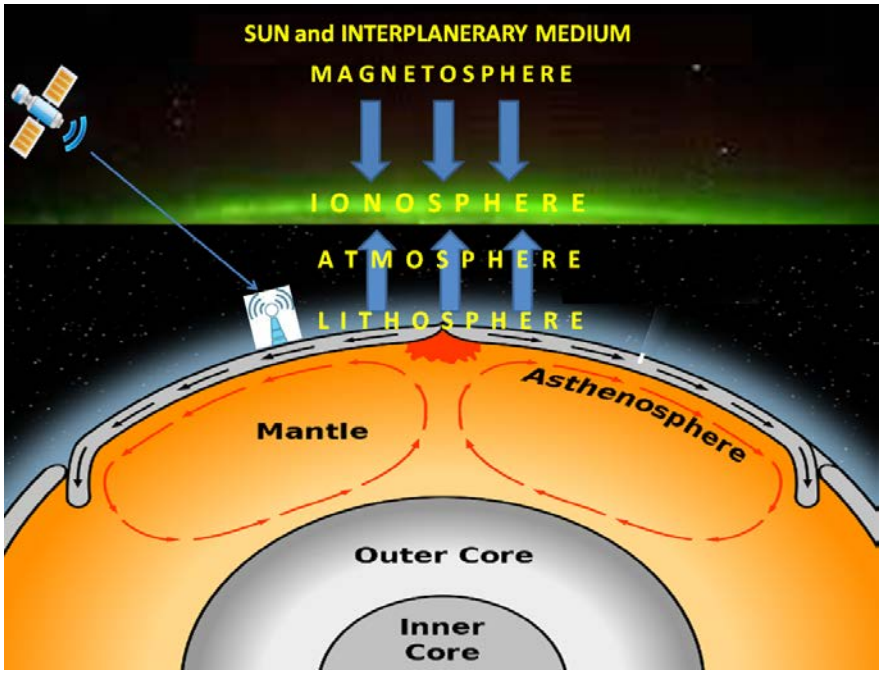
FIGA – 2019

Federation of Indian Geosciences Association

Second Triennial Congress-2019

13-16 October 2019, NGRI, Hyderabad, India

Focal Theme: Geosciences for sustainable development goals



Session title: Coupling between Earth system processes and its manifestation in the humanosphere

Session organized by Indian Institute of Geomagnetism

Navi Mumbai, India

Coupling between Earth system processes and its manifestations in the humanosphere

Main themes:

- Coupling processes within the solid Earth, Hydrosphere and Cryosphere
- Seismic imprints in Lithosphere-Atmosphere-Ionosphere coupled system
- Coupling processes in Geospace in response to the incoming solar energy
- Modelling and numerical simulations of various coupling processes in the Earth system and their implications for our future understanding of the humanosphere

Session Introduction:

The physical Earth system comprises of geosphere, hydrosphere, cryosphere, atmosphere, ionosphere and even magnetosphere. These subsystems are dynamic, intricately complex and divided, yet interconnected by various coupling processes. Consequently, continuous transfer of matter and energy taking place among these layers by various pathways (e.g. mechanical, chemical, thermal, EM). The energy that drives these processes comes mainly from the Sun and sources within the Earth. This session mainly focuses on some of the coupling processes in the Earth system having their manifestations in the humanosphere and that influence the human activities in appropriate spatio-temporal scales.

The Earth's core is hot and radiates heat, causing convection currents in the mantle, which in turn, cause movement of tectonic plates, resulting in mountain building, earthquakes etc. The electrical currents produced by the coupling of convective effects and rotation of the metallic outer core produce the Earth's magnetic field (convective dynamo). The magnetic field is extremely important for sustaining life in the humanosphere. Climate is yet another complex framework arising as a consequence of interaction between hydrosphere, cryosphere, atmosphere and solar radiation. Thus, we have a wide range of research aspects to cover the above, but confining to the magneto-hydro-dynamics, plate tectonics and interplate coupling, paleo and environmental magnetism, glacial isostatic adjustment, etc.

Far away from the Earth's surface, the solar wind, the magnetosphere and the upper layers of the Earth's atmosphere form a coupled system and this geospace is driven by the transfer of energy and momentum from the sun's solar wind to the magnetosphere and ionosphere. Variations in the solar wind energy can lead to the disruptions of space- and ground-based systems that are caused by enhanced currents flowing into and out of the ionosphere and magnetosphere. These studies immensely help in understanding the space weather phenomena in near Earth environment. Space weather forecast helps satellite communication (including navigation) and in mitigating the damage/ performance of the technological systems on Earth and in space.

On the other hand, the upper atmosphere is also disturbed by lithospheric disturbances e.g. earthquakes, tsunamis, volcanic eruptions, human activities (e.g. nuclear explosions) etc. In particular, the seismo-ionospheric perturbations that are readily observed in TEC and airglow can be monitored using both ground and space based optical and radio techniques and can be used as a proxy to study the coupling and energy transfer processes in the Lithosphere-Atmosphere-Ionosphere (LAI) coupled system. With the advances in monitoring ionospheric parameters, the ability to trace the earthquake- and tsunami-induced perturbations in the ionosphere had assumed great promise in recent years, with societal implications, in particular, in the area of tsunami warning (with better understanding on ocean-atmosphere coupling).

Various facets of this theme are multi-disciplinary and are expected to bring synergy across the Earth system scientists with allied scientific programs. We invite presentations relevant to the above mentioned themes dealing with experiments, data analysis, modeling and theoretical aspects that enunciate comprehensive understanding of the Earth system coupling processes.

Convener: S. Gurubaran

Co-Conveners: Gopi Seemala and Mala Bagiya

Participating Institutes: IIG, NGRI, NCPS, NIO, NIOT, INCOIS, NCESS, ISR, NCS

PRL, SAC, IITM, AIRS, GMRT(NCRA), IITs

Dibrugarh, Mumbai, Shivaji and Andhra Universities