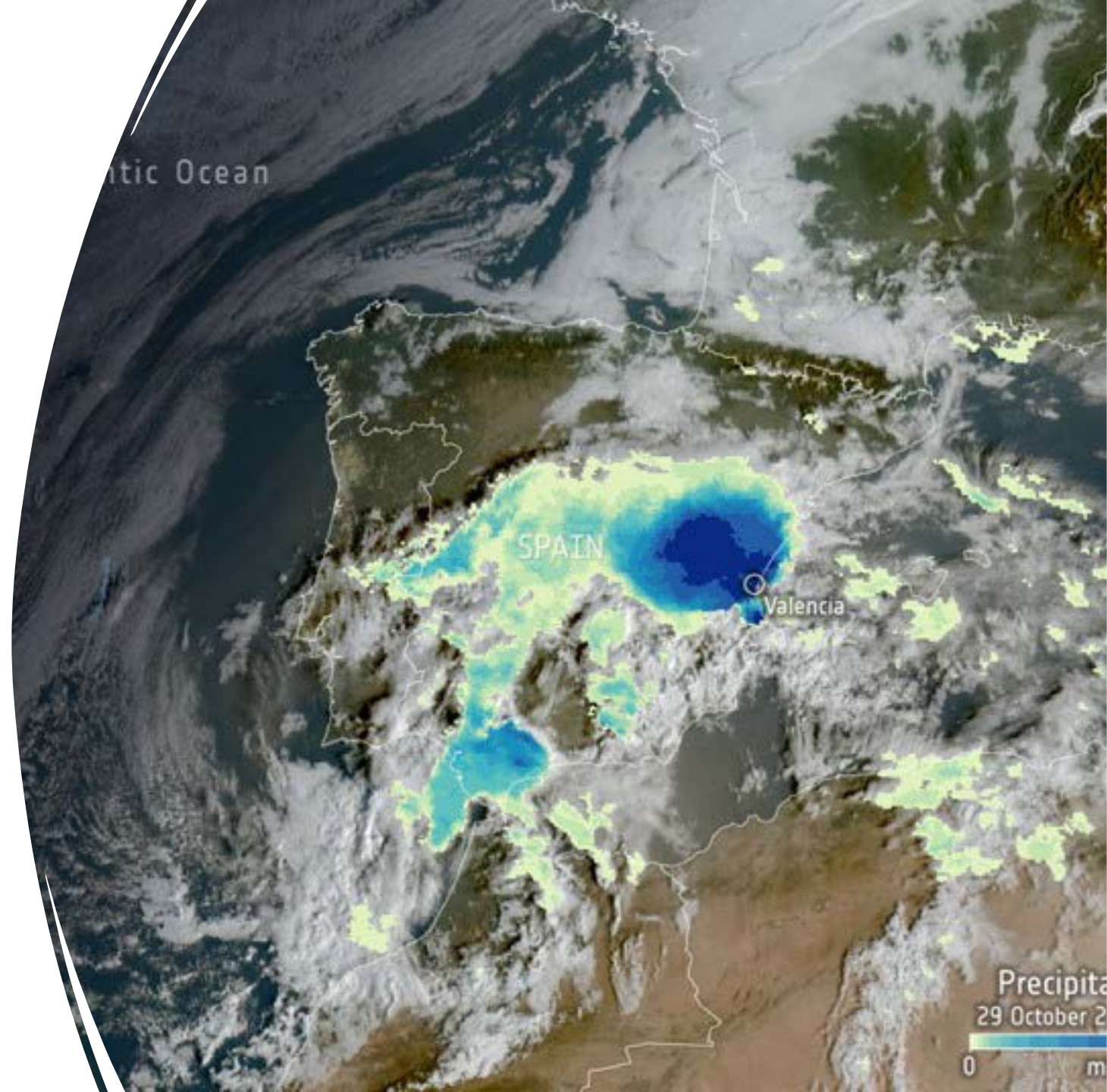
LA fires were the result of multiple drivers (Jan. '25)

- Combinations of dry conditions, buildup of vegetation, low humidity and strong wind
- At least 29 people were killed, more than 200,000 had to evacuate, and more than 18,000 homes and structures were destroyed



Flash floods Spain exacerbated by human drivers (Oct. '24)

- Extreme rainfall caused by isolated low-pressure system
- More than 200 people died, large damages to properties and infrastructures



Research gaps that COMPASS aims to address



Climate attribution is mainly focussed on univariate extremes

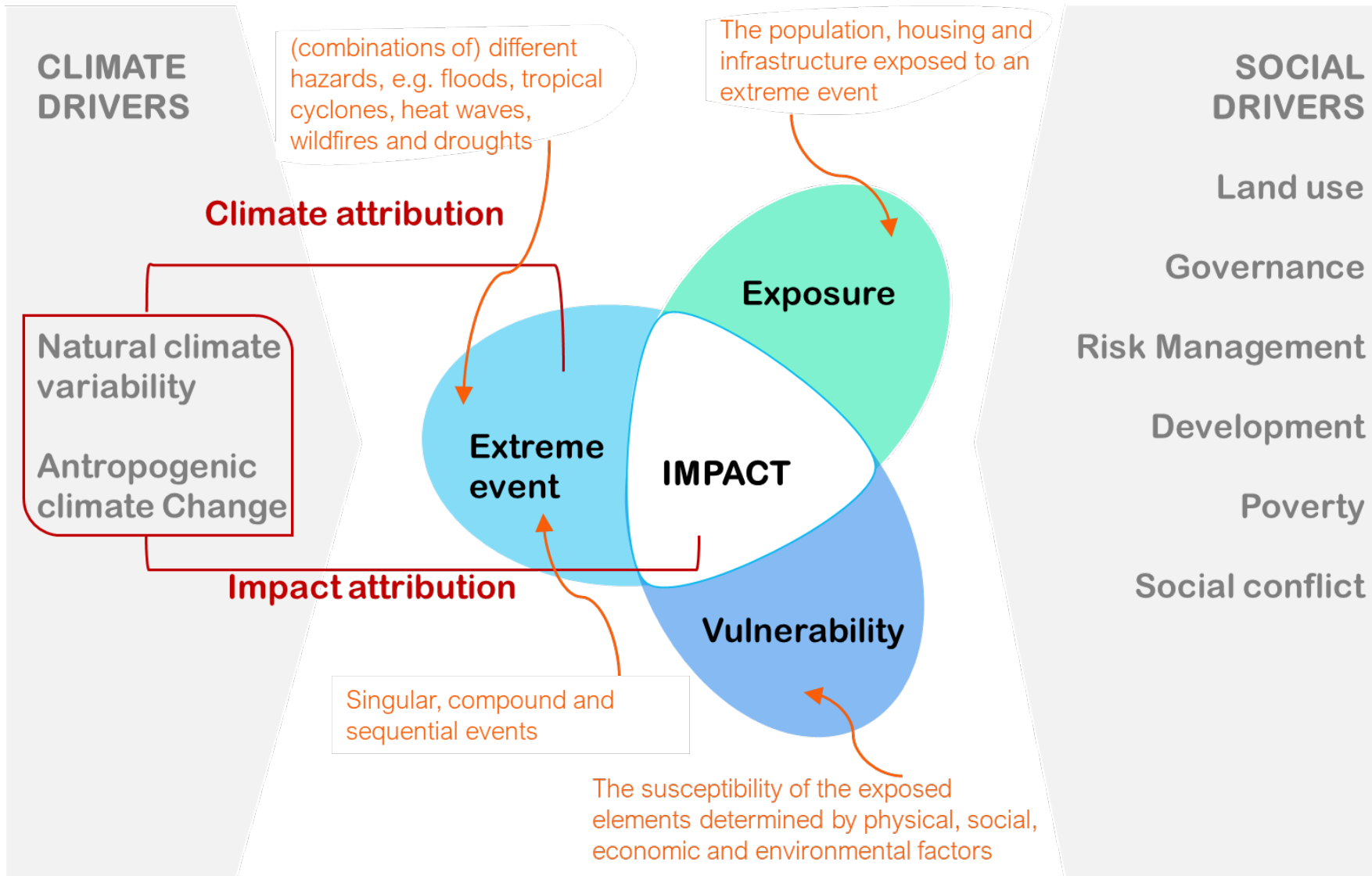
Most extreme disaster are often caused by a combination of different hazards



Climate attribution is mainly focussed on the change in the climate hazard

Not clear what is the driver of the socio-economic impacts

Conceptual framework



The main objectives

1

Improve hazard modelling of compound extremes in current and future climates with sufficient accuracy at local scale

2

Develop climate attribution method that can account for compound extremes

3

Improve impact modelling to enable shift from hazard to impact attribution

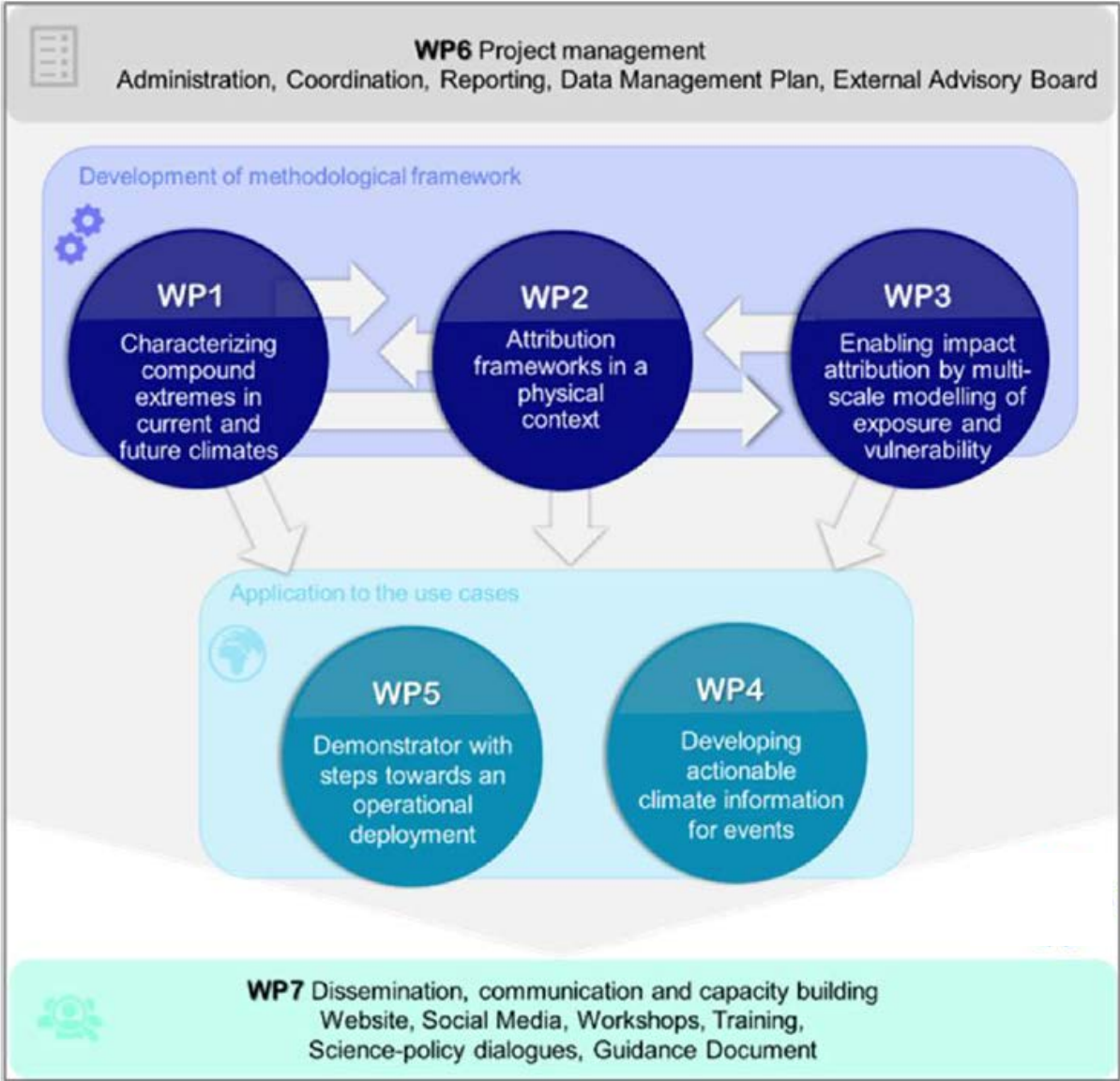
4

Generate of actionable information for events by application to historical events

5

Demonstrate potential for on operational service

The project design



Project achievements in 2024



First outputs have been shared on Zenodo



First code has been published on GitHub

Reviewing the state-of-the-art

September 30, 2024 (v1)

Project deliverable

Open

Guidelines for compound extremes modelling in current and future climates

Aleksandrova, Natalia ; Vertegaal, Doris; Couasnon, Anaïs 

The overarching goal of the COMPASS project is to develop a harmonised methodological framework for climate and impact attri

Part of EU Open R
operational Service
Uploaded on Octob

September 30, 2024 (v1)



Project milestone

Open

Scoping report of data and models

Paprotny, Dominik 

This report collects information on available data impacts that have prospective use in the project.

Part of EU Open Research Repository , COMPASS - COI operational Service 

Uploaded on October 4, 2024

November 29, 2024 (v1)

Report

Open

Report on dataset on best-available methods and climate datasets for climate attribution

Cotterill, Daniel ; Perks, Rachel ; Stott, Peter 

There are currently many well-established climate attribution methodologies for single driver extremes, however, there is very little literature on more complex extremes such as compound, sequences and cascading hazard...

Part of EU Open Research Repository , COMPASS - COMPound extremes Attribution of climate change: towardS an operational Service 

Uploaded on January 24, 2025

 24

 27

Going beyond state-of-the-art

WP1 Improve hazard modeling of compound extremes in current and future climates with sufficient accuracy at local scale



Workflow for compound modelling



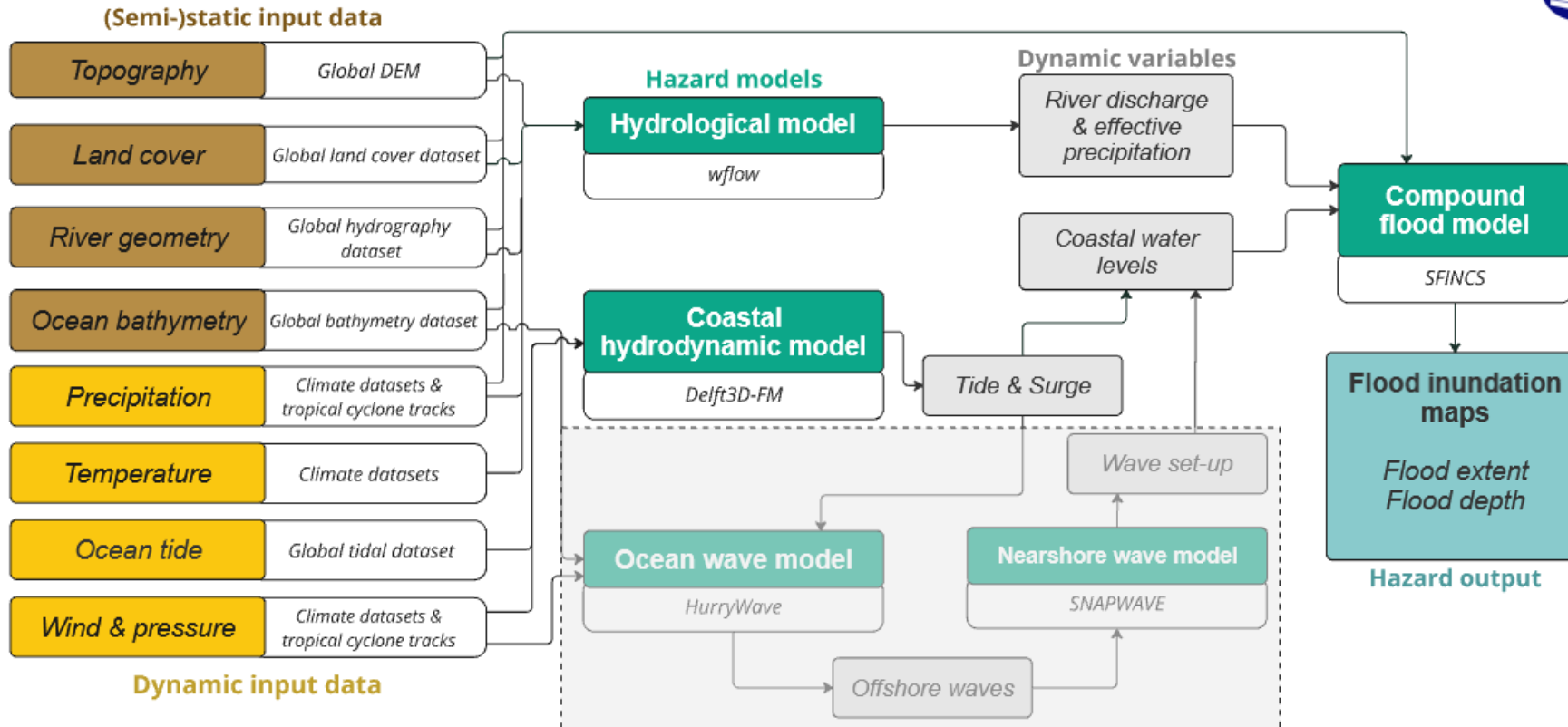
HydroMT Wflow



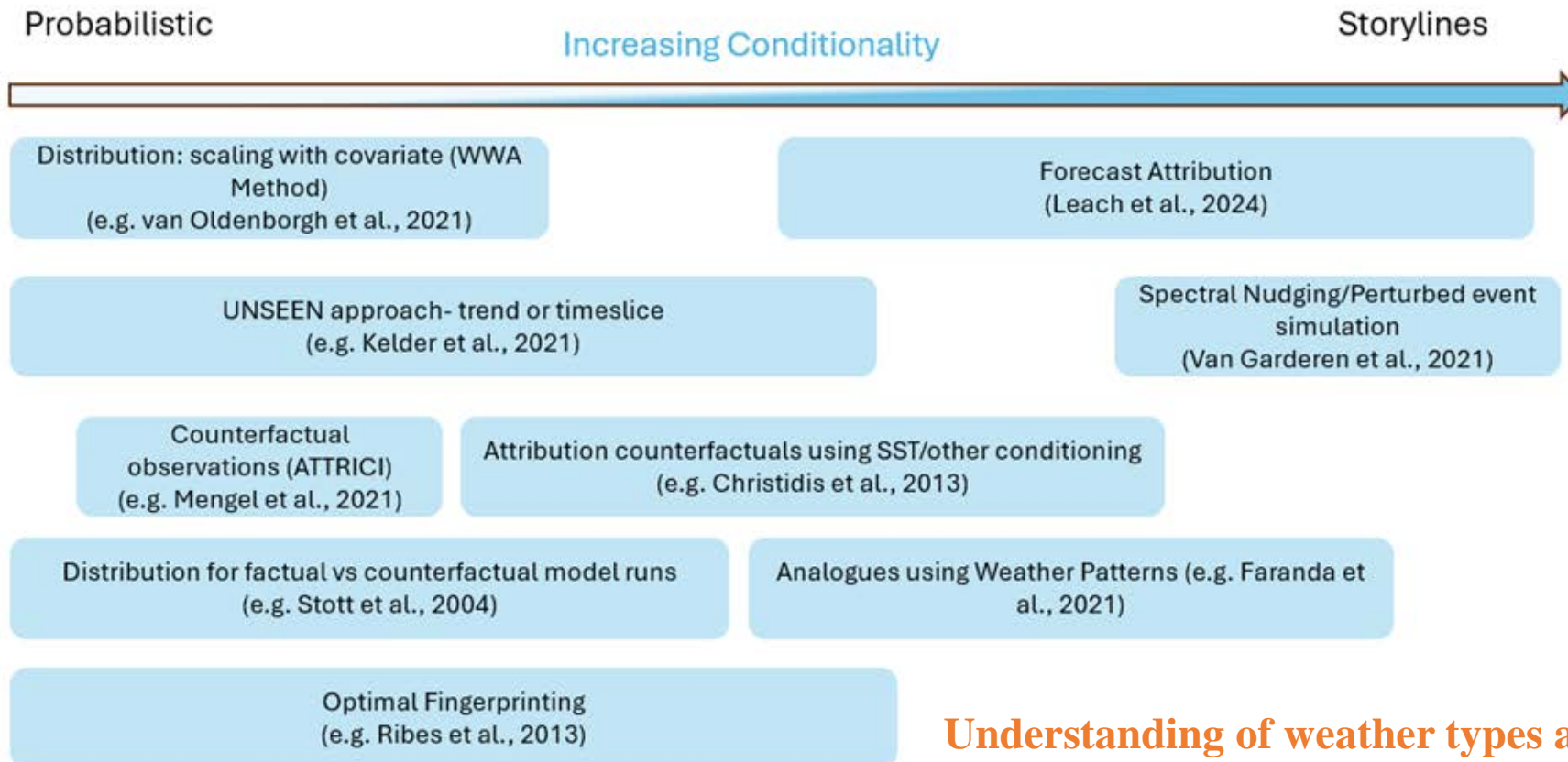
cht_cyclones



HydroMT SFINCS



WP2 Developing climate attribution methods that can account for compo extremes



Understanding of weather types and large-scale climate drivers

WP3 Novel multi-scale impact modeling to enable a shift from hazard to impact attribution

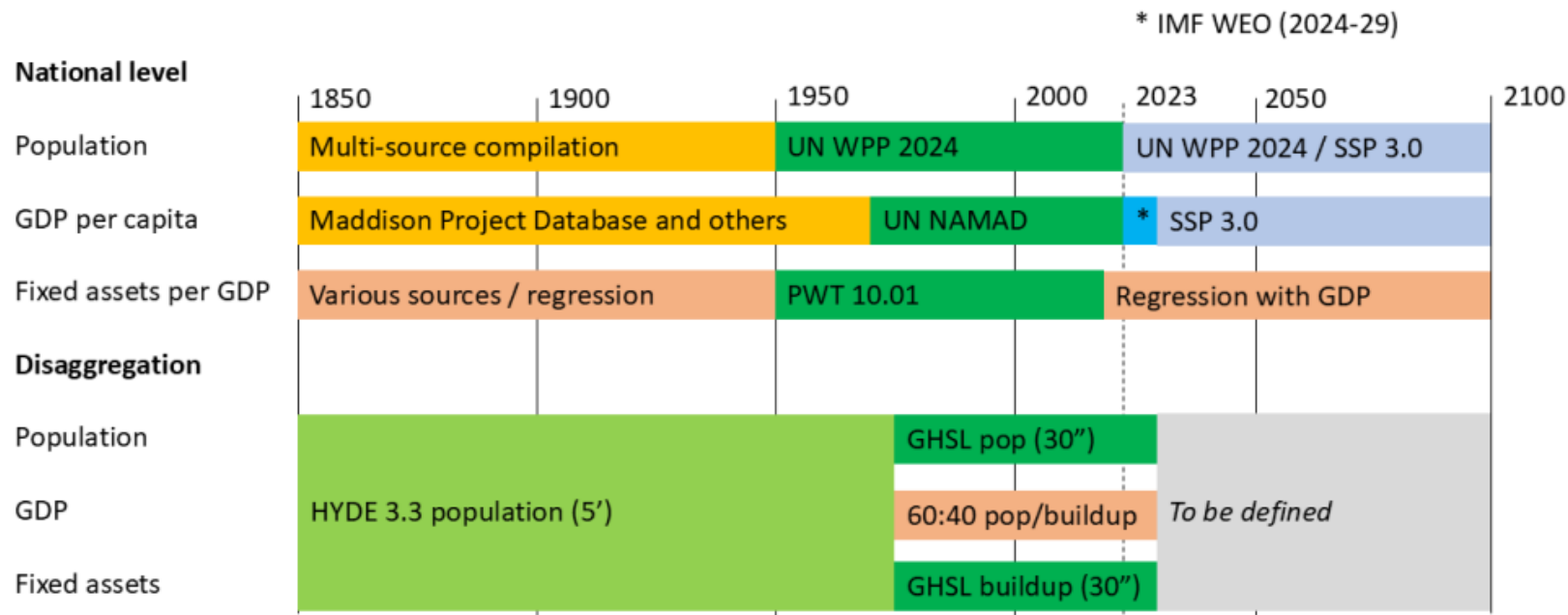
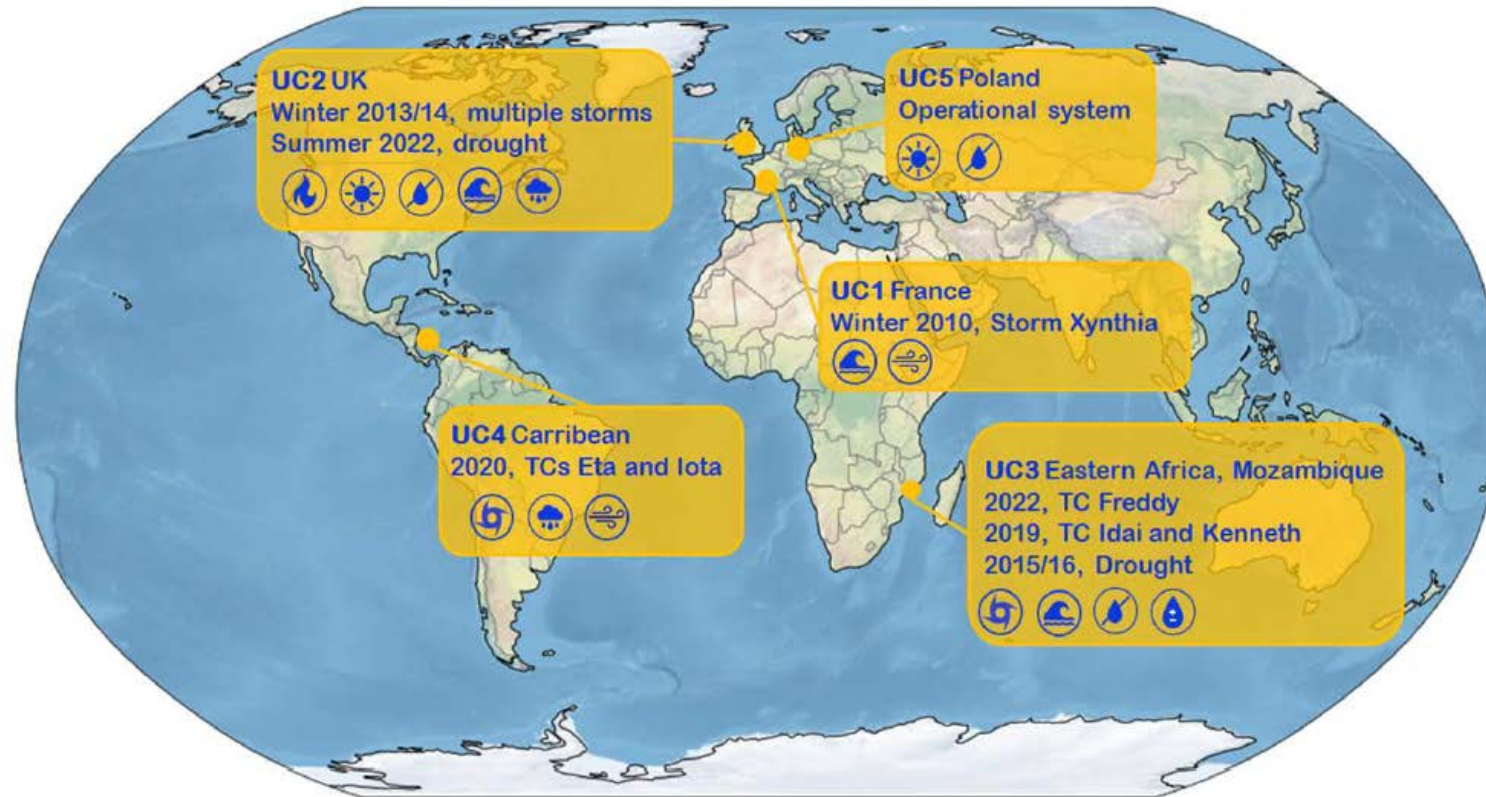


Figure 1. COMPASS multiscale model concept.

Application and operationalization of the COMPASS framework (WP4 and WP5)



Outlook for next year(s)

Further developing our methodological framework (WP1-WP3)

Hazard modelling of compound extremes

Impact modelling

Attribution methods

More emphasis on application in the use cases (WP4-WP5)

Finalizing first set of use cases

Second set of use case

Online demonstrator

Communication and dissemination (WP7)

Hackathon

Policy-briefs

Webinar

Main challenges

- Hazard and impact model need to be relevant at **the local scale**
- Need for **downscaling and bias correction**
- Dealing with **large uncertainties**
- **Operationalizing** framework and integration of different components



Concluding remarks

COMPASS will consolidate the scientific foundation of climate attribution, and attempts to extend current framework to include impacts and compound extreme

Our use cases will push the boundaries of existing attribution frameworks for hazard and impact modelling, and demonstrate the feasibility of an operational service



Let's stay in touch!



<https://github.com/HORIZON-COMPASS>

HORIZON - COMPASS
3 followers <https://compass-climate.eu> info@compass-climate.eu

Overview Repositories 4 Discussions Projects Packages People

README .md

Welcome to the COMPASS Github organization

The HORIZON-COMPASS GitHub organization contains the outputs of the COMPASS project funded under the European Union's HORIZON RIA programme. COMPASS (COMpound extremes Attribution of climate change: towardS an operational Service) aims to develop a harmonized, yet flexible, methodological framework for climate and impact attribution of various complex extremes that include compound, sequential and cascading hazard events.

- [COMPASS open research repository](#) for datasets and public deliverables from the project on Zenodo
- [COMPASS Github repository](#) (this page) for the code developed
- [Upcoming webinars and events](#)

For more information, visit the project website: <https://compass-climate.eu/>, join the [COMPASS community](#) or contact us at info@compass-climate.eu

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COMPASS

COMPASS-climate
Public group



zenodo

COMPASS - COMpound extremes Attribution of climate change: towardS an operational Service

Part of EU Open Research Repository <https://compass-climate.eu/> Project
Deltares ROR and 5 more organizations

COMPASS

Compound extremes attribution of climate change: towards an operational service

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