Efficient algorithms to simulate data patterns in geosciences

Grégoire Mariéthoz*[1]

[1]University of Lausanne – Suisse

Résumé

The last years have seen ever-increasing remote sensing capabilities and improved numerical models that feed our understanding of Earth surface processes. However, it appears that all such data have intrinsic limitations: any acquisition procedure, no matter how sophisticated, is limited by sensor constraints (e.g., coverage, resolution, frequency), and numerical models are challenged for predicting the state of the environment under a changing climate. Addressing these limitations calls for increasing the data harvesting capability, which is often not possible.
This talk will provide a survey of models and algorithms that palliate this lack of exhaustive measurements in geosciences. In particular, geostatistical tools can be used to stochastically generate unmeasured data about a studied process, which ideally should be statistically indistinguishable from the truth. This is enabled by new multiple-point approaches that extract training information from analogues. An important aspect is that large data requirements are accompanied by large computational costs, which need to be addressed with efficient algorithms and cloud computing. Recent simulation algorithms will be presented, along with 1D and 2D geoscience applications.

*Intervenant