Geophysical Research Abstracts
Vol. 16, EGU2014-16509, 2014
EGU General Assembly 2014

Uncertainty Quantification in Geophysical Sciences (Lewis Fry Richardson Medal Lecture)

Olivier Talagrand
Laboratoire de Météorologie Dynamique, École Normale Supérieure, Paris, France

Uncertainty is ubiquitous in science to some degree, and so is the need for quantifying it. This may be especially true of geophysical sciences, concerning in particular prediction of events of potential major consequences in, e.g., seismology, vulcanology, climatology or meteorology.

A review will be made of the various methods that are used in geophysical sciences for quantifying uncertainty, especially in the context of prediction. The strong nonlinearity and chaotic character of many of the physical laws that govern the evolution of the systems of interest significantly complicates the situation.

From a directly practical point of view, ensemble methods, in which the uncertainty on the state of the system of interest is described by a set of points in the corresponding state space, are developing rapidly. These methods and their performance will be presented, together with a number of questions they raise : prior identification of uncertainties, objective validation, dimension of ensembles and cost efficiency, limitations.