

**First Circular – Workshop of the International Space Science Institute (ISSI)**

## **Coupling between the Earth's atmosphere and its plasma environment**

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**Date:** 27 September – 1 October 2010

**Context:**

Within its Earth Science Program from Space the International Space Science Institute (ISSI) will hold a Workshop that will be focused on the interrelation between the atmospheric and the plasma environments of Earth in view of promoting the understanding of the relation and interaction between these two separate space envelopes of our planet.

The topics of the Workshop will cover the physics of the terrestrial atmosphere and the transition from the atmosphere to the magnetosphere and possibly further out to the solar wind in as far as they are of relevance to the intention of the Workshop.

It is expected that the Workshop will illuminate common aspects of both these envelopes and their possible interrelations that may contribute to mutually affecting their parameters and dynamics both on short time scales and in the long-term trends.

## **Workshop objectives:**

Two environments of Earth permeate the near-Earth space: the Earth's atmosphere and the Earth's plasma envelope. The atmosphere extends out from Earth's surface up to an altitude of – very roughly – below ~1000 km. The Earth's plasma environment starts from altitudes – also very roughly – above ~50-70 km and stretches out far into space.

While the Earth's atmosphere forms – again very roughly – an about spherical shell around Earth, with its extended uppermost layer the thermosphere, the Earth's plasma environment is about spherical only at its bottom layer, the ionosphere. At altitudes above about ~1000 km it becomes completely ruled by the geometry and dynamics of Earth's magnetic field, forming a spatially inhomogeneous and asymmetric and temporarily highly variable envelope that, from mid- to low latitudes and geocentric distances below roughly ~4-5 Earth radii, forms the plasmasphere that is attached to the closed low latitude geomagnetic field lines. At high latitudes, on the open auroral and polar geomagnetic field lines, it connects to the magnetosphere and is subject to its violent dynamics.

Both Earth's envelopes are usually treated as separate entities. Their interaction has for long time and for historical reasons been considered only in the context of the physics of the ionosphere, with the atmosphere acting as the source of ionization that is due to solar UV irradiance plus a small contribution from occasional particle precipitation from the radiation belts and in the aurora.

The present Workshop intends to closer investigate the interrelationship between the two environments based on the increase of knowledge in both, atmospheric and plasma physics. In a manner of pioneering this widely unknown area it intends to bring together experts from both fields for mutual information and selecting areas that are promising for further investigation.

The goal of the Workshop is to find out up to what degree it can be expected that the dynamics of the atmosphere – and possibly even the climate – affect the dynamics and "climate" of Earth's plasma environment, contributing to Space Weather. Vice versa, it is the goal of the Workshop to identify those areas in which the plasma envelope of Earth may possibly affect the dynamics of the Earth's atmosphere, contributing to its chemistry, temperature structure and balance, and its radiative and absorptive properties as well as its long-term trends.

## **Product of Workshop:**

Following the Workshop, its output will be published as a volume in the *Space Science Series of ISSI* (SSSI) by Springer, in parallel with publication of the peer reviewed papers in one issue of the Springer journal *Space Science Reviews*. It is expected that the publication will contain a total of about 20-30 review style and scientifically high-quality papers, submitted to the usual refereeing process. The papers will be based on the presentations at the Workshop and will be moderated by the expected discussions. Participants are strongly encouraged to co-operate and join in writing common papers.

**Location:**

The Workshop will be held at the International Space Science Institute (ISSI), Hallerstrasse 6, 3012 Bern, Switzerland. The presentations will take place in the Lecture Hall on the second floor.

**Attendance:**

by invitation only, ~ 40 participants maximum.

**Funding:**

ISSI will provide the subsistence costs (hotel and meals) to all participants, exempting the travel costs.

**Young scientist program of ISSI:**

A number of young scientists, up to 5, can be invited to participate in the Workshop. Invited contributors may make suggestions to the Convenors (c/o Lennart Bengtsson and Rudolf Treumann) who will make the selection. ISSI will cover the subsistence costs (hotel and meals) to the invited young scientists.

**Schedule:**

Invitations and First Circular:	1 November 2009
Second Circular (if deemed necessary):	1 June 2010
Final Circular:	1 August 2010