**"Rossby waves, heatwaves and compound extreme events”**

ABSTRACT – Poster presentation

Visual verification of a Machine Learning detection algorithm for Heat Waves on Lake Como

**Antonello Squintu**, Ronan Mc Adam, Cesar Pelaez Rodriguez, Jorge Perez Aracil, Carmen Alvarez Castro, Enrico Scoccimarro

Heatwaves heavily affect European public health, society and economy. A full understanding of the drivers behind the occurrence and intensity of heatwaves (HW) is one of the priorities of H2020 CLimate INTelligence (CLINT) project. A Machine Learning (ML) model is trained, employing ERA5 reanalysis summer data in the period 1980-2011. Data are pre-processed, identifying for each variable geographical clusters that show similar variability in the anomalies of the variables themselves. The training is repeated several thousands of times and in each of these rounds a set of features is selected making use of the Coral Reef Optimization (Salcedo-Sanz et al., 2014). This allows to identify which clusters of each variable are relevant for the identification of a HW and in which range of lag times. The clusters that appear more often are selected as candidate drivers for a data driven detection of HW. The area of Lake Como is taken as a case study, with the aim to verify how the candidate drivers behave in relation to HW that took place in the testing period of 2012-2022. At the same time, it is checked the eventual occurrence of a HW (in terms of Heat Wave Index) after noteworthy signals displayed by one or more of the drivers. This analysis has the purpose to verify the solidity of the data-driven method, so that it can be transposed to climate projections until 2100. In this perspective, the method is currently under experimentation on climate historical simulations which are part of CMIP6, testing whether the models reproduce the same patterns detected in ERA5 reanalyses or they perform differently.

Salcedo-Sanz, S., et al. "The coral reefs optimization algorithm: a novel metaheuristic for efficiently solving optimization problems." *The Scientific World Journal* 2014 (2014)