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

6 August 2018

Understanding the Diversity of Planetary Atmospheres

Convenors

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Date: 12-16 November 2018

Objectives and Contents of the Workshop

Progress in understanding of atmospheric evolution on terrestrial planets and explosive development of exoplanetary science, suggest to reassess and generalize our knowledge from the Solar system to multiple worlds beyond. Analysing the atmosphere of an exoplanet is the only possible means to assess its habitability, because so far we have no other access to biosignatures, for instance at the surface. The goal of the present Workshop is to bring together planetologists, experts on aeronomy and escape, climatologists, and astronomers to look for commonalities among atmospheres of the Solar system, the only example we know reasonably well, and the atmospheres of planets around distant stars, which can be assessed only indirectly. The WS will summarise our knowledge of the atmospheres and their evolution, based on ground/space-based observations and modelling, and will address future space missions to characterize exoplanets' atmospheres and possibly find signatures of life there.

Several space missions have recently brought new insights about the atmospheres of the Solar system planets, such as Venus Express and Akatsuki on Venus, dedicated escape and atmosphere missions on Mars, MAVEN and ExoMars TGO, New Horizons and JUNO on outer planets. The exoplanet missions, flying and planned (Kepler, TESS), explore the transit method with advanced spectroscopic capabilities for atmospheres. This means that for a long time the focus will remain on atmospheres characterisation.

During the Workshop we aim first to address the diversity of observed planets, draw analogies to the Solar system planets, and review how an exoplanetary atmosphere can be constrained by observations. In the second part of the Workshop, the variety of processes bringing an

atmosphere from its formation to known end members will be addressed, including protoatmospheres, early evolution, geochemical cycles, and escape. Present-day processes in the atmospheres of Solar system (chemistry, circulation) and current understanding of the atmospheres at the planets on other stars, including special cases, will be discussed. The Workshop will conclude with future space missions, which are important for understanding of exoplanetary atmospheres.

The topics covered in the Workshop

- 1) Planetary diversity
- 2) Solar system giant planets
- 3) Spectroscopy of exoplanetary atmospheres
- 4) Formation of atmospheres an early evolution
- 5) Evolution of terrestrial planetary atmospheres
- 6) Atmospheric escape regimes
- 7) Chemistry of planetary atmospheres
- 8) Geochemical cycles
- 9) Atmospheric circulation regimes
- 10) Silicate atmospheres and Ultra Short Period (USP) rocky planets
- 11) Terrestrial exoplanets around red/small stars
- 12) Future observations of exoplanetary atmospheres

Product of the Workshop

Following the Workshop, its output will be published as a volume in the Space Science Series of ISSI by Springer, in parallel with the publication of the papers in a Topical Collection in Space Science Reviews. It is expected that a total of up to 15 high-quality topical review papers will result, to be submitted to the usual refereeing process and published in the book. The papers will be based on talks presented at the Workshop and will reflect the discussions that are encouraged to be held among the participants during the Workshop, with emphasis on interdisciplinarity.

Location

The Workshop will be held at the International Space Science Institute, Hallerstrasse 6, 3012 Bern, Switzerland. More information on: www.issibern.ch.

Attendance

By invitation only, ~ 40 participants maximum.

Funding

ISSI will provide the subsistence costs (hotel and a per diem to cover meals) to all participants, but not the travel costs. There will be no registration charge for the Workshop.

Hotel reservations

Block bookings have been made for the Workshop. All participants at the Workshop are requested to contact the ISSI secretary, Alexandra Lehmann (Tel. +41-31-631-4896, Fax: +41-

31-631-4897, email: alexandra.lehmann@issibern.ch), to indicating their arrival and departure dates and times, as well as any special requests they may have (e.g. double room). Please note that all hotel reservations have to be made by the ISSI Secretariat. The invitation letters for visas etc can also be obtained from the ISSI Secretariat.

Schedule

Formal invitations and First Circular	8 August 2018
Registration deadline	7 September 2018
Hotel deadline	26 October 2018
Second Circular and final program	26 October 2018
Workshop	12-16 November 2018