

# Planetary Atmospheres 2007

Baltimore/Washington Area  
6-7 November, 2007

*This workshop highlights the planetary atmospheres research enabled by the NASA Planetary Atmospheres program, facilitating communication between researchers and providing the opportunity for cross-disciplinary interaction. The main topics to be discussed include Atmospheres Around Solid Surfaces, Giant Planets, Comets, and Extrasolar Planets, with an emphasis on outstanding questions, future capabilities and critical needs. There will be ample time devoted to open discussion and to contributed research poster sessions.*

## Invited Speakers:

Sushil Atreya	Andrew Nagy
Neil Dello Russo	Mark Richardson
Tristan Guillot	Sara Seager
Ralph Lorenz	Adam Showman
Janet Luhmann	Bob West
Julie Moses	Kevin Zahnle

## Discussion Leaders:

Gordon Bjoraker	Bill Hubbard
Steve Bougher	Bob Johnson
Michael Flasar	Jim Kasting
Randy Gladstone	Carey Lisse
Caitlin Griffith	Glenn Orton
Joseph Harrington	Chris Russell

## Scientific Organizing Committee:

Don Banfield	David Huestis
Jay Bergstralh	Carey Lisse
Mark Bullock	Julianne Moses
Phil Crane (ex officio)	Adam Showman
Neil Dello Russo	Amy Simon-Miller
Heidi Hammel	

URL: <http://www.lpi.usra.edu/meetings/patm07>

# Meeting Overview

5 Nov. 2007

Philippe Crane

Nasa Headquarters

# Planetary Atmospheres in the Next Decade: A Look Forward

## Purpose:

Workshop will highlight the planetary atmospheres research enabled primarily by the NASA Planetary Atmospheres program. The overarching goal of the workshop is to facilitate communication between researchers and to provide the opportunity for cross-disciplinary interaction.

## Goals:

Enhance communication between planetary atmospheres researchers. Stimulate theoretical, laboratory, and observational activities in planetary atmospheric research in the next decade. Identify particular fields of critical interest if any.

# Format & Content

- Topic length: 40 mins talk + 20 mins discussion
  - The breadth of the talks argued for a longer presentation time, but we don't want to make the talks any longer than this or it will cut back too much on discussion
- Arrange talks in an order to enhance cross fertilization (limit self-segregation)

# Themes

- **Atmospheres Around Solid Surfaces**
- **Giant Planets**
- **Other topics: Extra-solar Planets, Comets**
- **Talk content includes:**
  - Focus on current outstanding questions
  - Look toward future capabilities
    - critical lab needs of the future
    - critical modeling needs of the future
    - critical data needs in the future

# **Atmospheres around Solid Surfaces**

## **Topics & Speakers**

**Mars, Venus, Titan, Icy Satellites, Comets (Earth as relevant to other Solar System bodies)**

- 1. Dynamics -- Mark Richardson**
- 2. Surface-Atmosphere interactions--Ralph Lorenz**
- 3. Atmospheric Evolution and Escape-- Kevin Zahnle**
- 4. Composition, Chemistry, and Structure-- Sushil Atreya**
- 5. Plasma Interaction effects -- Janet Luhmann**
- 6. Cometary Atmospheres-- Niel Dello-Russo**

# Atmospheres around Solid Surfaces: Topic Guidelines

## 1. Dynamics

1. Mars GCMs(strengths, weaknesses, outstanding questions)
2. Titan GCMs, 2D chemical-dynamical models
3. Venus(including super-rotation issues)
4. Io
5. Enceladus
6. Connections to terrestrial GCMs

## 2. Surface-Atmosphere interactions

1. Sputtering on icy satellites
2. Weathering on Mars, Venus, Titan and others
3. Aeolian processes on Mars, Titan, Venus, others
4. Volcanic Input to atmospheres of Mars, Titan, Venus, others
5. Geysers & plumes

## 3. Atmospheric Evolution and Escape

1. Various escape process and their effectiveness
2. Clues from chemical signatures
3. Early Earth and the implications for the origin of life

## 4. Composition, Chemistry, and Structure

1. Atmospheric chemistry on Mars, Titan, Venus, Io, Enceladus etc
2. Outstanding issues for the thermal structure
3. Aerosol formation and distribution
4. Laboratory, theoretical and observational needs

## 5. Plasma Interaction effects

1. Sputtering on icy satellites
2. Solar wind/magnetosphere/atmosphere interactions on Venus, Mars, Titan, Io etc
3. Ionospheric chemistry, structure, dynamics, thermo-ionosphere coupling

## 6. Cometary Atmospheres

1. Comet coma composition (volatiles and dust)
2. Coma modeling
3. Molecular fluorescence models of coma constituents
4. Comet coma/solar wind interactions
5. Laboratory studies relevant to comets

# Giant Planets: Topics & Speakers

Jupiter, Saturn, Uranus, Neptune, Extra-solar Planets

7. Dynamics-- Adam Showman
8. Composition and Chemistry-- Julie Moses
9. Thermal Structure and aerosols-- Bob West
10. Upper atmospheres/ aeronomy-- Andy Nagy
11. Interiors and Origins -- Tristan Guillot
12. Atmospheres of Extra-solar Planets -- Sara Seager

# Giant Planets Topic Guidelines

## 7. Dynamics

1. *Interior*
2. *Troposphere*
3. *Stratosphere/mesosphere*

## 8. Composition and Chemistry

1. Troposphere
2. Stratosphere/Mesosphere (thermosphere/ionosphere for #4)
3. Laboratory/theoretical/observational needs

## 9. Thermal Structure and aerosols

1. What is known(and how) of thermal structure of troposphere, stratosphere/mesosphere, thermosphere;
2. Strengths and weaknesses of observational methods
3. Radiative-seasonal climate models
4. Coupling with dynamics

## 10. Upper atmospheres/ aeronomy

1. Solar wind/magnetosphere interaction
2. Ionosphere chemistry and physics
3. Aurora

## 11. Interiors and Origins

1. Elemental abundances and clues to the early solar system
2. Structure and dynamics of the interior
3. Magnetic field generation
4. Equations of state

## 12. Atmospheres of Extra-solar Planets

1. Current and future observations
2. Models of EGPs (chemistry, dynamics, structure
3. Spectral signatures
4. Clouds, formation and migration

THE END!

# Speakers and Moderators

## Speakers

- Should be provided with both their topic, and list of other topics
- Should be encouraged to cover all subjects listed in their topic, and to contact others to get comprehensive overviews
- Should also cover future laboratory needs, future data needs, future modeling needs

## Moderator (discussion leader)

- An active and engaged moderator necessary for the discussions
- Moderator should come prepared with topics for discussions (One suggestion for the astrophysics conference was that the moderator could offer topics for discussion and the audience would choose one using “clickers”)
- Session moderator and session speaker should communicate

11/5/0 before the workshop

# Logistics

## Dates

6 -7 November 2007

Tues - Weds (2 days)

Selected to precede OPAG (8-9 Nov)

After VEXAG mtg (4-5 Nov)

## Venue

TBD, Baltimore-Washington vicinity

# SOC and LOC

## Science Organizing Committee

- Don Banfield
- Phil Crane (ex officio LOC liason)
- Heidi Hammel
- Jay Bergstralh
- David Huestis
- Julianne Moses
- Adam Showman
- Amy Simon-Miller
- Carey Lisse

## Local Organizing Committee

- Philippe Crane
- Amy Simon-Miller
- More TBD

# Schedule, page 1 of 2

## DAY 1

7.30 - 8.30 Breakfast  
8.30 - 9.30 Atmos. #1  
9.30 - 10.30 Atmos. #2  
10.30 - 11.30 Coffee/Posters  
11.30 - 12.30 Giant #7  
12.30 - 2.00 Lunch  
2.00 - 3.00 Giant #8  
3.00 - 4.00 Atmos #3  
4.00 - 5.00 Snacks/Posters  
5.00 - 6.00 Giant #12

## DAY 2

7.30 - 8.30 Breakfast  
8.30 - 9.30 Atmos. #4  
9.30 - 10.30 Atmos. #5  
10.30 - 11.30 Coffee/Posters  
11.30 - 12.30 Giant #9  
12.30 - 2.00 Lunch  
2.00 - 3.00 Giant #10  
3.00 - 4.00 Giant #11  
4.00 - 5.00 Snacks/Posters  
5.00 - 6.00 Atmos #6