What would happen if we were to stop fishing in the North Sea? - a model ensemble approach

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The need to understand marine ecosystems has led to the development of a number of different complex models that attempt to represent the dynamics of these systems in a detailed mechanistic way. These models can be used to simulate large-scale experiments and to make forecasts about the fate of marine ecosystems under different scenarios in order to advise management decisions. Systematic discrepancies and uncertainties lead to different models giving different predictions under these scenarios. This is further complicated by the fact that the complex models may not be run with the same species or functional groups, spatial structure or time scale. That said, it is often the case that these models have shared biases as well as their individual biases. We describe an approach in which we construct a flexible statistical model of the relationships between a collection or `ensemble' of mechanistic models and their biases, allowing for structural and parameter uncertainty and for different ways of representing reality. Using this statistical meta-model, we can combine model estimates and direct observations in order to make coherent predictions of future outcomes under different scenarios with robust measures of uncertainty. In this talk we will present the modelling framework and discuss an example that examines what would happen if we were to stop fishing today.

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