

COST Action CA19109 “MedCyclones” – Working Group 3**Deliverable D3.1**

White paper addressed to Action members and stakeholders, about Mediterranean cyclone impacts on the regional climate and the environment, including future perspectives

04 November 2022

After several discussions during WG3 meetings, it has been agreed to prepare a scientific paper, instead of a white paper as originally planned, since the contributions of the participants who have been progressively involved, seemed already mature enough. Therefore, a scientific paper has been prepared and will be submitted before the end of the year, addressing the **“Socioeconomic impacts of Mediterranean cyclones in a changing climate”**.

The paper will be submitted to Nature reviews earth and environment (IF 13.32), an online journal publishing high-quality review articles across the entire spectrum of Earth and Environmental Sciences. This will assure the effective dissemination of this work among not only Action members and stakeholders, but also researchers and other potentially interested communities internationally.

The aim of this scientific manuscript is contributing to go beyond the current state of knowledge regarding the impacts of Mediterranean cyclones, to efficiently design integrated responses toward climate change impacts, by providing a revision of existing knowledge regarding the socio-economic impacts of MedCyclones in the Mediterranean. As a consequence of this collaborative effort, the main knowledge gaps in the societal impacts of cyclones in the Mediterranean are identified, and the vulnerability of the main socio-economic sectors is assessed.

The draft of the paper may be consulted here:

https://docs.google.com/document/d/1TAhNq-10XTPdyqK_UTQmBJ5I1AanZFmj/edit

Ongoing Research Activities

One of the main goals of WG3 is the support of novel scientific initiatives to contribute to the improved knowledge of Mediterranean cyclones and their consequent impacts. The study of Mediterranean cyclone impacts is progressing in the Action framework through the following research initiatives:

1. Mediterranean cyclones and lightning (lead: Prof. David Schultz)

The group involves about 20 scientists with expertise on convection and lightning activity and led by prof. David Schultz. A MedCyclones Lightning Group meeting was organised on 27 October 2022. The initiative is expected to lead to tools that could potentially homogenise lightning activity modelling and visualise relative risk towards accommodating the needs of meteorological services and early warning systems.

2. Impact of cyclones on dust mobilization and transport (lead: Dr. Jonilda Kushta)

This initiative, led by the Cyprus Institute, is oriented towards the study of specific cases of Mediterranean cyclones and associated dust events. The first case study is the Ianos Mediterranean tropical-like cyclone. It was considered of high priority to first assess the impact of wind data assimilation on model performance.

3. ImCyCoast: Impact of cyclones on the sea state and coastal flooding (lead: Dr. Christian Ferrarin)

This initiative is strictly related with WG1 Model Intercomparison initiative, since it exploits simulation outputs provided by different modelling systems. This initiative aims at investigating the response of coastal sea level (storm surge) and sea state (waves) to Mediterranean cyclones. As a first step, Medicane Ianos has been considered as a case study, but other events will be considered later (e.g. Zorbas). A scientific paper presenting the results was submitted in September to Nat. Hazard Earth Sys. Sci.

4. Review on the socio-economic impacts of Mediterranean cyclones (lead: Dr. Samira Khodayar)

The group aims to summarize all knowledge gained in the last decades regarding the socio-economic impacts of Mediterranean cyclones and identify existing gaps highlighting future perspectives on this subject in a review paper.

5. Preparation of an impact database in the Mediterranean (lead: Dr. Samira Khodayar and Dr. Stavros Dafis)

This initiative aims at creating an open-access freely available databases or access to related information. This action will take place in collaboration with the European Severe Storms Lab (ESSL), European Flood Fatalities (EUFF), and similar initiatives around the Mediterranean.

Future Perspectives

1. An improved knowledge about the intrinsic relationship between Mediterranean cyclones and high-impact weather is needed. In this context, the state of the art suffers from the **lack of systematic quantification of cyclones' contribution to Mediterranean high-impact weather** (Flaounas et al. 2022).

2. The **need to step from hazard forecasts** (such as heavy rainfall, wind gusts, etc.) **to impact-based forecasts** is essential (Taylor et al., 2018; Zhang et al., 2019).



MedCyclones

**CA19109 | European network for
Mediterranean cyclones in weather and climate**

3. New research lines on the socio-economic impacts of Mediterranean cyclones e.g. in relation to wildfires.

4. Mapping stakeholders and establishing a close relationship is of primary importance for an efficient co-definition and co-design of needs and tools.

