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Computer techniques of complex systems for education in geoinformatics

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The studies and applications of complex systems (CS) in the last decades have gained a great level of importance for dealing with physical, geophysical and even social problems. The field of CS encompasses the use of different and special computer techniques, among which we can mention: chaos theory, fractals, cellular automata, etc. The CS approach has become a useful tool for modeling the behavior of many geophysical phenomena. These comparatively modern techniques, although not completely accepted or understood by many researchers in Earth sciences, offer a different point of view and an interesting alternative in the description and understanding of many natural phenomena.

At present, the scientific literature related to geophysical research, shows useful and interesting results owing to the application of the above mentioned techniques. Therefore, in our opinion, the inclusion of CS concepts and techniques in the curricula of geophysical studies will help students and young researchers to see natural phenomena from a more realistic way, that is, they will learn that Nature behavior in many cases is not completely deterministic neither totally random.

The purpose of this contribution is to emphasize the importance of considering the use of the complex systems approach in the formation of students in the areas of geophysics and geoinformatics. To that end we present in this paper some examples of environmental problems based on the use of time-series or data provided by digital images of the Earth acquired by remotely sensors. The computer analysis by using techniques or models based on complex systems approach allows us to retrieve useful information.

In summary, we strongly believe that the teaching of the complex systems techniques, accompanied with the use of some of the many scientific software packages in the commerce, the students of geophysical sciences will be better equipped to discuss, explore and apply these tools to solve some of the challenging problems of our planet.