Climate modelling

Climate modelling in INTAROS is focusing on data assimilation into models of the climate and the global ocean and the use of observational data for improving climate prediction. The basic challenges of climate prediction are explained in the CLIMATEUROPE project (www.climateurope.eu). Climate prediction has been a central research theme in climate science for the last thirty years. The reason behind the interest is twofold. On the one hand, a growing need has emerged from a range of stakeholders including public decision makers, (re)insurance companies, the tourism industry and the agricultural sector etc., to benefit from more accurate climate information at time scales ranging from a month to a decade into the future, a range where management and relatively short-term (up to a few years) planning is crucial. On the other hand, the scientific development behind S2D prediction benefits from progress in both weather forecasting and long-term climate change assessment, covering a wide range of topics.

The feasibility of climate prediction largely rests on the existence of slow, and predictable, variations in the soil moisture, snow cover, sea-ice, and ocean surface temperature, including how the atmosphere interacts and is affected by these boundary conditions.

The initialisation of the models is the first critical stage to be addressed in climate prediction. This means including information about the state of the atmosphere, ocean, sea-ice cover, snow, soil moisture, etc. which must be included in order to phase-in the model with the best estimate of state of the climate system at the start date of a forecast. (Fig. x)

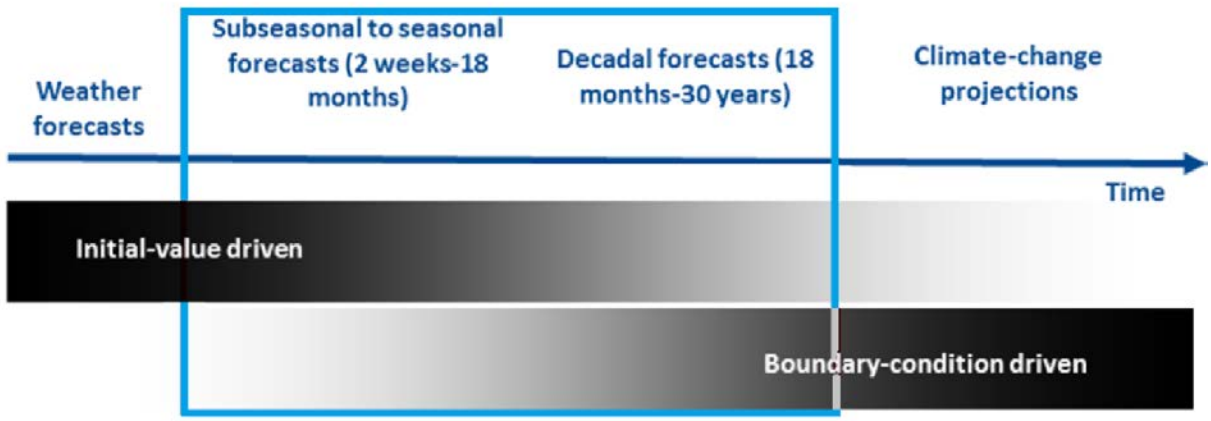

Figure x Schematic illustrating the progression from initial value problems with daily weather forecasts at one end, and multi-decadal to century projections as a mainly forced boundary condition problem at the other, with sub-seasonal, seasonal and decadal prediction in between. Adapted from Meehl et al. (2009).

For INTAROS, this gives the opportunity to improve model initialisation by observational data from the Arctic. Novel INTAROS observations will benefit the climate prediction and climate services community, especially through an improved accuracy of initial conditions towards more skilful climate prediction. Work aims at assessing the impact of Arctic observational data on climate prediction by e.g. analysing retroactive prediction experiments with limited access to observations and by evaluating skill improvements due to novel INTAROS observational data sets of ocean and land.

INTAROS observational data provision covers sea-ice properties, ocean temperature, snow thickness, and Meteorological and hydrological conditions. The most relevant information for improving climate prediction from an Arctic perspective is better representation of specific geographical key areas and enhanced realism of meridional temperature gradients (land-sea coast, sea-ice edge). Prediction skill can be expected to improve by triggering inter-regional interaction between the Arctic and oscillation patterns such as the NAO, with a direct impact on our ability to predict the climate of Europe and the Arctic.