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The analysis and calibration of decadal forecast may well take the form of a rigorous Bayesian statistical analysis. In the ideal scenario where a multi-model ensemble produces decadal outlooks and a relation between model output and specific quantities of interests has been identified, statistical postprocessing may add information from other sources, either in the form of prior beliefs derived from on-going trends or forced but uninitialized experiments, or in the form of observations becoming available over time after the forecast has been issued. The Bayesian paradigm let us merge this kind of information with the models' forecast and produce posterior probability distributions of the quantities of interest.

I have presented an example of Bayesian analysis applied to the CMIP3 multi-model ensemble that produces joint PDFs of temprature and precipitation's future trends and changes. I have then shown an example of how this probabilistic information, derived at large scales and in the form of decadal means may be translated into "weather scenarios" for decision making at local, small regional scales. In this specific case the GCM-derived PDFs feed into a statistical downscaling model and subsequently into a hydrological model to study impacts of climate change on the management of a river basin in California.