Atlantic Variability and Predictability
Changes in Atlantic sea surface temperature have the potential to influence coastal and inland climate variability (e.g. fishery). Efforts at BSC-ES deal with better understanding its predictability sources and impacts.

Summary

Nowadays the ocean is no longer seen as a passive agent suffering the changing weather, but as an integrator of it that feedbacks onto the atmosphere and indeed provides memory to the system thanks to its longer persistence.

The Atlantic Ocean is a complex water mass system that largely contributes to weather and climate conditions in the surrounding continents, particularly in the tropical band and at middle-to-high latitudes. Its variability ranges multiple timescales.

At short term, seasonal-to-annual, variations in the tropical Atlantic are dominated by the Atlantic Niño - leading variability mode of sea surface temperature (SST) anomalies in this region. The first-order dynamical impact on the North Atlantic is through the atmospheric teleconnection, which is crucial for its predictability. Many scientific questions concerning these linkages and their simulation remain however unresolved to date.

At long term, annual-to-decadal, the ocean dynamics gains special relevance. The wide SST signature of the North Atlantic multi-decadal variability, driven by long-term changes in the thermohaline circulation, is a key important feature of the global climate system. Its predictability is more challenging due to the scarcity of observational data. Likewise, the AMO-AMOC relationship is still controversial.

Objectives

Under different national (RESPONS, DANAE) and international (FP7 PREFACE, H2020 DPETNA) projects, BSC-ES tries to advance the understanding of the reasons for its variability and predictability. The main research topics are:

- Investigate the causes of model biases and work towards their elimination
- Gain dynamical insights into the mechanisms underlying variability and impacts
- Improve seasonal-to-decadal forecasts of Atlantic SST and related phenomena