



The probabilistic tolerable windows approach

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The integrated assessment of climate change (IA) aims to consider the whole chain of cause-and-effect of climate change. Since uncertainty is ever-present in this chain, it needs to be taken into account explicitly. The Tolerable Windows Approach (TWA), one approach in IA, is extended to a probabilistic approach in order to consider some of the uncertainty explicitly.

The TWA excludes undesirable impacts of climate change by setting constraints that limit these impacts, so-called guardrails, and subsequently it determines the maneuvering space humanity has if these undesirable impacts are to be avoided.

Uncertainty about climate change that either arises through the natural variability of climatic variables or can be expressed as a probability distribution of uncertain parameters leads to probability distributions of experiment outcomes. This also implies that it is no longer possible to determine the consequences of a particular climate protection strategy with certainty. Instead, uncertainty leads to a probability of violating the guardrails.

The probabilistic TWA can take these uncertainties into account explicitly. It will be demonstrated by applying it to the European Union's target of limiting climate change to a warming of less than 2°C.