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Dealing with the Earth's ionosphere's complexity

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The Earth's ionosphere is a composite system of several charged chemicals, both ions and electrons, dynamically conditioned by the important ionizing factors determining its existence, and by the forces exerted on them: in particular, the solar UV radiation (main ionizing factor) and the forces due to the geomagnetic field, gravity and the massive neutral matter containing them. Hence, Ionospheric time and space variability is essentially driven by the concurrence of all these forcing factors, imprinting ionosphere's tempos with their ones. The characteristic times of the Sun-Earth relative kinematics and geometry are recognizable in the Ionospheric variability, but these forcing factors do not just superimpose, and give rather rise to a complicated non-linear composition of causes into Ionospheric effects. This non-linear composition results in a complex behavior both in terms of space structures and time evolution: indeed, on one hand large scale Ionospheric patterns evolve on a quasi-periodic basis, as those systems following strange trajectories in their phase space; on the other hand, local Ionospheric proxies (fields, velocities and densities) are irregular, resembling rather turbulent signals than smooth profiles. In few words, this all is Ionospheric complexity. Ionospheric complexity must be dealt with in modeling Ionospheric effects on positioning, navigation and telecommunication. In this talk, aspects of Ionospheric modeling centered on taking into account complexity will be discussed.

Biography

Massimo Materassi has completed his PhD from Perugia University and Post-doctoral studies from Space Research Centre in Warsaw. He is the Italian Representative in the Commission G "Ionospheric Radio and Propagation" of the International Union of Radio Science (URSI). He has published more than 30 papers in reputed journals and has been serving as a referee in different journals. His research is about both Applied Physics (Ionospheric physics and space weather, ecological models) and Pure Physics (fundaments of dissipation).

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