



IL MIO VOLER CERCAR
OLTRE LA META

INTERNATIONAL SCHOOL OF SPACE SCIENCE

L'Aquila - ITALY

Web School on: Dynamical Systems and Machine Learning Approaches to Sun-Earth Relations

1-5 February 2021

Programme and Lecturers

DYNAMICAL SYSTEMS AND TURBULENCE

R. Benzi - University of Rome "Tor Vergata", Roma, Italy
Introduction to dynamical systems in physics

V. Carbone - University of Calabria, Cosenza, Italy
Turbulence in space plasmas

R. Donner - Hochschule Magdeburg-Stendal, Germany
Recurrence Quantification Analysis Approaches to complex systems dynamics

T. Alberti - INAF/IAPS, Roma, Italy
Dynamical systems approaches and chaos in Sun-Earth's relations

MACHINE LEARNING

M. Piana - University of Genova, Italy
Machine Learning and Flare forecasting

C. Campi - University of Genova, Italy
Machine Learning Methods in Space Weather

D. Del Moro - University of Rome "Tor Vergata", Roma, Italy
Hands-on session on Machine Learning Techniques

G. Salina - University of Rome "Tor Vergata", Roma, Italy
An Introduction to Machine Learning Methods in Physics

COMPLEXITY, ENTROPY AND INFORMATION THEORY

G. Consolini - INAF/IAPS, Italy
Dynamical Complexity in the Earth's Magnetospheric Dynamics

G. Balasis - NOA, Greece
Entropic Measures and magnetospheric dynamics

P. De Michelis - INGV, Roma, Italy
Turbulence and scaling features in the ionospheric dynamics

S. Wing - JHU-APL, USA
Information Theory approaches to Sun-Earth's System

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SCHOOL SECRETARIAT

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THE DIRECTOR OF THE SCHOOL

U. Villante

SCHOOL RATIONALE

The dynamics of the Sun strongly affects the interplanetary and circumterrestrial environment, causing phenomena that have a great impact on the anthropic activities. In the past, the response of the Earth's magnetosphere-ionosphere system to the changes of the solar wind and interplanetary conditions due to the solar activity has been widely investigated showing that the dynamics of the coupled solar wind-magnetosphere-ionosphere (SMI) system resembles that of a complex system displaying scale invariant features, turbulence and a near-criticality behaviour. On the other hand, in the framework of dynamical systems several new tools and methods have been proposed to quantify and characterise the dynamical complexity and its role in nonlinear out-of-equilibrium dynamical systems.

Furthermore, the modelling of the complex dynamics of the SMI system, as such as some features of the solar activity has been shown to benefit from the recent advances in the field of machine learning techniques.

The course is devoted to young researchers and PhD students and will provide an introduction and an overview of the recent theoretical, numerical and data analysis advances in the framework of dynamical systems and machine learning approaches to the characterisation and the modelling of Sun-Earth's relations. The course will consist in theoretical lectures and laboratory exercises.

GENERAL INFORMATION

The School will be held online. Applications, including a brief curriculum vitae, are due before November, 29, 2020. See the website www.cifs-iss.org/application.asp for details.

The fee is of 200 Euro. Some financial support will be available for a limited number of students on request.

Applications will be evaluated by the Scientific Committee of the International School of Space Science. All applicants will be notified by e-mail.

