Venus Exploration
VEXAG
Analysis Group

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

Comparative Climatology of Terrestrial Planets

A Scientific Workshop on the Climates of Venus, Earth, Mars, and Titan

Boulder, Colorado

June 25-28 2012 (4 days)

Conveners

Eliot Young (SwRI)

Mark Bullock (SwRI)

David Grinspoon (DMNS)

TOPICS

Climate and atmosphere

Clouds, hazes, and precipitation

Interior-surface-atmosphere interactions

Solar-atmosphere interactions

University of Arizona Press edited volume

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Climate and Atmosphere

- What is the observational evidence for climate change on the terrestrial planets?
- What is the sensitivity of each terrestrial planet climate changes in forcing due to geology, impacts, and solar output?
- How are energy balance and atmospheric dynamics coupled on Venus, Earth, Titan, and Mars?

Clouds, Hazes, and Precipitation

- What are the mechanisms for cloud formation and dissipation on Venus, Titan, and Mars, in comparison with Earth?
- How does the altitude and composition of aerosol layers affect the energy balance of terrestrial planet atmospheres?
- What do landforms reveal about the history of precipitation on Mars, Titan, and Earth?

Surface-Atmosphere and Solar-Atmosphere Interactions

- What is the geologic evidence for climate change on the terrestrial planets?
- What does the surface mineralogy suggest about the origin and subsequent alteration of surface rocks on terrestrial planets?
- How do sedimentary minerals on Earth, Mars, Venus, and Titan preserve a record of climate change?
- How do mantle convection and volcanic outgassing affect climate?
- How have the magnetic fields of the terrestrial planets influenced their atmospheres and oceans?
- How do variations in solar output affect the climates of the terrestrial planets?

Sponsors and Potential Sponsors

Sponsors

- NASA
- Lunar and Planetary Institute (LPI)
- JPL Climate Center

Potential Sponsors

- NCAR
- ESA
- SwRI
- LASP
- The Planetary Society

Daily Schedule

• Morning session	8:30 – 11:00
• Panel discussion	11:00 – 12:00
• Lunch	12:00 – 1:30
• Afternoon session	1:30 – 4:00
• Panel discussion	4:00 – 5:00
• Poster and keg session	5:00 – 6:30

Earth Atmosphere

• James Hansen	GISS	Climate sensitivity
• Brian Toon	CU	Clouds and climate
• Jeff Kiehl	NCAR	Climate sensitivity
• Charlie Zender	UC Irvine	Climate and aerosols
• Tom Wigley	NCAR	Climate and carbon cycle
• V. Ramanathan	UCSD	Energy balance
• Graeme Stevens	JPL	Climate and clouds
• Lennart Bengtsson	ISSI	Water cycle, storms
• Gilbert Compo	NOAA	Storms and climate
• Dave Crisp	JPL	Atmospheric carbon
• Gavin Schmidt	GISS	realclimate.org
• Jacob Haqq-Misra	Penn State	Climate ethics

Surface-Atmosphere Interactions

- Lindy Elkins-Tanton MIT
  - Volatile origin & evolution
- Adrian Lenardic Rice
  - Mantle convection-climate feedback
- Allan Treiman LPI
  - Volatile chemistry
- Michael Coffin Southampton
  - Igneous provinces, climate
- Christophe Sotin JPL
  - Thermal history of planets

Solar Atmosphere Interactions

- David Brain CU
  - Magnetospheric processes
- Feng Tian CU
  - Atmospheric loss
- Helmut Lammer SRI Austria
  - Atmospheric loss
- Judith Lean NRL
  - Solar-Terrestrial climate

Terrestrial Planet Climate Models

- Sebastien Lebonnois LMD
  - GCMs
- Francois Forget LMD
  - Radiative processes
- Mark Richardson Ashima GCMs
  - Alternates: Andy Ingersoll, Scot Rafkin, Tim Dowling
- Ray Pierrehumbert U. Chicago
  - Radiative balance
- Dan McCleese JPL
  - Mars climate-surface disagreement
- Ken Caldeira Carnegie
  - Climate evolution
- Peter Read Oxford
  - Dynamics and waves

Photochemistry and Exoplanet Atmospheres

- Yuk Yung — Caltech — Planetary photochemistry
- Frank Mills — ANU — Planetary photochemistry

- Sarah Seager — MIT
  - Exoplanet atmospheric modeling
- Jim Kasting — Penn State
  - Spectroscopic signatures
- Mark Swain — JPL
  - Exoplanet atmospheres
- Kristen Menou — Columbia
  - Exoplanet GCMs
- Channon Visscher — SwRI
  - Exoplanet atmospheric chemistry

Conclusions

- Comparative Climatalogy of Terrestrial Planets has the potential to open a whole new perspective on the study of planets.
- University of Arizona Press edited volume will maximize the impact of the conference
- MARK YOUR CALENDARS: June 25-28, 2012.
- SIGN UP for a book chapter!