Workshop proposal to ISSI

Planetary Atmospheric Electricity

WS General Theme

Planetary Atmospheric Electricity on the solar system planetary objects: Generation and characteristics of electrostatic discharges in the solar system - Their role in the global electric atmospheric circuit

What can be learned from our understanding of the Earth case?

Topics

- Review of the lightning on the solar system planetary objects: detected (the Earth, Jupiter, Saturn, Uranus), to be confirmed (Neptune, Venus), non-detected (Mars, Titan) and others?
- Understanding of the electric general circuit of solar system planets
- Role of the cosmic ray, magnetospheric electrons and surface radioactivity

Topics (cont'd)

- Formation of large electric field by charge separation (inductive or non-inductive charge transfer in the Earth thunderstorms, Mars dust charging, Titan charging by absorption of free charge...)
- Convection pattern leading to large electric field (signature of atmospheric dynamics...)
- Potential breakdown (dependency with respect to pressure and composition...)

Topics (cont'd)

- Induced chemistry (production of non-equilibrium trace organic constituents, Titan HCN production...)
- Influence of the lightning on the magnetosphere
- Electromagnetic waves (optical emissions, high frequency radio emission, very low frequency plasma waves...)
- Ground based observations (LOFAR...) and Future space mission (Taranis...)

Timeliness and relevance to space science

- Recent Huygens mission highlights the possibility of lightning in Titan atmosphere
- Venus Express may also address this question

- A review on the main questions related to atmospheric electrification should also support the future Earth mission like Taranis (CNES)

Scientific Relevance

- Knowledge (models, observations) of the atmospheric planetary electrification of numerous solar system objects makes comparative studies very desirable and compelling

- The workshop will also highlight outstanding problems and areas in which progress remains to be made

WS Date & Structure

- End 2006 - Early 2007
- 4.5 days, 4 talks/half day, plenary sessions, no splinter sessions, no working groups

Proposed Convenors

- J.P. Lebreton (ESTEC/ESA)
- F. Leblanc (Service d’Aéronomie du CNRS/IPSL)
- P. Zarka (Observatoire de Paris – Meudon)
- K. Aplin (Rutherford Appleton Laboratory)