

LAURENT G. J. MONTÉSI

WORK ADDRESS

Department of Earth, Atmospheric, and
Planetary Sciences
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EDUCATION

1996 - present **Massachusetts Institute of Technology** Cambridge, MA

Ph. D. Candidate, Department of Earth, Atmospheric, and Planetary Sciences

- **Thesis: Localization instability and the origin of regularly-spaced faults in planetary lithospheres**

Advisor: Maria T. Zuber

Expected graduation date: September 2001

1993 - 1996 **Ecole Normale Supérieure, Univ. Paris VI, VII, XI, XIII** Paris, France

Magistère Interuniversitaire de Physique, 1993 - 1996

- **Specializations: Geophysics, Fluid Mechanics**

1995 - 1996 **Univ. Paris-Sud (Paris XI) and Ecole Normale Supérieure** Orsay, France

DEA Géodynamique et Physique de la Terre

1993 - 1995 **Université Pierre et Marie Curie (Paris VI)** Paris, France

Licence et Maîtrise de Physique

1991 - 1993 **Université Poincaré (Nancy I)** Vandoeuvre-les-Nancy, France

DEUG A, Sciences

- **Specializations: Physics, Earth sciences**

TEACHING EXPERIENCE

Spring, 1999 *Teaching Assistant* Massachusetts Institute of Technology

Geodynamics (Undergraduate level). Instructor: Pr. B. H. Hager

Fall 1997, 1998 *Teaching Assistant* Massachusetts Institute of Technology

Geodynamics (Graduate level). Instructor: Pr. B. H. Hager

RESEARCH EXPERIENCE

1996 - present **Massachusetts Institute of Technology** Cambridge, MA
Ph. D. Candidate, Department of Earth, Atmospheric, and Planetary Sciences

- **Thesis: Localization instability and the origin of regularly-spaced faults in planetary lithospheres**

Developed a unified measure for the tendency of localization in deforming materials. Built a semi-analytical theory to determine the characteristic spacing of faults in simple models of the lithosphere under horizontal shortening or extension. Applied results to deformation areas on Earth (Central Indian Ocean), and Mars (wrinkle ridges). Additional work focused on application to Ganymede's tectonics and Finite Element modeling of fault patterns.

Advisor: Maria T. Zuber

Expected graduation date: May 2001

Publications (3); manuscripts in preparation.

- **Additional work: Frictional properties of diabase at high temperatures**

Measured coefficient of friction of simulated diabase fault gouge and its rate- and state-dependent parameters at temperatures up to 400°C. Microstructural observations.

Supervisors: C. J. Marone (MIT), G. Hirth (WHOI)

Avril-July 1996 **Université Paris-Sud (Paris XI)** Orsay, France

- **Flank tectonics and dynamism of the Volcano Pavonis Mons (Mars)**

Mapped tectonic structures of the flank of the edifice from Viking images. Interpreted morphology as indicative of concentric dike swarm. Implications for evolution of Martian volcanoes and origin of Tharsis rise (Mars). Led to publication (2).

Supervisors: Jean Bébien, and Bernard Bonin.

January-July 1995 **State University of New York at Stony Brook,** Stony Brook, NY

- **Permeability of sandstones under triaxial extension stress states**

Conducted experimental measurements of permeability under triaxial tests. Helped designing experiments for triaxial extension. Led to publication (1).

Supervisors: Teng-fong Wong and Wenlu Zhu

July 1994, **Université Poincaré (Nancy I)** Vandoeuvre-les-Nancy, France

- **Magnetic studies of organic compounds and thin films**

Measured the magnetic properties of diverse materials using SQUID and FONER magnetometers.

Supervisor: Joel Hubsch

OTHER ACTIVITIES

1999-2000 EAPS Graduate Student Association *President*

1999-2000 Geophysics Informal Group Seminar *Organizer*

PROFESSIONAL MEMBERSHIPS

- American Geophysics Union:
Member since 1997
Session Chair, Fall meeting 2000

- Geological Society of America
Member since 1999

PUBLICATIONS

(3) Montési, L.G.J., and M.T. Zuber, A unified description of localization for application to large-scale tectonics, *J. Geophys. Res.*, in press, 2001.

(2) Montési, L.G.J., Concentric dike swarms on the flanks of Pavonis Mons: Implications for the evolution of Martian shield volcanoes and mantle plumes. *Mantle Plumes: Their Identification Through Time*, *Geol. Soc. Spec. Pap.*, 352, eds. R. E. Ernst and K. L. Buchan, in press, 2001

(1) Zhu, W., L. Montési, and T.-f. Wong, Shear-enhanced compaction and permeability reduction: Triaxial extension tests on porous sandstone, *Mech. Mat.* 25, 199-214., 1997

MANUSCRIPTS IN PREPARATION

Montési, L.G.J., and M.T. Zuber, Spacing of faults at the scale of the lithosphere and localization instability 1: Theory.

Montési, L.G.J., and M.T. Zuber, Spacing of faults at the scale of the lithosphere and localization instability 2: Application to the Central Indian Basin.

Montési, L.G.J., and M.T. Zuber, Clues to the lithospheric structure of Mars from wrinkle ridge spacing.

Zhu, W., D. K. Smith, and L.G.J. Montési, Effects of regional slope on viscous flows: A preliminary study of lava terrace emplacement on submarine volcanic rift zones.

Zhu, W., L.G.J. Montési, and T.-f. Wong, Effects of differential stress on shear enhanced compaction and permeability reduction.

CONFERENCE ABSTRACTS

Montési, L.G.J. and M.T. Zuber, Crustal Thickness Control on Martian wrinkle ridge spacing, *Lunar Planet. Sci. XXXII*, abstr. 1879 , 2001

Montési, L.G.J. and M.T. Zuber, Can the ~5-km spacing of faults in the central basin of the Indian Ocean have developed during the current N-S shortening? *EOS Trans. Am. Geophys. Un.*, 81, Fall Meet. Suppl., F1097 2000

Montési, L.G.J., and M.T. Zuber, The lithospheric structure of the margin of Tharsis as indicated by wrinkle ridges, *Tharsis - Evolution in light of MGS data*, USGS workshop, 2000

Montési, L.G.J., M.T. Zuber, and O. Aharonson, Geometry of faults underlying wrinkle ridges on Mars: Dynamic modeling and MOLA topography, *Lunar Planet. Sci. XXXI*, abstr. 1927 , 2000

Montési, L.G.J., C.J. Marone, G. Hirth, and S.L. Karner, Frictional properties and microstructure of simulated diabase gouge at temperatures up to 400°C, *EOS Trans. Am. Geophys. Un.*, 80, Fall Meet. Suppl., F689, 1999

Zhu, W., D.K. Smith, and L.G.J. Montési, Effects of regional slope on viscous flows: A preliminary study of submarine terrace emplacement, *EOS Trans. Am. Geophys. Un.*, 80, Fall Meet. Suppl., F1100, 1999

Montési, L.G.J., and M.T. Zuber, The importance of localization for the development of large-scale structures in the Earth's crust, *ASME Mech. & Mat. Conf.*, p307, 1999

Montési, L.G.J., and M.T. Zuber, The evolution of fault patterns during orogeny, *EOS Trans. Am. Geophys. Un.*, 80, Spring Meet. Suppl., S345, 1999

Montési, L.G.J., Concentric dike swarm and internal structure of Pavonis Mons (Mars), *Lunar Planet. Sci. XXX*, abstr. 1251, 1999

Montési, L.G.J., and M.T. Zuber, Modeling the development of faults: definition of the effective rheology of a continuum undergoing localization. *EOS Trans. Am. Geophys. Un.*, 79, Fall Meet. Suppl., F846, 1998

Montési, L.G.J., and M.T. Zuber, The influence of localization of tectonic strain on lithospheric buckling, *EOS Trans. Am. Geophys. Un.*, 79, Spring Meet. Suppl., S346, 1998

Montési, L.G.J., and M.T. Zuber, Short-wavelength compressional deformation in a strong Venusian lithosphere, *Chapman Conf. Geodynamics of Venus: Evolution and Current State*, p.14 1997

Bébian, J., L. Montési, and B. Bonin, Flank morphology and internal structure of the Tharsis shield volcanoes (Mars), *Terra Nova*, 9, Abst. Suppl. 01, p. 192, 1997

Zhu, W., L. Montési, and T.-f. Wong, Development of permeability during the cataclastic flow of sandstones, *EOS Trans. Am. Geophys. Un.*, 76, Fall Meet. Suppl., 1995