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Predictability of large scale drivers leading intense Mediterranean cyclones

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Windstorms, extreme precipitations and instant floods seems to strike the Mediterranean area with increasing frequency. These events occur simultaneously during intense tropical-like Mediterranean cyclones. These intense Mediterranean cyclones are frequently associated with wind, heavy precipitation and changes in temperature, generating high risk situations such as flash floods and large-scale floods with significant impacts on human life and built environment. Although the dynamics of these phenomena is well understood, little is know about their climatology. It is therefore very difficult to make statements about the frequency of occurrence and its response to climate change. Thus, intense Mediterranean cyclones have many different physical aspects that can not be captured by a simple standard approach.

The first challenge of this work is to provide an extended catalogue and climatology of these phenomena by reconstructing a database of intense Mediterranean cyclones dating back up to 1969 using the satellite, the literature and reanalyses. Applying a method based on dynamical systems theory we analyse and attribute their future changes under different anthropogenic forcings by using future simulations within CMIP framework. Preliminary results show a decrease of the large-scale circulation patterns favoring intense Mediterranean cyclones in all the seasons except summer.