

Best geoscience approach to complex systems in environment

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The environment is a social issue that continues to grow in importance. Its complexity, both cross-disciplinary and multi-scale, has given rise to a large number of scientific and technological locks, that complex systems approaches can solve.

Significant challenges must met to achieve the understanding of the environmental complexes systems. There study should proceed in some steps in which the use of data and models is crucial:

- Exploration, observation and basic data acquisition
- Identification of correlations, patterns, and mechanisms
- Modelling
- Model validation, implementation and prediction
- Construction of a theory

Since the e-learning becomes a powerful tool for knowledge and best practice shearing, we use it to teach the environmental complexities and systems.

In this presentation we promote the e-learning course dedicated for a large public (undergraduates, graduates, PhD students and young scientists) which gather and puts in coherence different pedagogical materials of complex systems and environmental studies.

This course describes a complex processes using numerous illustrations, examples and tests that make it “easy to enjoy” learning process. For the seek of simplicity, the course is divided in different modules and at the end of each module a set of exercises and program codes are proposed for a best practice.

The graphical user interface (GUI) which is constructed using an open source Opale Scenari offers a simple navigation through the different module.

The course treats the complex systems that can be found in environment and their observables, we particularly highlight the extreme variability of these observables over a wide range of scales. Using the multifractal formalism through different applications (turbulence, precipitation, hydrology) we demonstrate how such extreme variability of the geophysical/biological fields should be used solving everyday (geo-)environmental challenges.