PhD project: Nicola Scafetta

Climate change and natural climate variability and cycles

Since the pre-industrial period (1850-1900) the global surface temperature has increased by about 1°C. However, correctly interpreting the physical causes of the global warming trend of the 20th century is still an open issue that needs to be urgently solved. In fact, in the light of the long-term evolution of the climate system there are concerns about whether the observed warming trend could be part of natural climate variability or whether it is linked only to increased anthropogenic emissions of greenhouse gases in the atmosphere, as the Global Circulation Models have always interpreted. Solving this problem has important consequences because if the natural climate variability is currently overlooked, the present climate model projections for the 21st century would be erroneously alarming.

The proposed study requires careful comparative statistical analyses of the climatic reconstructions of the past and of the climate records to identify common patterns of natural climate variability. Furthermore, identify the climatic patterns that could be associated with specific cycles are particularly important because they could in principle be associated with a number of possible astronomical forcings and because they could be easily used for accurate forecasts.

The aim of this project is (1) to study climate proxy records and temperature records to determine whether a common set of harmonics could be identified and whether these harmonics could be astronomically induced, (2) to study the global climate simulations obtained by the current Global Climate Models to determine whether they are able to properly reconstruct the observed natural variability, and (3) to attempt to develop optimized empirical models for better forecast climate change.