

Gautam Sen, Ph.D.
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Gautam Sen is the Associate Dean of Research & Facilities in the College of Arts & Sciences, which is the largest College in FIU. In this role he oversees contracts and grants, research activities, and research facilities in the College. He is also a tenured Professor and an ex-Chair of the Department of Earth Sciences. He is the founding Director of Florida Center for Analytical Electron Microscopy (FCAEM, www.fiu.edu/~emlab), a statewide facility. Prof. Sen served as a Program Manager for 2.5 years and as a panelist for 6 more years at the National Science Foundation. In addition, Prof. Sen was a member on several Tenure & Promotion committees at FIU, University of the West Indies, Indian Institute of Technology (Bombay), Jadavpur University (India), and the University of Miami. Prof. Sen's research has been supported by NSF grants (including a MRI) for 22 years. These grants have supported 4 post-doctoral fellows and graduate/undergraduate students. His published works include papers in flagship journals, *Science*, *Nature*, and an Undergraduate textbook. His research accomplishments include a cover article in *Science* on finding the deepest (excluding the earth's Core) magma chamber on earth. Prof. Sen served as the founding Director of the Presidential Lecture Series (that included speeches by several Nobel laureate scientists) and played a central role in the creation of the CeSMEC (Center for the study of matter under extreme conditions). He was a member of the Faculty Senate at FIU for several years. The University has recognized Prof. Sen's services with a prestigious Service Award. Prof. Sen presently supervises 1 post-doctoral fellow, and 2 graduate students.

(Detailed CV in the next pages)

Name: **Gautam Sen**

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Education: Ph.D., 1981, The University of Texas at Dallas
M.Sc.(First Class Second), 1973, Calcutta University, India
B.Sc. (Hons.), 1971, Calcutta University, India

Employment

Academic: 1992 - present: Professor, FIU
1987-1992 Associate Professor (tenured), FIU
1984-1987: Assistant Professor, FIU
1981-1984: Post-Doctoral Fellow, UCLA (W.G. Ernst, P.I.)
1981: Visiting Assistant Professor, UT Dallas
1976-1981: Teaching & Research Assistant, UT Dallas

Administrative: 2007-present: Associate Dean of Arts & Sciences, FIU
2001-2007: Director of Florida Center for Analytical
Electron Microscopy:

FIU: 1995Aug.-2001: Chair of the Department of Geology
(Earth Sciences)

NSF: 1992 March - '94Aug: Program Manager, Ocean Sciences
Division, National Science Foundation

Industrial:
Atlantic Richfield 1981(Summer): Research Geologist;
Oil & Gas Co:

Honors & Awards:

2005: University Award for Excellence in Service, *FIU*
2002-5: Founding Director, Presidential Lecture Series, FIU
2002: University Award for Excellence in Research, *FIU*
1991: College of Arts & Sciences Faculty Excellence Award, *FIU*
1990: Life Fellow, Geological Society of India
1988: University Award for Excellence in Research, *FIU*

Research Experience

From experimental petrology (application of thermodynamics to geological problems), field geology to trace element and isotope geochemistry and modeling. Specific projects include: Hawaiian mantle xenoliths, oceanic lithosphere formation, Hawaiian magma generation, Origin of Continental Flood basalts, Haitian K/T boundary, and Thermobarometry

Service to the Community

Committees, External:

- 2009: Panelist, NIH – High-end instrumentation Program
- 2006-7: Panelist, NSF – International Ocean Drilling Program
- 2004: Panelist, NSF Marine Geology & Geophysics
- 2002: Professorial Promotion Committee, RSMAS, University of Miami
- 1998: Rosenstiel Medal Committee, RSMAS, University of Miami
- 1995: Panelist, Ocean Sciences Division, NSF
- 1994-'95: Member, Site Review Panel of Minority Research Centers of Excellence Program, NSF
- 1989-'91: Member, Review Panel of Ocean Sciences, NSF

National and International Conferences/Workshops

- 2008: Principal workshop speaker on Remote Instrumentation, REUNA, Chile
- 2008: Invited Speaker, 50th Anniversary of Geological Soc. India.
- 2007: Invited Speaker, Indian Science Congress, Annamalaiagar, India.
- 2003: Invited Speaker, Symposium on Plate Pushing (in honor of W.G. Ernst) Geol. Soc. Am. Annual Mtg., Seattle
- 2003: Invited Speaker, Columbia River Basalt Symposium (in honor of P.R. Hooper), Geol. Soc. Am. Annual Mtg., Seattle
- 2003: Convener, VGP Session on Melting of the Mantle and Formation of Basalt Magmas: Am. Geophys. Union, San Francisco
- 1997: Chair, Session on Mantle melting, Am. Geophys. Un., San Francisco
- 1990: Co-organizer of Deccan Traps Workshop (Bombay) [NSF supported]
- 1988: Chairman, Experimental Petrology, American Geophysical Union, Baltimore
- 1987: Chairman, Igneous Petrology, Geol. Soc. Amer. Annual Mtg., Phoenix

Other Services

- 1984-present (at various times) Reviewer for Nature, Science, Geology, J. Petrol., Am. Mineral., J. Geophys. Res, Geophys. Res. Lett., Contrib. Mineral. Petrol., Geochim. Cosmochim. Acta, Earth Planet. Sci. Lett., Journal of Asian Earth Sciences, International Geology Review, J. Geosci. Educ.
- 1983-present: Proposal Reviewer, NSF, PRF (Am. Chem. Soc.)

Committees, Internal (FIU):

- 2004-8: Member of the Faculty Senate
- 2004-6: Member of the Tenure & Promotions Committee, College of A&S
- 2005: Member of the Program Evaluation Committee for Mathematics
- 2002-5: Director, Presidential Lecture Series, FIU
- 2002: Advisor to the Provost, Search for the Dean of Graduate School
- 2000-01: Honorary Degrees and Awards Committee
- 2000-2005: Director, Presidential Lecture Series in the Sciences
- 1989-'91: Member of the Faculty Senate
- 1989-91: Member of the Senate Procedural Committee

Societies: American Geophysical Union

Geological Society of India (Life Fellow)
Hands on Miami

Students (Supervisor) S. Keshav (Ph.D.'03), S. Durand (Ph.D. '06), M. Borges (Ph.D. '08), I. S. Sen (current Ph.D. student), A. Acosta (M.S.'07), K. Chau (current M.S. student) S. Schulze (Seniors thesis'03, Ph.D. '08 at ASU)

Dr. T. H. Cohen (M.S.'89, Ph.D. @ RPI), Mr. Z. Gao (M.S.'90), Dr. A. Gangopadhyay (M.S.'98. Ph.D. @ U. of Maryland), Z. Atlas (M.S. '01, Ph.D.'08 University of Miami)

Students (Ph.D. Committee) K. Panneerselvam, M. Sun, Z. Atlas (external), U. Bhui (external), S. Bhattacharya (external), S. Rekhi (Harvard), Z. Wang (Los Alamos), N. Pathak, Y. George (these last 4 are in Materials Science)

Post-Docs supervised H-J Yang (Asst. Prof., NCKU, Taiwan), M. Ducea (Assoc. Prof. U. Arizona), M. Bizimis (Asst. Prof., Univ. S. Carolina), M. Borges (Scientist, Corning Glass, NY)

Research Interests: Planetary Mantles. Plumes, and Volcanism

PUBLICATIONS

(Presentations at Meetings or Newspaper articles not included)

Books

2001 "Earth Materials: Minerals & Rocks", 560 pp. Prentice-Hall. [This is a textbook for 3rd and 4th year undergraduates]

Book Review

2000 Mantle Petrology: Field Observations and High Pressure Experimentation (a Tribute to Francis R. (Joe) Boyd) edited by Y. Fei, C. M. Bertka and B. O. Mysen, Geochemical Society Special Publication 6. (The Geochemical Society, Houston, TX, 1999. 322 pp.), *J. Petrology*. 41, 1821-1825.

Journals

(The highlighted authors below are current or ex-students or post-docs of the PI)

- 2009 Deccan plume, lithosphere rifting, and volcanism in Kutch, India. *Earth Planet. Sci. Lett.* 277, 101-111 [Sen, G., **Bizimis, M.**, Das, R., Paul, D.K., Biswas, S.]
- 2007 Garnet-bearing Xenoliths from Salt Lake Crater, Oahu, Hawaii: High-Pressure Fractional crystallization in the Oceanic Mantle. *Journal of Petrology* 48, 1681-1724 [**Keshav, S.**, Sen, G, Presnall, DC].
- 2007 Ancient recycled mantle lithosphere in the Hawaiian plume: Osmium-Hafnium isotopic evidence from peridotite mantle xenoliths. **Earth Planet. Sci. Lett.** 257, 259-273 [**Bizimis, M.**, Griselein, M., Lassiter, J.C., Salters, V.J.M., Sen, G.]
- 2006 A Case for Short Duration of Deccan Trap Eruption-*EOS*, v. 87, no. 20, 197-204 [Sen, G., **Borges, M.**, and Marsh, B.D.]
- 2006 Melt inclusions from Volcan Popocatepetl and Volcan de Colima, Mexico: melt evolution due to vapor-saturated crystallization during ascent. **J. Volcanol. Geotherm. Res.** 153, 221-240. [Atlas, **Z.D.**, Dixon, J.E., Sen, G., Finney, M., Martin-Del-Pozzo, A. L.]
- 2005 Hawaiian lithosphere and magmas: Composition and thermal characteristics of the lithosphere beneath Oahu: Insights from mantle xenoliths. **American Mineralogist** 90, 871-887. [Sen, G., **Keshav, S.**, and **Bizimis, M.**]
- 2005 Spatial and temporal variations of the Haitian K/Y boundary record: implications concerning the event or events. **Journal of Iberian Geology** 31, 113-133. [Maurrasse, F. J-M R., Lomolda, M.A., Aguado, R., Peryt, D., and Sen, G.]
2005. Experimental crystallization of Deccan Basalts at low pressure: effect of contamination on phase equilibrium. **A. De Volume, Indian Journal of Earth Science** 75, 54-71. [**Gangopadhyay, A.**, Sen, G. and **Keshav, S**]
2005. Hf-Nd-Sr isotope systematics of garnet pyroxenites from Salt Lake Crater, Oahu, Hawaii: Evidence for a depleted component in Hawaiian volcanism. **Geochim. Cosmochim. Acta.** 69, 2629-2646. [**Bizimis, M.**, Sen, G., Salters, V.J.M., and **Keshav, S**]
- 2004 High-pressure melting experiments on garnet clinopyroxenite and the alkalic to tholeiitic transition in ocean island basalts. **Earth Planet. Sci. Lett.** 223, 365-379 [**Keshav, S.**, Gudfinnsson, G.H., Sen, G., and Fei, Y.]
- 2004 The depth of magma fractionation in the oceanic mantle: insights from garnet-bearing xenoliths from Oahu, Hawaii. **Geophys. Res. Lett.** 31, DOI 10.1029/2003GL018990 [**Keshav, S.** and Sen, G.]

- 2004 Preeruption history of the Grande Ronde formation lavas, Columbia River Basalt Group, American Northwest: Evidence from phenocrysts: **Geology** (293-296) [**S.R. Durand** and G. Sen].
- 2004 Hf-Nd isotope decoupling in the oceanic lithosphere: **Earth Planet. Sci. Lett** 217, 43-58. [**M. Bizimis**, G. Sen, V.J.M. Salters].
- 2004 Suggestion for Proposal Reviews: **EOS. Transactions American Geophysical Union** 85, 171 [D. Genereux, G. Sen]
- 2003 Anomalous isotopes and trace element zoning in plagioclase peridotite xenoliths of Oahu (Hawaii): Implications for the Hawaiian plume: **Earth Planet. Sci. Lett.** 207,23-38. [G. Sen, M. **H-J. Yang**, **M. Ducea**].
- 2003 A rare composite xenolith from Salt Lake Crater, Oahu: high-pressure fractionation and implications for kimberlitic melts in the Hawaiian Mantle. **Contrib. Mineral. Petrol.** 144, 548-558 [**Keshav, S.** and Sen, G.]
- 2002: Melt depletion and subsequent metasomatism in the shallow mantle beneath Koolau volcano, Oahu (Hawaii) **Geochemistry, Geophysics, Geosystems.** 3, 1029/2001GC000184 [February issue, **M. Ducea**, G. Sen, J. Eiler, J. Fimbres]
- 2002: Giant Plagioclase Basalts, eruption rate versus time: Response to Sheth's comments and some additional thoughts, **Proc. Nat. Acad. Sci., India**, 110, 409-431.
- 2001: Generation of Deccan Trap Basalts, **Proc. Nat. Acad. Sci., India**, 110, 409-431.
- 2001 Majoritic Garnets in Hawaiian Xenoliths: preliminary results [**S. Keshav** & G. Sen,] **Geophys. Res. Lett.** Vol. 28 , No. 18 , p. 3509-12.
- 1998: Mid-Ocean Ridge Melting: Constraints from Lithospheric xenoliths at Oahu, Hawaii **J. Petrol.** 39, 277-295 [**H.J. Yang**, G. Sen, & N. Shimizu]
- 1996 Significance of hydrous alkaline melts in Hawaiian xenoliths: **Contrib. Mineral. Petrol.** 122, 415-427. [G. Sen, A. Macfarlane, & N. Srimal].
- 1995 A simple petrologic model for the generation of Deccan Trap magmas: **International Geol. Rev.** 37, 825-850.
- 1994 Fractionation and ascent of Deccan Trap magmas: An experimental study at 6 kilobar pressure: *in* **Volcanism** (K. V. Subbarao, ed.), 173-186; [**T. H. Cohen** & G. Sen].

- 1994 Deccan intrusion, crustal extension, doming, and the size of the Deccan-Reunion plume head: *in* **Volcanism** (K. V. Subbarao, ed.), 201-216; [G. Sen & **T. H. Cohen**].
- 1993 Evolution of the lithosphere beneath Oahu, Hawaii: Rare earth element abundances in mantle xenoliths: **Earth Planet. Sci. Lett.** 119, 53-69 [G. Sen, F. A. Frey, N. Shimizu, & W. P. Leeman].
- 1993 Earth's mantle, plumes, and volcanism in Hawaii: **Indian Academy of Sciences, Saha Volume** 63 (A), I, 15-32.
- 1991 Impacts, tsunamis, and the Haitian Cretaceous-Tertiary boundary layer: **Science**, 252, 1690-1693 [F. J-M. R. Maurrasse & G. Sen].
- 1991 Iron-rich lherzolitic xenoliths from Oahu: Origin and implications for Hawaiian magma sources, **Earth Planet. Sci. Lett.**, 102, 45-57 [G. Sen & W.P. Leeman].
- 1990 Cumulate xenolith in Oahu, Hawaii: Implications for Deep Magma Chambers and Hawaiian volcanism: **Science**, 249, 1154-1157 [G.Sen & R. Jones].
- 1990 Occurrence, geochemistry and igneous petrogenesis of magnesian metavolcanic rocks from the WTrPz belt, central Klamath Mountains, northern California: **Bull. Geol. Soc. America** [W.G. Ernst, M.D. Barton, B.R. Hacker, G. Sen].
- 1989 Experimental equilibration of multicomponent pyroxenes in the Spinel peridotite field: Implications for practical thermometers and a possible barometer: **J. Geophys. Res.** 94, 17871-17880 [G. Sen & R. Jones].
- 1988 THERMOBAR: A Pascal program to calculate temperature and pressure of mantle rocks: **Computers & Geosciences** 14, 527-539. [N. Prabhakaran & G. Sen].
- 1988 Possible depth of origin of primary Deccan tholeiite magma: *In* **Deccan Flood Basalts** (K.V. Subbarao, ed), *Memoir of the Geological Society of India*, 10 ,35-51.
- 1988 Exsolved silicate and oxide phases form clinopyroxenes in a single Hawaiian xenolith: Implications for oxidation state of the Hawaiian upper mantle: **Geology** 16, 69-72. [G. Sen & R.E. Jones].
- 1988 Geochemistry of basalts from the Dumisseau formation of Southern Haiti: Implication for the origin of the Caribbean Sea crust: **Earth Planet. Sci. Lett.** 87, 427-437. [G. Sen, R. Hickey-Vargas, D.G. Wagoner, & F. Maurrasse].

- 1988 Hot Spot basalts from Southern Haiti: Evidence for derivation of TiO₂-rich Dumisseau formation magmas from a homogeneous mantle source: **Trans. 11th Caribbean Geological Conf. Barbados** 25, 1-17 [G. Sen & F. Maurrasse].
- 1988 Petrogenesis of spinel lherzolite and pyroxenite suite xenoliths from the Koolau shield, Oahu, Hawaii: Implications for petrology of the post-eruptive lithosphere beneath Oahu: **Contrib. Mineral. Petrol.** 100, 61-91.
- 1987 Xenoliths associated with the Hawaiian Hot Spot: *In* **Mantle Xenoliths** (P.H. Nixon, ed.), J. Wiley, 359-375.
- 1986 Mineralogy and petrogenesis of the Deccan Trap lavas around Mahabaleshwar, India: **J. Petrol.** 27, 627-663.
- 1986 Petrogenesis of the Dunite xenoliths from the Koolau volcano, Oahu, Hawaii: Implications for Hawaiian volcanism: **J. Petrol.** 27, 197-217. [G. Sen & D.C. Presnall].
- 1985 Experimental determination of pyroxene compositions in the system CaO-MgO-Al₂O₃-SiO₂ at 900-1200°C and 10-15 kbar using PbO and H₂O fluxes: **American Mineral.** 70, 678-695.
- 1984 Liquidus phase relations on the join anorthite-forsterite-quartz at 10 kbar, with applications to basalt petrogenesis: **Contrib. Mineral. Petrol.** 85, 404-408. [G. Sen & D.C. Presnall].
- 1983 A petrologic model for the constitution of the upper mantle and crust of the Koolau shield, Oahu, Hawaii, and Hawaiian magmatism: **Earth Planet. Sci. Lett.** 62, 215-228.
- 1983 Deccan Trap intrusion: Magma mixing in the Chakhla-Delakhari sill, Chhindwara district, Madhya Pradesh (India): **J. Geol. Soc. India** 24, 381-393.
- 1982 Composition of basaltic liquids generated from a partially depleted lherzolite at 9 kbar pressure: **Nature** 299, 336-338.
- 1982 Discussion of the paper - "Na and Cr contents in clinopyroxenes from peridotites: A possible discriminant between 'sub-continental' and 'sub-oceanic' mantle: by J. Kornprobst et al: **Earth Planet. Sci. Lett.** 60, 45-454.
- 1980 Mineralogical variations in the Delakhari sill, Deccan Trap intrusion, central India: **Contrib. Mineral. Petrol.** 75, 71-78.

Invited Talks within the last 5 years:

- 2008 REUNA, Chile (lead speaker on remote instrumentation)

- 2008 Geol. Society India 50th Anniversary (Bangalore)
- 2008 North Carolina State University
- 2007 Indian Science Congress, Annamalai Univ. campus, India
- 2006 Florida International University
- 2005 University of Miami, main campus (on Indian Ocean tsunami)
- 2004 University of Florida
- 2003 University of Miami, RSMAS (January)
- 2002 Geological Society of America (Ernstfest II, November; Prof. W.G. Ernst's retirement celebration)
- 2002 Florida State University (Department Colloquium, November)
- 2002 Florida International University (Departmental Colloquium, October)

Abstracts of More “recent” presentations at national conferences/meetings:

My students, post-docs and I have presented at least 1 or 2 papers at every American Geophysical Union (San Francisco) annual meeting and/or Geological Society of America Annual Meeting since 1985. In our field, meeting presentations do not mean as much as refereed publications. Below I cite **only a sprinkling of** references.

- 2009: High-MgO Glass (Melt) inclusions in the 200 million year old Palisades Sill, New Jersey, USA, Goldschmidt Conference, Davos, Switzerland.
- 2008: Sen, I., Bizimis, M., and Sen, G., Platinum Group Element Abundances in the Hawaiian Mantle: Constraints from in-Situ Sulfide and Bulk Rock Analyses of Garnet Pyroxenite Xenoliths from Oahu, 2008 Joint Annual Meeting of the Geological Society of America, Abstract 141-13.
- 2007: Sen, I., Sen, G. and Bizimis, M., (2007). Sulfides in the garnet pyroxenites from Oahu, Hawaii (AGU, Fall Meeting).
- 2006: Borges, M.R., Sen, G., Hart, G.R., Wolff, J.A., Crystal Zoning in Deccan Giant Plagioclase Basalts: Implications for a Short Duration of Deccan Trap Eruption, AGU Mtg. Abstr. 87(52) V51B-1677
- 2005: Durand, S.R., Sen, G., Reidel, S.P., Origin of the Grande Ronde Basalts, Columbia River Basalt Group: Eos Trans. AGU Mtg. Abstr. 86 (52) V41C-1454
- 2005: Bizimis, M, Salters, V J., Sen, G., Keshav, S., Ducea, M., The Heterogeneous Hawaiian Lithosphere: New Isotope Data From Kauai and Oahu Peridotites, Eos Trans. AGU Mtg. Abstr. 86 (52) V51A-1467.
- 2004: Bizimis, M, Lassiter, J.C., Salters, V J., Sen, G., Griselin, M., Extreme Hf-Os Isotope Compositions in Hawaiian Peridotite Xenoliths: Evidence for an Ancient Recycled Lithosphere Eos Trans. AGU Mtg. Abstr. 85 (47) V51B-0550.
- 2003: Sen, G., Keshav, S., Bizimis, M., Mcfarlane, A, Water, phlogopite, amphibole, carbonatite and a new model for the lithosphere/asthenosphere transition and the low velocity zone beneath Oahu: Eos Trans. AGU. Mtg. Abstr. 55-2. [Invited]
- 2003: Durand, S.R. and Sen, G, Evidence for shallow differentiation and magma mixing of the Grande Ronde Formation, Columbia River Basalt Group: Geol. Soc. Am. Ann. Mtg. Abstr. [Invited]

- 2003: Mukherjee, S., Bizimis, M, Keshav, S , Sen, G., Hydrous and anhydrous garnet-bearing mantle xenoliths from Hawaii: Isotopic Heterogeneity? Eos Trans. AGU 84 (46) Fall Mtg San Francisco Abstract V12C-0597.
- 2003: Keshav, S, Gudfinnsson, G H, Sen, G, Presnall, D C, Fei, Y, Ocean Island Lavas: Garnet Clinopyroxenite or CO₂-bearing Mantle Lherzolite? Eos Trans. AGU 84 (46) Fall Mtg San Francisco Abstract V42H-05 INVITED
- 2003: Sen, G., Bizimis, M., Keshav, S, A Physical Description of the Lithosphere and Seismic Low-Velocity Zone beneath Oahu: Perspectives from Hawaiian Mantle Xenoliths: Eos Trans. AGU 84 (46) Fall Mtg San Francisco Abstract V42H-04 INVITED.
- 2003: Bizimis, M, Sen, G., Salters, V J, Volatile-Rich Mineral Phases in the Hawaiian Lithosphere: Phlogopites and Carbonates in 0-age Garnet Pyroxenite Xenoliths From Salt Lake Crater, (Oahu, Hawaii). Eos Trans. AGU 84 (46) Fall Mtg San Francisco.
- 2002: Atlas, Z D, Sen, G, Finny, M, and Dixon, J.E. Melt Inclusion from Volcan Colima and Popocat'petl, melt generation by combined fractionation and degassing, Trans. AGU V22A-1218 [*Atlas received the Best Student Paper Award.*]
- 2002: Durand, S.R., Sen, G. Basaltic Lava Floods on Continents: A Case of Exothermic Magma Mixing in the Columbia River Basalt Group, American Northwest, Trans. AGU V71B-1269
- 2002: Keshav, S, Sen, G., Exsolution Times of Hawaiian Garnet Pyroxenites, Trans. AGU V62B-1409
- 2002: Sen, G., Keshav, S., Presnall, D.C., Weng, Y-H., High-pressure Polybaric Fractionation and Spinel-Garnet-Liquid Reactions in Garnet-bearing Xenoliths from Oahu: Evidence from CMAS, Trans. AGU V62B-1410.
- 2001: Sen, G., Keshav, S., Sowerby, J., Ilmenite Exsolution in Xenolithic Garnets From the Hawaiian Hot Spot: Evidence for the Existence of High-titanium Garnets in the Earth's Mantle: Am. Geophys. Union, SF, 82, V12B-0975.