François Forget

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Proposed Role in Metnet

- Prepare, analyze and interpret Metnet observations using a range of models:
  - Global Climate Model, including water, cloud and dust cycles
  - Meso-scale model for local meteorology
  - "Micro-scale" model ("Large Eddy Simulation" model) to model the boundary layer
- Support for mission design (including Entry Descent and Landing) with these models and through the "Mars Climate database".

Experience Related to the Investigation

F. Forget is an expert in Mars Climate Modeling and observation analysis. He has been leading the development of the European Mars Global Climate Model (GCM) which can be used to simulate the 3D atmospheric chemistry, the dust cycle, the water cycle and the CO2 cycle on present-day Mars or in the past. Mesoscale and microscale models has been derived from the GCM. F. Forget is active in observations analysis, currently from the ESA Mars Express mission, in which he is involved as Interdisciplinary Scientist in charge of the atmospheric science (he has also been responsible for pressure, density and temperature remote sensing using data from instruments Spicam and Omega). F. Forget has also been involved in the preparation of landed missions such as the projects of network *Exomars* or *Pascal* and currently the Entry Descent and Landing phase of the ESA Exomars Rover.

Employment

- **1998-Present :** Research scientist (Permanent position at CNRS) at the Laboratoire de Meteorologie Dynamique (LMD: Laboratory for Dynamic Meteorology), Paris, France.
- **2004-2005** Invited Scientist, NASA Ames Research Center, Space Science Division, California.
- **1996-1998** CNES (French Space Agency) Post-doctoral Fellow.
- **1993-1996:** Phd Student PhD , LMD.

Education

- 1996: Ph.D. in Physics, University of Paris VI
- 1991: D.E.A (M.S.) in Meteorology and Oceanography, University of Paris VI.
- 1991: Graduated from the Grande Ecole ENSTA, Paris, France (National College for Advanced Technologies, engineering).

Honors/Awards

- 2007 : Award: Fondation del Duca (Institut de France - Académie des Sciences)
- 2002 : Award: Zeldovich medal, Committee on Space Research (COSPAR)
- 2001 : Award: ``Bronze medal'', CNRS
- 2008-present : member of the Mars Architecture Tiger Team (NASA-MEPAG)
- 2004-2006 : Member of the Solar System Working Group, European Space Agency
- 2001-2003 : Member of the Solar System Working Group, CNES.
- 2001 : Member of ``NASA Mars Reconnaissance Orbiter Science Review pannel''

Publications

- **Author or co-author of about 80 peer-reviewed publication about Mars Meteorology and climate.**
- **Selection of recent relevant publications :**
    - Spiga, A., and F. Forget, A new model to simulate the Martian mesoscale and microscale atmospheric circulation : validation and first results. *Jour. Geophys. Res.*, Volume 114, Issue E2, CiteID E02009 (2009)
    - Forget, F., F. Gonzalez-Galindo, S. Lebonnois, E. Quemerais, J-L Bertaux, F. Montmessin, A. Reberac, E. Dimarellis, M.A. Lopez Valverde. The density and temperatures of the upper martian atmosphere measured by stellar occultations with Mars Express SPICAM Jour. Geophys. Res., 114, Issue E1, CiteID E01004 (2009)
    - Gonzalez-Galindo F., F. Forget, M-A. Lopez-Valverde , M. Angelats i Coll , E. Millour A Ground-to-Exosphere Martian General Circulation Model. 1. Seasonal, Diurnal and Solar Cycle Variation of Thermospheric Temperatures *Jour. Geophys. Res.*, Volume 114, Issue E4, CiteID E04001 (2009)
    - Lefèvre, F., J-L. Bertaux, F. Forget, S. Lebonnois, F. Montmessin, S. Perrier, K. Fast, R. T. Clancy, T. Encrenaz. Heterogeneous chemistry in the atmosphere of Mars Nature 454, 971-975 (2008).
    - Spiga, A., and F. Forget, Fast and accurate estimation of solar irradiance on Martian slopes, Geophys. Res. Lett., 35, (L15201) (2008).
    - Haberle, R. M., F. Forget, A. Colaprete, J. Schaeffer, W. V. Boynton, N. J. Kelly, and M. A. Chamberlain. The effect of ground ice on the Martian seasonal CO2 cycle. Planet. Space Sci., 56, 251-255 (2008).
    - Forget, F., A. Spiga, B. Dolla, S. Vinatier, R. Melchiorri, P. Drossart, A. Gendrin, J-P Bibring, Y. Langevin, B. Gondet. Remote sensing of surface pressure on Mars with the Mars Express/OMEGA spectrometer. Part I: retrieval method. J. Geophys. Res., 12, E8, CiteID E08S15, (2007).
    - Spiga, A., F. Forget, B. Dolla, S. Vinatier, R. Melchiorri, P. Drossart, A. Gendrin, J-P Bibring, Y. Langevin, B. Gondet. Remote sensing of surface pressure on Mars with the Mars Express/OMEGA spectrometer. Part II: meteorological maps. J. Geophys. Res., 12, E8, CiteID E08S16 (2007).
    - Montmessin, F., B. Gondet, J. P. Bibring, Y. Langevin, P. Drossart, F. Forget and T. Fouchet. Hyper-spectral imaging of equatorial CO2 ice clouds on Mars by OMEGA on Mars Express. J. Geophys. Res. 112, E11, CiteID E11S90 (2007).
    - Fouchet, T., E. Lellouch, N.I. Ignatiev, F. Forget, D.V. Titov, M. Tschimmel, F. Montmessin, V. Formisano, M. Giuranna, A. Maturilli, T. Encrenaz. Martian water Vapor: Mars Express PFS/LW Observations. Icarus, 90, 32-49. (2007)
    - Montmessin, F., R. M. Haberle, F. Forget, Y. Langevin, R. T. Clancy and J-P. Bibring. On the origin of perennial water ice at the South Pole of Mars: a precession-controlled mechanism. J. Geophys. Res. 112, E11, CiteID E08S17 (2007)
    - Langevin, Y., J-P. Bibring, F. Montmessin, F. Forget, M. Vincendon, S. Douté, F. Poulet and B. Gondet. Observations of the South seasonal cap of Mars during retreat in 2004-2006 by the OMEGA visible/NIR imaging spectrometer on board Mars Express. J. Geophys. Res., 112, E8, CiteID E08S12 (2007)
    - Grassi D., V. Formisano, F. Forget, C. Fiorenza, N.I. Ignatiev, and L.V. Zasova The Martian Atmosphere in the Region of Hellas Basin as Observed by the Planetary Fourier Spectrometer (PFS-MeX) Planet. Space Sci., 55, 1346-1357 (2007).
    - Levrard, B., F. Forget, Montmessin, F. and Laskar, J. Recent formation and evolution of northern Martian polar layered deposits as inferred from a Global Climate Model. J. Geophys. Res., 112, 9
    - Forget, F., R. M. Haberle, F. Montmessin, B. Levrard, and J. W. Head, Formation of Glaciers on Mars by Atmospheric Precipitation at High Obliquity, Science, 311, 368-371 (2006).

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- Langevin, Y., S. Douté, M. Vincendon, F. Poulet, J.-P. Bibring, B. Gondet, B. Schmitt, and F. Forget, No signature of clear CO2 ice from the `cryptic' regions in Mars' south seasonal polar cap, Nature, 442, 790-792, (2006).
- Bibring, J.-P., Y. Langevin, J. F. Mustard, F. Poulet, R. Arvidson, A. Gendrin, B. Gondet, N. Mangold, P. Pinet, and F. Forget, Global Mineralogical and Aqueous Mars History Derived from OMEGA/Mars Express Data, Science, 312, 400-404, (2006).
- Baratoux, D., N. Mangold, F. Forget, A. Cord, P. Pinet, Y. Daydou, A. Jehl, P. Masson, and G. Neukum, The role of the wind-transported dust in slope streaks activity: Evidence from the HRSC data, Icarus, 183, 30-45 (2006).
- Lebonnois, S., E. Quémerais, F. Montmessin, F. Lefèvre, S. Perrier, J.-L. Bertaux, and F. Forget, 2006, Vertical distribution of ozone on Mars as measured by SPICAM/Mars Express using stellar occultations, Journal of Geophysical Research (Planets), 111, 9, (2006).
- Montmessin, F., J.-L. Bertaux, E. Quémerais, O. Korablev, P. Rannou, F. Forget, S. Perrier, D. Fussen, S. Lebonnois, A. Rébérac, and E. Dimarellis, Subvisible CO2 ice clouds detected in the mesosphere of Mars, Icarus, 183, 403-410, (2006).
- Forget, F., R. M. Haberle, F. Montmessin, B. Levrard, J. W. Head Formation of Glaciers on Mars by Atmospheric Precipitation at High Obliquity Science 311, 368-371 (2006)
- Angelats i Coll, M., Forget, F., M. A. Lopez Valverde, F. Gonzalez-Galindo The first Mars Thermospheric general circulation model: the Martian atmosphere from the ground to 240 km Geophys. Res. Lett.,32, Issue 4, CiteID L04201 (2005).
- Montmessin, F., T. Fouchet and F. Forget. Modeling the annual cycle of HDO in the Martian atmosphere J. Geophys. Res.,110, E3, CiteID E03006 (2005).
- Urban, J., Dassas, K. , Forget, F. and Ricaud, P. Retrieval of vertical constituent and temperature profiles from passive sub-millimeter wave limb observations of the Martian atmosphere: a feasibility study. Applied Optics, Vol. 44, 2438-2455, (2005).
- Forget, F. Perspective: Alien weather at the Poles of Mars. Science, 306, 1298-1299, 2004.
- Levrard, B., F. Forget, Montmessin, F. and Laskar, J. Recent ice-rich deposits formed at high latitudes on Mars by sublimation of unstable equatorial ice during low obliquity Nature, 431, 1072-1075 (2004)
- Montmessin, F., F. Forget, P. Rannou, M. Cabane and R. M. Haberle The origin and role of water ice clouds in the Martian water cycle as inferred from a General Circulation Model J. Geophys. Res. 109, E10, CiteID E10004 (2004).
- Lefèvre, S., S. Lebonnois, F. Montmessin and F. Forget Three-dimensional modeling of ozone on Mars J. Geophys. Res. 109, E07004, 2004
- Angelats i Coll, M., Forget, F., M. A. Lopez Valverde, S. R. Lewis and P. L. Read. Upper atmosphere of Mars up to 120 km: Mars Global Surveyor accelerometer data analysis with the LMD general circulation model J. Geophys. Res. 109, E01011, 2004
- Capderou, M. and Forget, F.. Optimal orbits for Mars atmosphere remote sensing. Planetary and Space Science 52, 789-798, 2004.