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Poster link

ICARIA: IMPACTS OF COMPOUND STORM AND FLOODING EVENTS IN A MOUNTAINOUS REGION

Website link

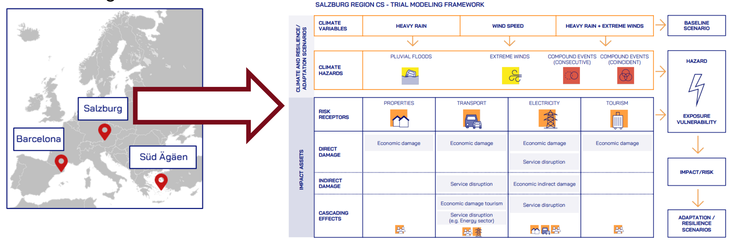
INTRODUCTION

ICARIA (Improving ClimAte Resilience of crItical Assets)
Promotes the definition and use of a **holistic asset-level modelling framework** for understanding:

- potential **multi-hazard risks/impacts** posed by **compound events** (including cascading effects) on critical assets (i.e., infrastructures) and services;
- provide insight into cost-effective means of mitigating hazardous events through the application of suitable and sustainable adaptation measures

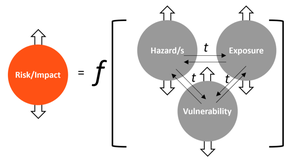
COMMUNITY OF PRACTICE (COP) - SALZBURG

Group of significant and diverse stakeholders that may be relevant to address an issue and may be available to share and join experiences and skills for embracing shared challenges.



CLIMATE RISK/IMPACT

When modelling the risks/impacts within a region, it is important to recognise that the **hazard landscape is dynamic**, where the characteristics (including exposure and vulnerability) of a region that can influence the magnitude, duration and likelihood of a hazard **may change over time**.
Furthermore, these characteristics can also change in response to a hazard event.



Expanded risk/impact equation (Gil et al., 2021).

DATA

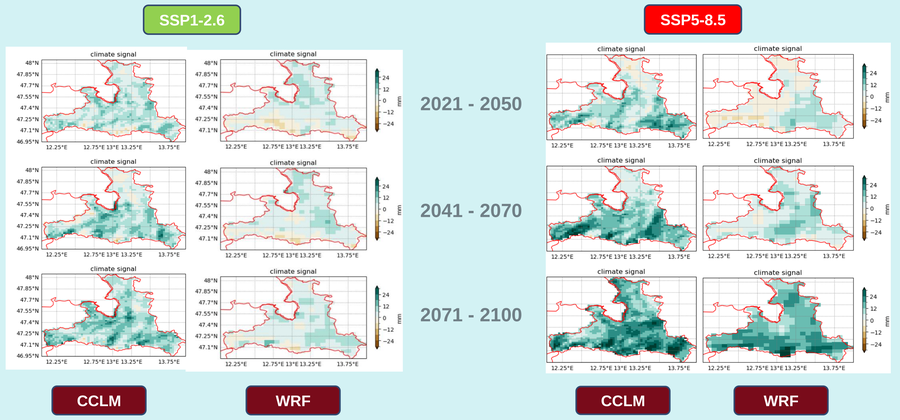
The created **data is open source** and can be found on **zenodo**::

Bügelmayer-Blaschek, M., Hasel, K., & Gazzaneo, P. (2025). ICARIA: dynamically downscaled climate projections using two regional climate models [Data set]. Zenodo. https://doi.org/10.5281/zenodo.14937418

Models, Data & Scenarios
· WRF (MPI-ESM1-2-HR) · COSMO-CLM (EC-Earth3-Veg) · SSP1-26 · SSP5-85 · 1981 - 2100
Verifikation: · CHELSA reanalysis (1km x 1km daily resolution)

RESULTS - Maximum precipitation in 1 day (RX1day)

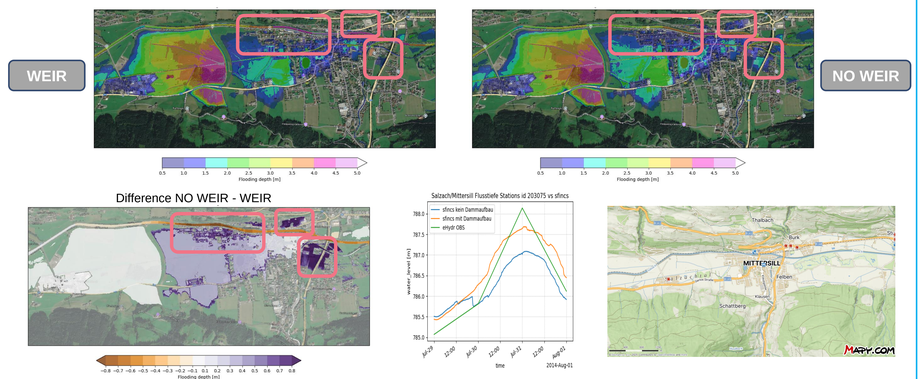
While the scenario SSP1-2.6 shows only minor changes in the climate change signal for the Cosmo-CLM model and nearly none for the WRF model, both climate models show a significant rise in the maximum precipitation in 1 day for the scenario SSP5-8.5 indicating an increase in extreme precipitation, especially for the mid- and far future period



RESULTS – Flood depth maps

For the hazard fluvial flooding the SFINCS model is used (Eilander et al 2025). As a first step, also for calibrating the model, historical events are simulated and compared to in situ waterlevel measurements. Adaptation measures like weirs and their influence on the hazard can be simulated (Figures right). The creation of such scenarios allow a cost-benefit analysis in the asset-level modelling framework.

Eilander, D., de Goede, R., Leijnse, T., van Ormondt, M., Nederhoff, K., & Winsemius, H. C. (2025). HydroMT-SFINCS (v1.2.0). Zenodo. https://doi.org/10.5281/zenodo.15270197



RESULTS – Compound / Consecutive Event

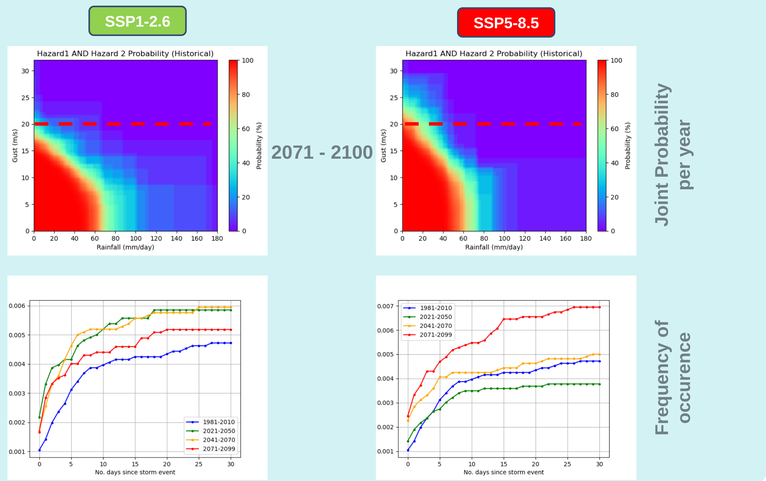
The Joint Probability of a compound event per year for the scenarios SSP1-2.6 and SSP5-8.5 for Mittersill in the Pinzgau region (Salzburg) during the period 2071 – 2100 (top).

The following thresholds have been used:

- Wind Gusts 20 m/s (72 km/h)
- Daily Precipitation sum 20 mm

Increase in the Joint probability for wind gusts with 20 m/s and a daily precipitation sum of 20 mm in the SSP5-8.5 compared to the SSP1-2.6 scenario (top Figure, dashed line).

Increase in the frequency of occurence for the far future period in the SSP5-8.5 compared to the SSP1-2.6 scenario (bottom Figure).



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