

The utility of long-term reconstructions with regional climate/earth system models

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Ideally, regionally climate/earth system models describe at the same time the joint development of not only the limited area meteorology, but also the dynamics of marginal seas, of the hydrology of catchments and the transport and transformation of chemical substances of interest. Even though such models are presently hardly coupled together but run in sequence, they allow for the construction of considerable useful knowledge. Apart of sensitivity studies, on the impacts of changing external conditions, scenarios of possible futures, short term forecasts, analysis of the present state and change, such models may be used to describe homogenously (i.e., with (cyclo)stationary errors) the actual development in the past decades.

A number of such “multi-decadal reconstructions” have been done at GKSS, dealing with such diverse issues as assessing the success of out-phasing the usage of lead in gasoline, the formation of Polar Lows and changing ocean wave conditions.

The methodology, which includes the application of a large-scale constraint, is briefly described, the skill in reproducing the real conditions is examined and a series of examples presented.