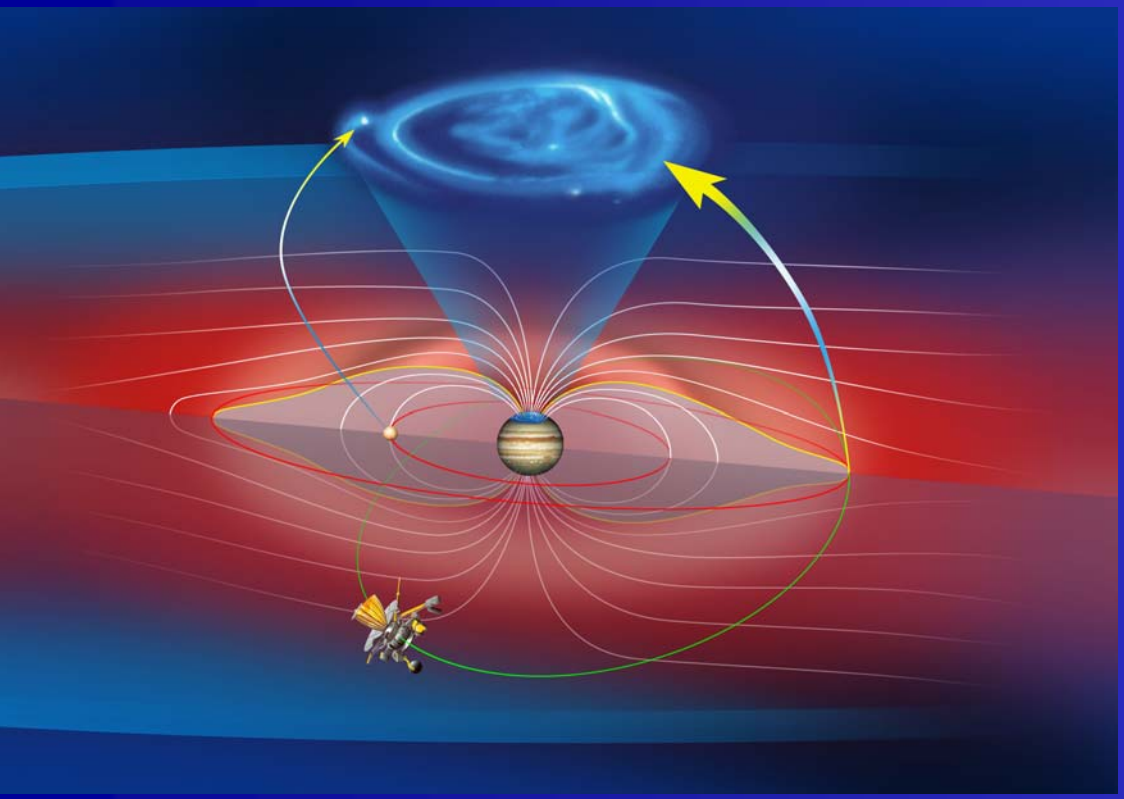
Workshop proposal to the Science Committee

Planetary aurorae and their electrodynamic drivers: solar wind vs. internal processes

WS General Theme

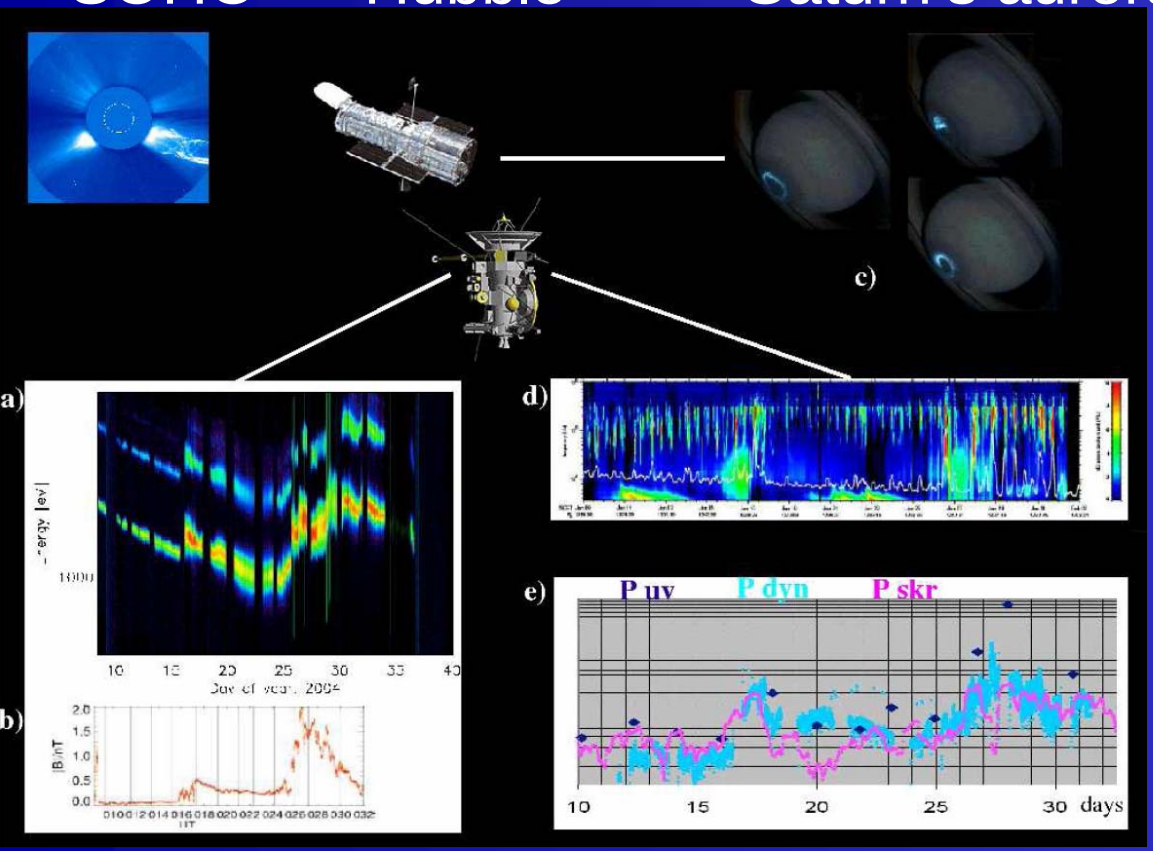


The main auroral oval at Jupiter is correlated to the break-down of corotation at about 25 RJ in the Jovian magnetosphere.
How important is the solar wind interaction?

- At Jupiter, most of the aurora is driven by internal processes, including the satellite interactions, which are of high interest to planetary science at large. At Saturn, the question of the relative importance of solar wind forcing and internal processes is still open. A comparison with auroral processes at Earth (with the best studied solar wind interaction among all planets) is going help us in understanding the magnetospheric “engines” of the giant planets in a broader way.

WS General Theme

SOHO Hubble Saturn‘s aurora



Cassini in-situ measurements

- Explore the solar wind interaction at Jupiter and Saturn including aurorae by using new results from in-situ mesurements and from ground-based / Earth-orbit based measurements in combination with existing models of the magnetospheres / aurorae and compare with Earth’ observations
- Take the opportunity of directly in-situ measured solar wind onboard Cassini and the correlated outer planet observations to be performed in 2007 with Hubble and other observatories near Earth to explore the dynamics of an outer planet’s

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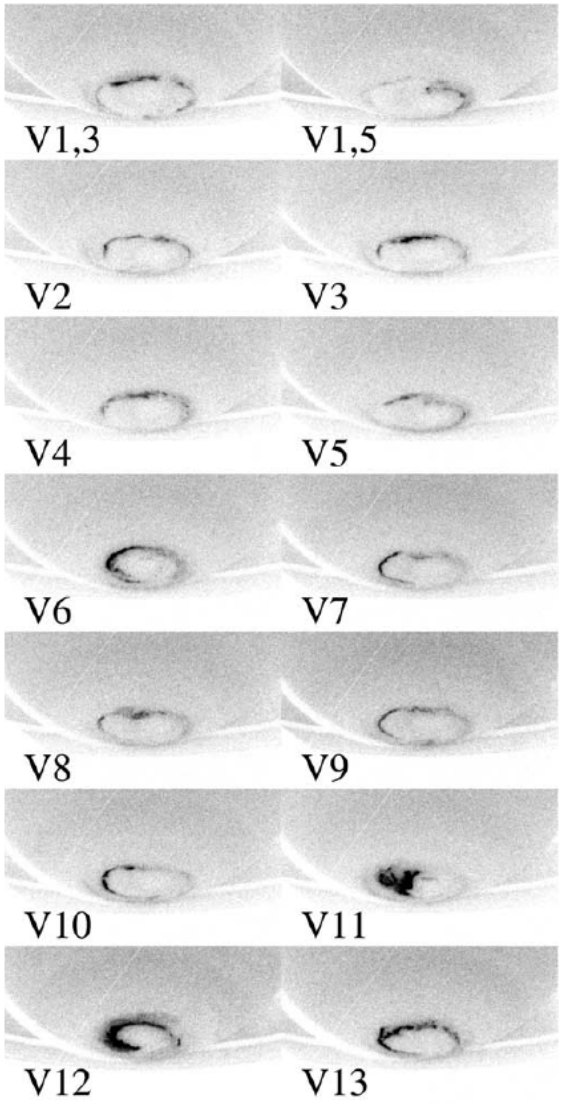

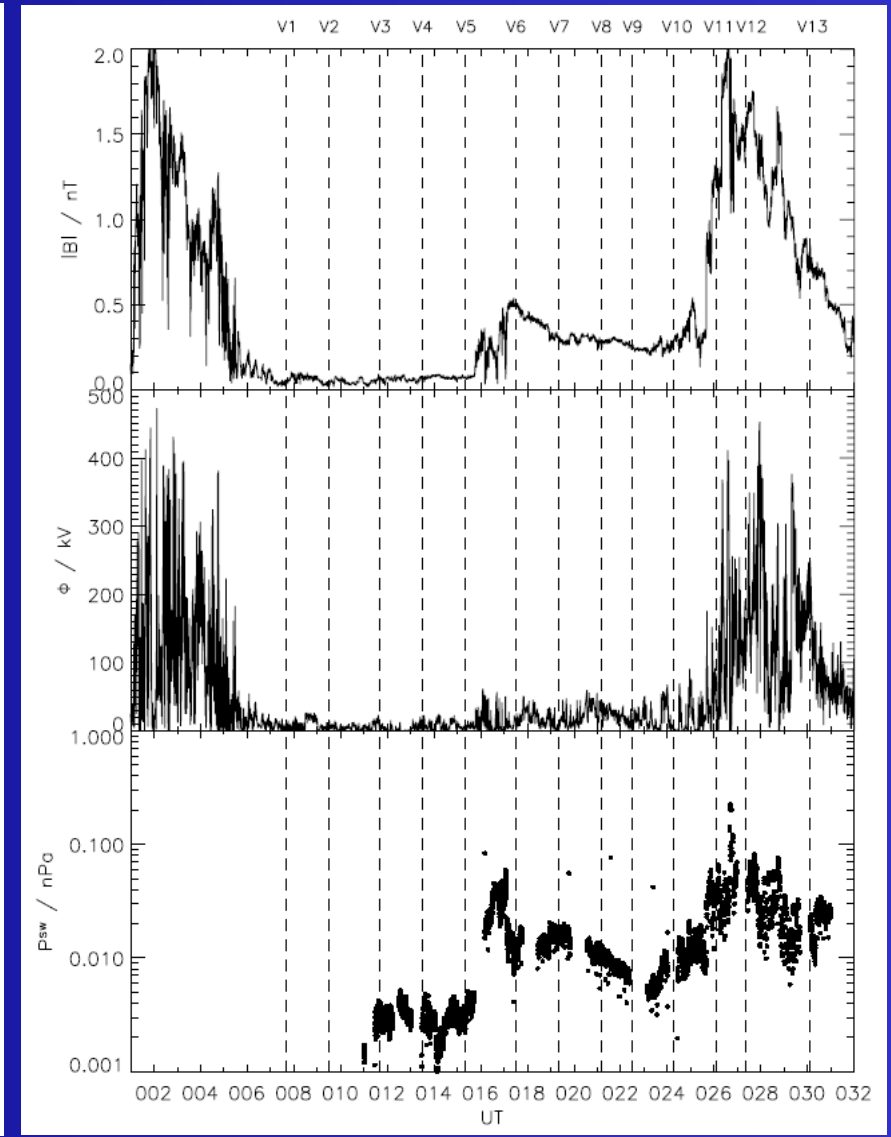

Grodent et al., JGR, 2005:
Crary et al., Nature, 2005:
Kurth et al., Nature, 2005:
Clarke et al., Nature, 2005:
Gerard et al, JGR, 2004:

Hubble obs. combined with Cassini measurements

Topics

- Review of published and most recent solar wind/outer magnetosphere/aurora observations in the vicinity of Jupiter and Saturn from spacecraft data
- Review of published and most recent ground-based/Earth-orbit based observations of the aurorae of Jupiter and Saturn compared to Earth
- Review of published and most recently developed models of the magnetosphere-ionosphere current systems of the giant planet magnetospheres and their comparison with actual data

Timeliness

- The opportunity to use data of the new Hubble Jupiter/Saturn observation campaign in 2007 in combination with data from the still orbiting Cassini spacecraft at Saturn at the same time is outstanding
- The understanding of the role of the solar wind for the global configuration and dynamics in outer planets is very important in the context of plasma physics in general
- Outcome of the WS may help to optimize scientific return of spacecraft and ground-based/Earth-orbit based data sets

Scientific Relevance

- The importance of the solar wind at outer planets and its influence for the global system is still unknown. Correlated measurements from ground and in-situ are absolutely necessary to better understand the processes.
- Cassini at Saturn which is partly outside the magnetosphere could serve as solar wind monitor when Hubble and other observatories will observe the aurora.
- Existing models can be checked against real data sets and will help to further understand auroral processes and the entire dynamics in the magnetospheres of the giant planets

WS Date & Structure

- end of 2008 (end of nominal Cassini mission)
- 5 days, ca. 45 participants,
  plenary sessions, no splinter sessions,
  no working groups

Proposed Convenors and Co-convenors

- Norbert Krupp, Joachim Woch (MPS, Katlenburg-Lindau, D)
- Michele Dougherty, Chris Arridge (Imperial College London, UK)
- Michel Blanc, Philippe Louarn (CESR, Toulouse, F)
- Andrew Coates, Geraint H. Jones (UCL-MSSL, UK)
- Steve Miller (UCL, London, UK)
- Frank Crary, Scott Bolton (Southwest Research Institute, USA)
- Denis Grodent, Jean-Claude Gerard (Liege, Belgium)
- John Clarke (Boston University, USA)
- Melissa McGrath (Johns Hopkins University, USA)
- Larry Esposito, Fran Bagenal (LASP, Boulder, USA)
- Philippe Zarka, Renee Prange (Meudon Paris, F)
- Stan Cowley, Emma Bunce (Leicester University, UK)
- B. Brown (Arizona, USA)
- Joe Ajello
- Hunter Waite, Tamas Gombosi, K.C. Hansen (University of Michigan, USA)
- Don Gurnett, Bill Kurth (University of Iowa, USA)
- Don Mitchell, Barry Mauk, Ed Roelof (Applied Physics Laboratory, USA)