

EPSC #1

European Planetary Science Congress 2006

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Programme Book



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Chairperson: KALLIO, E.

11:00-11:15; EPSC2006-A-00224

Fedorov, A.; Barabash, S.; Sauvaud, J.-A.; Lundin, R.; ASPERA
Venus and Mars plasma environments. A comparative analysis of IMA (ASPERA-4, ASPERA-4) mass spectrometer data onboard Venus Express and Mars Express

11:15-11:40; EPSC2006-A-00169

Barabash, S.
ENA diagnostics of the solar wind interaction with planetary bodies

11:40-11:55; EPSC2006-A-00531

Fränz, M.; Dubinin, E.; Krupp, N.; Martinecz, C.; Roussos, E.; Woch, J.; Barabash, S.; Lundin, R.; ASPERA3-Team
Ion moments and pressure balance in Mars magnetosphere

11:55-12:10; EPSC2006-A-00534

Roussos, E.; Fraenz, M.; Dubinin, E.; Woch, J.; Martinecz, C.; Barabash, S.; Lundin, R.; ASPERA-3 Team
Asymmetries in the Mars-solar wind interaction: Mars Express ASPERA-3 observations

12:10-12:35; EPSC2006-A-00047

Nagy, A.; Ma, Y.
MHD modeling of the interaction of fast moving plasmas with non-magnetic solar system bodies

12:35-13:00; EPSC2006-A-00009

Withers, P.
Determination of upper atmospheric properties on Mars and other bodies using satellite drag/aerobraking measurements

13:00 LUNCH

Chairperson: LEBLANC, F.

14:30-14:45; EPSC2006-A-00364

Vaisberg, O.; Zelenyi, L.; Smirnov, V.; Avakov, L.; Skalski, A.
Early observations of mass-loading and induced magnetospheres at Venus and Mars

14:45-15:00; EPSC2006-A-00562

Chaufray, J.Y.; Modolo, R.; Leblanc, F.; Chanteur, G.M.
Non thermal effects on the oxygen escape at Mars at low and high solar activities

15:00-15:25; EPSC2006-A-00193

Shematovich, V. I.; Johnson, R.E.
Hot oxygen coronas at terrestrial planets

15:25-15:40; EPSC2006-A-00358

Cipriani, F.; Leblanc, F.; Berthelier, J.J.
A modelling study of the hot heavy species in the martian corona

15:40-16:05; EPSC2006-A-00054

Cravens, T.; Robertson, I.
Solar wind interaction with comets, Venus, Earth, and Mars: soft x-ray emission from charge exchange

16:05-16:20; EPSC2006-A-00474

Mordovskaya, V.
The mirage of Mars magnetosphere

16:20 END OF SESSION

Planetary Moons

PM2/PA5 Planetary bodies with past or present oceans: formation, evolution, and internal structure

Convener: Grasset, O.
Co-Convener(s): Sohl, F., Grieger, B.
Lecture Room: ECC5
Chairperson: SOHL, F.

8:30-8:45; EPSC2006-A-00470

Ward, W. R.; Canup, R. M.
Formation/Evolution of Giant Planet Accretion Disks

8:45-9:05; EPSC2006-A-00465

Canup, R. M.; Ward, W. R.
Accretion of large satellites of gas planets (solicited)

9:05-9:20; EPSC2006-A-00022

Griv, E.
Formation of the regular satellite systems of Jupiter, Saturn, and Uranus

9:20-9:40; EPSC2006-A-00021

Roatsch, Th.; Waehlich, M.; Hoffmeister, A.; Scholten, F.; Neukum, G.; Helfenstein, P.; Porco, C.
Mapping of the Icy Saturnian satellites (solicited)

9:40-9:55; EPSC2006-A-00610

Neukum, G.; Wagner, R.; Wolf, U.; Denk, T.
The Cratering Record and Cratering Chronologies of the Saturnian Satellites and the Origin of Impactors: Results from Cassini ISS Data

9:55-10:10; EPSC2006-A-00030

Jaumann, R.; Stephan, K.; Wagner, R.; Hansen, G.B.; Brown, R.H.; Cassini VIMS Science Team
Distribution of icy particles across Enceladus' surface

10:10-10:25; EPSC2006-A-00571

Denk, T.; Neukum, G.; Roatsch, Th.; Giese, B.; Wagner, R.; Helfenstein, P.; Burns, J.A.; Turtle, E.P.; Johnson, T.V.; Porco, C.C.
Iapetus: Two Years of Observations by the Cassini ISS Camera

10:25-10:40; EPSC2006-A-00119

Giese, B.; Roatsch, T.; Wagner, R.; Denk, T.; Neukum, G.
Topographic models of the icy Saturn satellites

10:40 COFFEE BREAK

Chairperson: GRASSET, O.

11:00-11:15; EPSC2006-A-00225

Tobie, G.; Cadek, O.
Heat generation by tidal friction within Enceladus' heterogeneous interior

11:15-11:30; EPSC2006-A-00366

Sohl, F.; Hussmann, H.; Grott, M.
Tidal friction in small icy satellites: The Mimas-Enceladus dichotomy revisited

11:30-12:00; EPSC2006-A-00608

Pappalardo, R.T.
Europa: Processes and Habitability (solicited)

12:00-12:15; EPSC2006-A-00544

Pauer, M.; Breuer, D.
Detectability of large subsurface structures in the gravity field of Europa

12:15-12:30; EPSC2006-A-00543

Breuer, D.; Spohn, T.
The magnetic dichotomy of the Galilean satellites Europa and Ganymede

Iapetus: Two Years of Observations by the Cassini ISS Camera

T. Denk (1), G. Neukum (1), Th. Roatsch (2), B. Giese (2), R. Wagner (2), P. Helfenstein (3), J.A. Burns (3), E.P. Turtle (4), T.V. Johnson (5), C.C. Porco (6), and the Cassini ISS Team

(1) FU Berlin, (2) DLR Berlin, (3) Cornell Univ., (4) Univ. of Arizona, (5) JPL, (6) SSI

Since its arrival at the Saturn system in mid-2004, the Cassini orbiter has successfully performed seven observation campaigns of Saturn's strange satellite Iapetus at ranges of 1.4 million km or closer. Large parts of the surface have now been observed at 9 km/pxl resolution or better. The closest flyby was taking place on 31 Dec 2004, when Cassini passed the northern leading side of Iapetus at 124000 km altitude. The surface of Iapetus is heavily cratered on both the bright and the dark hemispheres, with an unusually high number of large basins of up to 800 km in size [1; 2; 3].

The irregular (non-spherical, rather ellipsoidal) shape of Iapetus [4] was confirmed by Cassini data [1; 5], and is considered as a remnant of the despinning process [6]. A major surprise was the discovery of a large, up to 20 km high ridge system on the leading side on 25 Dec 2004 [1; 2], which is located exactly at the equator, and which might also be explained by despinning early in Iapetus' history. An alternative hypothesis considers an ancient ring system around Iapetus as the cause for the ridge formation [7]. The ridge appears to be a geometric continuation of isolated bright mountains, which have been discovered in Voyager images on the anti-Saturn side [4], but remained unexplained at this time.

There is also progress in solving the centuries-old question of the formation of the unique dark/bright albedo dichotomy. ISS data have not shown any "hole" (fresh "punch-through" impact crater) at a resolution down to 750 m/pxl. RADAR data indicate that the dark layer is rather thin (at the order of decimeters, [8]), suggesting that it is either a young structure relative to major crater formation, or that an ongoing process is responsible. Earlier ideas for the albedo dichotomy formation included dust from retrograde outer satellites covering Iapetus' leading side [9; 10]. The advantage of this idea is that the exact alignment to the center of the leading side can be explained. However, the bright poles are a problem here. A recent idea from Spencer *et al.* [11] is based on data from the CIRS infrared spectrometer and suggests that a thermal re-distribution of water ice towards the poles is responsible for the albedo dichotomy. Here, the bright poles can be easily explained, but the leading/trailing side asymmetry requires different starting conditions for each hemisphere. Outer satellite dust was considered as a candidate.

This scenario is now supported by the ISS discovery of a color dichotomy in addition to the albedo dichotomy [12]. Different to the albedo dichotomy, the color dichotomy is quite precisely aligned to the leading side, including the bright poles. It allows to link the Spencer *et al.* [11] and Buratti *et al.* [10] hypotheses. The dust from outer satellites only causes a moderate darkening, but a significant reddening of the whole leading side. This process once triggered the thermal re-distribution of water ice to start on the leading side, but not on the trailing hemisphere, as suggested by Spencer *et al.* [11].

While the described mechanism appears straightforward, it is still questionable if the very complex albedo patterns at equatorial latitudes revealed by Cassini images [2] have also been produced entirely by these two rather simple processes. Imaging of the anti-Saturn side planned for the sole targeted flyby on 10 Sep 2007 will hopefully provide information that may help to ultimately solve the Iapetus enigma.

References: [1] Porco *et al.* (2005), *Science* 307, 1237. [2] Denk *et al.* (2005), LPSC abstract 2268. [3] Giese *et al.* (2005), DPS abstract 47.08. [4] Denk *et al.* (2000), LPSC abstract 1596. [5] Thomas *et al.* (2006), LPSC abstract 1639. [6] Castillo *et al.* (2005), DPS abstract 39.04. [7] Ip (2006), *GRL*, in press. [8] Ostro *et al.* (2006), *Icarus*, in press. [9] Soter (1974), *IAU Colloq.* 28. [10] Buratti *et al.* (2002), *Icarus* 155, 375. [11] Spencer *et al.* (2005), LPSC abstract 2305. [12] Denk *et al.* (2006), EGU 06-A-08352.