N2
Discipline working groups
Status, August 2006

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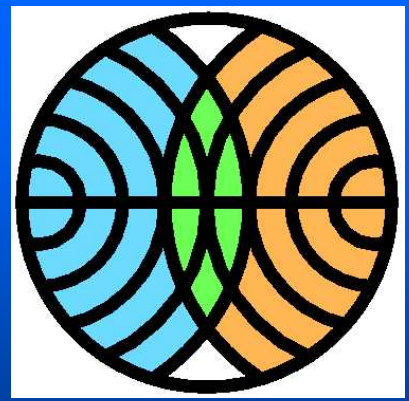

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- **N2 Website:**
  http://www.mps.mpg.de/de/projekte/europlanet

N2 Activity report 2005-2006
Months 1-20

Month 1-9:	set-up of the working groups, define scientific key questions for each discipline working group
Month 4:	Europlanet General Assembly with N2 presentation, Vienna, Austria
Month 4:	Participation at N3 kick-off meeting
Month 9:	N2-ISSI cooperation meeting #1, Bern, Switzerland (workshop proposals)
Month 11:	N2-meeting #1, Northeim, Germany
Month 11:	Europlanet meeting Brussels with N2 presentation
Month 11:	Participation at N3 workshop in Graz, Austria
Month 14:	N2-ISSI cooperation meeting #2, Bern, Switzerland
Month 15:	Participation at N4 workshop in Toulouse, France
Month 16:	Participation at N3 workshop in Vienna, Austria
Month 16:	N2-N7 workshop, Villafranca, Spain
Month 17:	Europlanet coordinator meeting, Paris, France
Month 18-20:	Preparation of N2 meeting #2, Helsinki, Finland
Month 20:	N2 meeting #2, Helsinki, Finland

N2 Budget

- allocated:
  - 10% of 2 Mio €= 200000 € -> 50000 €/year
    - 2000 for Toulouse
    - 10000 for coordinators
    - 38000 for activity
- received:
  - 57600 € for the first 18 months
- spent:
  - as of June 30 2006: 39793 € = 69 % of advance
    - 2005: 18762 + 20% ind. costs = 22514 € = 45% of annual budget
    - 2006: 14399 + 20% ind. costs = 17279 € = 34% of annual budget

Annex 1: .N2.3 Outline implementation plan for the full duration of the activity

Milestones:

- set-up of discipline working groups, invitation of experts
- define science key questions for each discipline working group
- activate action plan with co-ordination of modeling work and observations
- Two N2 meetings per year, refinement of objectives, preparation of special publications

Deliverables:

- report about activities in N2 during general assemblies
- motivate new observation campaigns and modeling work
- common publications

Annex 1: N2.4 Expected outcome

The expected outcome of this activity is:

- Identification of the world leading experts for each discipline working group ✓*ok*
- Definition of the scientific targets to be tackled with the latest data sets.
- Collect the inputs of each discipline working group for planning and coordination of future observations, laboratory and modeling work as well as analysis of data measured from the ground or on board spacecraft.
- Publications of the results from each discipline working group

Outcome N2 meeting#1
example DWG2

Aims: What is the origin of the planetary modulated (quasi-periodic) signatures at Saturn?	
Modelling: *Wave theory: investigate the global response of the magnetosphere to external/internal perturbations.* *Solar wind-magnetosphere-ionosphere coupling (Leicester, Warsaw)* *New global magnetic and plasma models (IC, Braunschweig, MSSL, U. Michigan, JHU/APL)* Observations: *magnetic field, particle data, radio emissions, energetic neutral atoms, UV observations from Cassini/Hubble Space Telescope, InfraRed Telescope Facility, Chandra X-ray Observatory, X-ray Multi-Mirror* Expertise: *DWG2 + Cassini Teams and PIs, Jean-Claude Gerard, Denis Grodent, Randy Gladstone, Graziella Branduardi-Raymont +other theoreticians/frequency analysis experts*	Initiate collaborations with new scientists Correlate multi-instrument and multi-observatory data sets Use of models/expertise to characterise quasi-periodic signatures
Aims: Can we detect an exoplanet magnetosphere now?	
Modelling: *-comparisons with Jupiter and other magnetospheres* *- consider sub-sonic versus super-sonic interactions* *- consider sub-Alfvenic versus super-Alfvenic interactions* Observations: *Future radio emissions could indicate the presence of a magnetosphere (LOFAR from 2008-2010)* Expertise: *Uwe Motschmann, Helmut Rucker, Pekka Janhunen (FMI) Gombosi/Hansen*	Initiate collaborations with new scientists Extend available planetary models to exoplanetary conditions

Outcome N2 meeting#1
example DWG2

Specific Suggestions	Milestones
Aim: Investigation of solar-planetary interactions	
Modelling: *New solar wind propagation modelling – to investigate different solar wind conditions at different orbital distances* Observations: *2003/2004 interval: Cassini (~9AU), Ulysses (~5AU), Mars Express (~1.5AU),ACE (~1AU),solar monitor (SOHO ?)* *Other intervals : Mariner10, Messenger,Venus Express, New Horizons ?* Expertise: *DWG2 + Gombosi/Hansen, R. Prange, J. Luhmann, D. McComas, J. Slavin +others*	Initiate collaborations with solar system scientists Establish a solar wind propagation model Construct a database of multi-spacecraft observations
Aim: What is the influence of the solar wind interaction at Jupiter?	
Modelling: *Solar wind-magnetosphere-ionosphere coupling (Leicester, Warsaw) e.g. reconnection rates, cusp processes* *New global magnetic and plasma models* Observations: *Millennium Campaign at Jupiter (Cassini, Galileo, Hubble Space telescope (UV), Chandra X-ray Observatory, X-ray Multi-Mirror, InfraRed Telescope Facility)* Expertise: *DWG2 + Gombosi/Hansen, Graziella Branduardi-Raymont*	Initiate collaborations with new scientists Further development of existing models Create a database for the Millennium Campaign Recommendations for future ESA jovian mission: *- multi-spacecraft observations* *- solar wind monitoring* *- dedicated moon orbiters*

Outcome April 2006
N2-N7 workshop: Science cases

- Understanding super-rotation (Grieger)
- Ion-neutral chemistry at Titan (Leblanc)
- Solar wind interaction at Jupiter and Saturn including aurorae (Krupp)
- What is the origin of the planetary modulated (quasi-periodic) signatures at Saturn? (Krupp)
- Investigation of the interaction of magnetospheric plasma with icy moons in the Saturnian system an other giant planet systems (Krupp)
- Definition and archiving of ground-based observations in support of space missions (Coustenis)
- Catalogue of IR and Raman spectra of gas CH4 coefficients, organics (Coustenis)
- Dating planetary surfaces from cratering processes: formation of the solar system (Coustenis)
- Quantifying the Martian geochemical reservoirs (Toplis)
- Exchange processes between surface and interior of icy moons (Grasset)
- What are the relative contributions of asteroidal dust, cometary dust, meteor streams, interstellar dust and circumplanetary dust to the structure of zodiacal cloud as a function of heliocentric distance, latitude and time (Graps)
- What is the dynamical and morphological structure of the Kuiper belt (Graps)
- How can we best optimize from observations, numerical experiments, lab simulations, further analysis of past mission data, the science return of Rosetta
- Solar wind-comet surface interaction (Schmidt)
- Surface material composition (Schmidt)
- Distant activity, outbursts, splitting and disruption of cometary nuclei (Makinen)
- Planets under extreme stellar conditions (Lammer)

N2 DWG 2
Science Case 1

1 - Objective or science goal:

Solar wind interaction at Jupiter and Saturn including aurorae?

2 - Needed data sets:

Millennium Campaign at Jupiter (Cassini, Galileo, Hubble Space telescope (UV), Chandra X-ray Observatory, X-ray Multi-Mirror, InfraRed Telescope Facility), other ground-based observations

Saturn Hubble campaign 2004

3 - Problem description

Modelling of the *Solar wind-magnetosphere-ionosphere coupling e.g. reconnection rates, cusp processes and compare it with existing data sets.*

Variations of particle fluxes, pitch angle distributions, energy spectra, aurora brightness,... as indicators of solar wind influence.

4 - Current solution: the way scientist presently work to select data of interest, to access these data and to process it.

PDS, MAPS KP, direct contact between scientists

5 - What services users expect from an IDIS to work more efficiently

add new data sets (relevant events on the Sun, additional data sets from missions in Earth orbit and in the heliosphere for a given time period), add new global transport and plasma models, add relevant Laboratory measurements

6 - Other comments

7 - Key references on science and methodology for this science case

Cowley and Bunce, Clarke et al., Crary et al, Hansen et al., Tomas et al.,...

experience from Earth magnetosphere,...

N2 DWG 2
Science Case 2

1 - Objective or science goal:

What is the origin of the planetary modulated (quasi-periodic) signatures at Saturn?

2 - Needed data sets:

magnetic field, particle data, radio emissions, energetic neutral atoms, UV observations from Cassini/Hubble Space Telescope, InfraRed Telescope Facility, Chandra X-ray Observatory, X-ray Multi-Mirror + Voyager and Pioneer data sets

3 - Problem description

Investigate the global response of the Saturnian magnetosphere to external/internal perturbations.

4 - Current solution: the way scientist presently work to select data of interest, to access these data and to process it.

PDS, MAPS KP, direct contact between scientists

5 - What services users expect from an IDIS to work more efficiently

add magnetic field models of Saturn, time-series analysis tools

6 - Other comments

7 - Key references on science and methodology for this science case

Mitchell et al., Kurth et al., Krupp et al., Gambieri et al., Espinosa et al., Arridge et al.,...

N2 DWG 2
Science Case 3

1 - Objective or science goal:

Investigation of the interaction of magnetospheric plasma with icy moons in the Saturnian system and other giant planets systems

2 - Needed data sets:

particle and fields data sets of Cassini, Voyager and Pioneer data sets

3 - Problem description

Investigate moon-magnetosphere interaction processes and their mutual effects (on the magnetosphere in terms of sources and sinks, on the moon surface via weathering and induced chemistry),

investigate the transport mechanisms in Saturn's magnetosphere by using absorption signatures (determine diffusion coefficients)

4 - Current solution: the way scientist presently work to select data of interest, to access these data and to process it.

PDS, MAPS KP, direct contact between scientists

5 - What services users expect from an IDIS to work more efficiently

add laboratory and model data, provide additional parameters necessary (sputter yields,...)

6 - Other comments

7 - Key references on science and methodology for this science case

Paranicas et al., Roussos et al., Ip et al., Johnson et al., ...

Outcome May 2006:
ISSI proposals

Workshop topics to be proposed to ISSI
(Outcome of telecon May 12, 2006 with M. Blanc, B. Grieger, A.-M. Harri, N. Krupp)

For 2007
- Climate and atmospheric circulation of terrestrial planets (Grieger)
- Planetary atmospheric electricity (Lebreton, Leblanc)
- Exchange processes from the deep interior to the surface of icy moons (Grasset)

For 2008
- Quantifying the Martian geochemical reservoirs (Toplis)
- Planetary aurorae and their electrodynamic drivers: solar wind vs. internal processes (Krupp)
- Solar wind – comet surface interaction (Schmidt)

Not selected this time:
- Planetary chemistry issues in support to the analysis of space mission data (Coustenis)
- What are the connections between TNOs, Centaurs, Trojans, comets and icy satellites and what is the dynamical and morphological structure of the Kuiper belt (Graps)
- How can we best optimize from observations, numerical experiments, lab simulations, further analysis of past mission data, the science return of Rosetta (Graps)
- Distant activity, outbursts, splitting and disruption of cometary nuclei (Mäkinen)
- Planets under extreme stellar conditions (Lammer) (2008)

Outcome May 2006:
ISSI proposals

Workshop topics "selected" from ISSI

(Outcome of ISSI science committee meeting, May 2006)

For 2007

- Planetary atmospheric electricity (Lebreton, Leblanc)

For 2008

- Exchange processes from the deep interior to the surface of icy moons (Grasset)
- Quantifying the Martian geochemical reservoirs (Toplis)

in addition:

- Planetary aurorae and their electrodynamic drivers: solar wind vs. internal processes (Krupp)

N2-Next steps

- Coordinator meeting in Brussels September 4/5 2006
- Science cases to be presented at EPSC, Berlin, September 2006
- Support N7 and other activities
- N2 meeting #3 in November 2006 at ?
- Plan selected ISSI workshops

N2 science cases to be presented at EPSC, Berlin, September 19, 2006

- 14:30 - 14:45
  EPSC2006-A-00395
  Krupp, N.
  Planetary aurorae and their electrodynamic drivers: solar wind vs. internal processes (solicited)
- 14:45 - 15:00
  EPSC2006-A-00306
  Leblanc, F.
  IDIS Science Case: Titan Ion-Neutral chemistry: understanding observations and constraining models (solicited)
- 15:00 - 15:15
  EPSC2006-A-00393
  Grieger, B.; Leblanc, F.; Fränz, M.; Lammer, H.; Siili, T.; Tokano, T.
  A science case on atmospheric circulation (solicited)
- 15:15 - 15:30
  EPSC2006-A-00422
  Coustenis, A.; EUROPLANET WG3&5
  Catalogue of IR and Raman spectra of gas CH4 and other molecules' coefficients, organics, minerals and ices (solicited)
- 15:30 - 15:45
  EPSC2006-A-00321
  Grasset, O.
  Exchange processes from the deep interior to the surface of icy moons (solicited)
- 15:45 - 16:00
  EPSC2006-A-00417
  Coustenis, A.; EUROPLANET WG3&5
  Dating planetary surfaces from cratering processes: formation of the solar system (solicited)
- 16:00 - 16:15
  EPSC2006-A-00405
  Lammer, H.; Selsis, F. ; Eiroa, C. ; Fridlund, M.
  Planets under Extreme Stellar Conditions (solicited)
- 16:15 - 16:30
  EPSC2006-A-00416
  Coustenis, A.; EUROPLANET WG3&5
  Definition and archiving of ground-based observations in support of space missions (solicited)