Synthesizing Uncertainties

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Regarding its organization, CE is calling for contributions from several scientific disciplines. Regarding its methodology, CE will have to be based heavily on simulation modeling. A main point is that these two aspects are interdependent. More precisely, we want to address how (different) uncertainties get, or should get, synthesized when different simulation models get coupled.
Here, two issues interfere. The first is uncertainty in a conceptual sense, i.e. what are relevant types of uncertainty? The second is about the technical dimension: How can or should we deal with uncertainty when different simulation models get coupled, each bringing in their uncertainties? Our contribution will address these questions in three steps.
(i) Three types of uncertainties will be distinguished: risk where we already have in hands a probability distribution. Second, there is uncertainty, or uncertainty proper, where the location and reasons of uncertainty are known, but cannot be estimated quantitatively. Third, we have deep uncertainty where there is missing knowledge about the actual reasons for uncertainty.
(ii) In a sense, uncertainties seem to proliferate and the question then is what kind of result or statement can be upheld without a cloud of caveats around it. Robustness arguments can support statements that seem to be more certain than their conditions are. However, robustness arguments are also limited. We will argue about the power and the limitations of robustness.
(iii) The third part will draw lessons from the conceptual analysis. We will focus on pitfalls of integration, i.e. particular dangers of misapprehending uncertainties when integrating simulation models. Our analysis will use integrated assessment models as an example that has relevant similarities to climate engineering. This study will give us opportunity to discuss whether integrated models are synthesizing uncertainties or whether they are making uncertainties disappear.