



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

Discipline Working Group 1: *Atmospheres, Ionospheres, Exospheres*

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Science Cases

SC1	SC2.4	Understanding super-rotation
SC2	SC2.1	Titan Ion Chemistry
SC7	SC2.2	Catalogue of IR and Raman spectra of gas CH ₄ coefficients, organics
SC9	SC1.2	Quantifying the Martian geochemical reservoirs
SC13	SC4.4	Comet C-G outgassing
SC21	SC2.3	Mars atmosphere measured by Spicam and GCM visualisation tool



DWG-1 Activities

- **No DWG-specific coordinated activities**
- **Atmosphere-related activities centered on Atmospheres Node in Paris:**
 - Implementation of Science Cases and definition of related resources
(will be discussed during the presentation of the Atmospheres node)
- **Inonosphere / Exosphere related activities not directly linked to defined science cases**
 - Various coordinated activities in connection with science- and project-meetings and joined publications, related to Titan, Mars, Venus and Mercury (24 publications in 2007/2008 so far)



DWG-1 Related Publications 2007-2008: Titan

Kallio, E., I. Sillanpää, R. Jarvinen, P. Janhunen, M. Dougherty, C. Bertucci and F. Neubauer, ***Morphology of the magnetic field near Titan: Hybrid model study of the Cassini T9 flyby,*** //Geophys. Res. Lett., 34, L24S09, doi:10.1029/2007GL030827 <<http://www.agu.org/pubs/crossref/2007/2007GL030827.shtml>>, // /2007.

Sillanpää, I., E. Kallio, R. Jarvinen, and P. Janhunen, **Oxygen Ions at Titan's Exobase in a Voyager 1 Type 1 Interaction from a Hybrid Simulation,** / JGR, 112, A12205, //doi:10.1029/2007JA012348 <<http://www.agu.org/pubs/crossref/2007/2007JA012348.shtml>> //, 2007./

Coustenis, A and 155 co-authors, **Tandem: Titan and Enceladus Mission,** /_Astrophysical Instruments and Methods_/, /accepted/, 2/2008.



DWG-1 Related Publications 2007-2008: Mars

Milillo, A., A. Mura, S. Orsini, S. Massetti, P. C.son Brandt, T. Sotirelis, R. D'Amicis, S. Barabash, R.A. Frahm, E. Kallio, A. Galli, M. Holmstrom, E. C. Roelof, J.D. Winningham, P. Cerulli-Irelli, S. Livi, R. Lundin, M. Maggi, and A. Morbidini, ***MEX/ASPERA-3 NPI data statistical analysis***, /Planetary and Space Science//, **submitted, 3/2008/**

Galli, A., P. Wurz, E. Kallio, A. Ekenbäck, M. Holmström, S. Barabash, A. Grigoriev, Y. Futaana, M.-C. Fok, and H. Gunell, ***The Tailward Flow of Energetic Neutral Atoms Observed at Mars***, /JGR//, **submitted, 3/2008/**

Kallio, E., A. Fedorov, E. Budnik, S. Barabash, R. Jarvinen, and P. Janhunen, ***On the properties of O^{+} and O_2^{+} ions in a hybrid model and in Mars Express IMA/ASPERA-3 data: A case study***, Planetary and Space Science, accepted, 2008./

Yamauchi, M. Y. Futaana, A. Fedorov, E. Kallio, R. Lundin, J.-A. Sauvaud, D. J. Winningham, R. A. Frahm, S. Barabash, and M. Holmström, ***Advanced method to derive the IMF direction near Mars from cycloidal proton distributions***, / Planetary and Space Science 56, 1145– 1154,/ /doi:10.1016/j.pss.2008.02.012 <<http://dx.doi.org/10.1016/j.pss.2008.02.012>>/, / 2008/

Mura, A., S. Orsini, A. Milillo, E. Kallio, and 31 co-authors, ***ENA detection in the dayside of Mars: ASPERA-3 NPD statistical study***, / doi:10.1016/j.pss.2007.12.013, //Volume 56, Issue 6 <http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_userid=1065758&md5=4083629e91d857ad444c48cd1d78be0c>, 840-845, //Planetary and Space Science/, 2008.//



DWG-1 Related Publications 2007-2008: Mars (cont.)

Kallio, E., S. Barabash, P. Janhunen and R. Jarvinen, ***Magnetized Mars: Transformation of Earth-like magnetosphere to Venus-like induced magnetosphere***, doi:10.1016/j.pss.2007.12.005, 56, Issue 6

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=05a95b888429ab084fefbb9ea833cb9d, Pages 823-827, //Planetary and Space Science/, 2008.//

Frilund, H., E. Kallio, M. Yamauchi, A. Fedorov, P. Janhunen, R. Lundin, J.-A. Sauvaud, and S. Barabash, ***The Magnetic Field Near Mars: A Comparison Between A Hybrid Model, Mars Global Surveyor and Mars Express Observations***, doi:10.1016/j.pss.2007.12.003, //Vol. 56, Issue 6

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=05a95b888429ab084fefbb9ea833cb9d, 828-831, // //Planetary and Space Science/, 2008.

Frahm, R. A., E. Kallio, F. Yoshifumi, A. Fedorov, and P. Janhunen, ***Variations of the magnetic field near Mars caused by magnetic crustal anomalies***, doi:10.1016/j.pss.2007.12.018

<http://dx.doi.org/10.1016/j.pss.2007.12.018>, 56, Issue 6
http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=05a95b888429ab084fefbb9ea833cb9d, 856-860, //Planetary and Space Science/, 2008.

Kallio, E., R. A. Frahm, Y. Futaana, A. Fedorov and P. Janhunen, ***Morphology of the magnetic field near Mars and the role of the magnetic crustal anomalies: Dayside region***, doi:10.1016/j.pss.2007.12.002, //Vol. 56, Issue 6

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=05a95b888429ab084fefbb9ea833cb9d, 852-855, // //Planetary and Space Science/, 2008.//



DWG-1 Related Publications 2007-2008: Venus

Barabash, S., A. Fedorov, J.A. Sauvaud, R. Lundin, C. T. Russell, Y. Futaana, T. L. Zhang, H. Andersson, K. Brinkfeldt, A. Grigoriev, M. Holmström, M. Yamauchi, K. Asamura, W. Baumjohann, H. Lammer, A. J. Coates, D. O. Kataria, D. R. Linder, C. C. Curtis, K. C. Hsieh, B. R. Sandel, M. Grande, H. Gunell, H. E. J. Koskinen, E. Kallio, P. Riihelä, T. Säles, W. Schmidt, J. Kozyra, N. Krupp, M. Fränz, J. Woch, J. Luhmann, S. McKenna-Lawlor, C. Mazelle, J.-J. Thocaven, S. Orsini, R. Cerulli-Irelli, M. Mura, M. Milillo, M. Maggi, E. Roelof, P. Brandt, K. Szego, J. D. Winningham, R. A. Frahm, J. Scherrer, J. R. Sharber, P. Wurz & P. Bochsler., ***Venus loses its water through the plasma wake***, Nature/_,_ Vol 450, 29 November 2007, doi:10.1038/nature06434 <<http://www.nature.com/nature/journal/v450/n7170/index.html>>, 2007.

Jarvinen, R., E. Kallio, I. Sillanpää, and P. Janhunen, ***Hybrid Modelling the Pioneer Venus Orbiter Magnetic Field Observations***, Adv. //Space Res., Volume 41, Issue 9, 2008, Pages 1361-1374, doi:10.1016/j.asr.2007.10.003 <<http://dx.doi.org/10.1016/j.asr.2007.10.003>>, 2008./

Martinez, C. and 54 co-authors, ***Location of the bow shock and ion composition boundaries at Venus – initial determinations from Venus Express ASPERA-4***,/doi:10.1016/j.pss.2007.07.007, /56, Issue 6 <http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_use rid=1065758&md5=4083629e91d857ad444c48cd1d78be0c>, 780-784, /Planetary and Space Science/, 2008./

Galli, A., and 34 co-authors, ***First observation of energetic neutral atoms in the Venus environment***, doi:10.1016/j.pss.2007.12.011, 56, Issue 6 <http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_use rid=1065758&md5=4083629e91d857ad444c48cd1d78be0c>, 807-811, /Planetary and Space Science/, 2008.



DWG-1 Related Publications 2007-2008: Venus (cont.)

Coates, A. J., and 48 co-authors, ***Ionospheric Photoelectrons at Venus: Initial Observations by ASPERA-4 ELS***, doi:10.1016/j.pss.2007.12.008, 56, Issue 6

<http://www.sciencedirect.com/science?_ob=PublicationURL&_tokey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_use_rid=1065758&_md5=4083629e91d857ad444c48cd1d78be0c>, 802-806, /Planetary and Space Science/, 2008.//

Kallio E. and 55 co-authors, ***The Venusian induced magnetosphere: A case study of plasma/ and magnetic field measurements on the Venus Express mission***,/ doi:10.1016/j.pss.2007.09.011, //56, Issue 6

<http://www.sciencedirect.com/science?_ob=PublicationURL&_tokey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_use_rid=1065758&_md5=4083629e91d857ad444c48cd1d78be0c>,796-801, //Planetary and Space Science/, 2008.//

Gunell, H., E. Kallio, R. Järvinen, P. Janhunen, M. Holmström and K. Dennerl, ***Simulations of solar wind charge exchange X-ray emission at Venus***, /Geophys. Res. Lett, 34, L03107, doi:10.1029/2006GL028602

<<http://www.agu.org/pubs/crossref/2007/2006GL028602.shtml>>, 2007



DWG-1 Related Publications 2007-2008: Mars/Venus

Fedorov, A. and 52 co-authors, ***Comparative analysis of Venus and Mars magnetotails***, doi:10.1016/j.pss.2007.12.012, 56, Issue 6

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_useId=1065758&md5=4083629e91d857ad444c48cd1d78be0c, 812-817, //Planetary and Space Science/, 2008.

Futaana, Y. and 53 co-authors, ***Mars Express and Venus Express stereo observations of solar flare event in December 2006***, doi:10.1016/j.pss.2007.10.014, //56, Issue 6

http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235823%232008%23999439993%23687995%23FLA%23&_cdi=5823&_pubType=J&_auth=y&_acct=C000051220&_version=1&_urlVersion=0&_useId=1065758&md5=4083629e91d857ad444c48cd1d78be0c, 873-880, //Planetary and Space Science/, 2008.//

Kallio, E., S. Barabash, P. Janhunen and R. Jarvinen, ***Magnetized Mars: Transformation of Earth-like magnetosphere to Venus-like induced magnetosphere***, doi:10.1016/j.pss.2007.12.005, 56, Issue 6

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Kallio, E., M. Yamauchi and H. Frilund, ***Analysis of the H⁺ ring velocity distribution function near the Martian and Venusian bow shocks by an analytical model***, doi:10.1016/j.pss.2007.12.004, //56, Issue 6

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DWG-1 Related Publications 2007-2008: Mercury

Milillo, A., M. Fujimoto, E. Kallio; S. Kameda, F. Leblanc, Y. Narita, G. Cremonese, H. Laakso, M. Laurenza, S. Massetti, S. McKenna-Lawlor, A. Mura, R. Nakamura, Y. Omura, D. A Rothery, K. Seki, M. Storini, P. Wurz, W. Baumjohann, E. Bunce, Y. Kasaba, J. Helbert, A. Sprague, ***The BepiColombo mission: an outstanding tool for investigating the Hermean environment***, Planetary and Space Science, **accepted, 2008/**

Kallio, E., P. Wurz, R. Killen, S. McKenna-Lawlor, A. Milillo, A. Mura, S. Massetti, S. Orsini, H. Lammer, P. Janhunen and W-H. Ip, ***On the impact of multiply charged heavy solar wind ions on the surface of Mercury, the Moon and Ceres***, Planetary and Space Science, **submitted, 1/2008./**