Variational Methods for Sensitivity Analysis and Parameters Estimation in Hydrology

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The varaitional approach for the assimilation of data provides a Framework to link together models, data, statistics and all the available information on a given episode. The result of the formultion is so-called Optimality System (Euler-Lagrange équation) in which all these ingredients appear.

Sensitivity Analysis is an important tool for modeling in hydrology, it permits to evaluate the answer of the system to perturbation and give some idea about the propagation of uncertainties. In this talk we will see how to apply sensitivity analysis iusing variational methods. They have to be applied not directly to the model but to the Optimality System.

All these developments will be illustrated with the models MARINE and TOPMODELS with applications to real data.