

MARCO SCAMBELLURI

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CURRICULUM VITAE

27-11-1984: Degree in Geological Sciences, University of Torino, Italy.
12-09-1989: PhD in Earth Sciences, University of Genova, Italy. Thesis in metamorphic petrology.
16-06-1990: Permanent research position in Petrography and Petrology, University of Genova, Italy.
01-09-2000 - present: Associate Professor in Petrography and Petrology, University of Genova.

Research activity

Research activity in metamorphic petrology, the genesis of metamorphic fluids, fluid/rock interactions and petrology of eclogite-facies rocks. Research is focussed on high- (HP) and ultrahigh-pressure (UHP) metamorphism of oceanic and continental lithosphere from the Alps, the Betic Cordillera (South-Eastern Spain), Dabie-Shan and Sulu (China), the Caledonides of Western Norway. The research is field-based and process-oriented, aimed to understand behaviour of rock and fluid systems in subduction environments.

Goals:

- **Tectonic and petrologic processes recorded by high (HP) and ultrahigh-pressure (UHP) rocks** during subduction, exhumation and emplacement in orogenic belts.

Targets:

- the pre-subduction features of rocks and their influence on subduction-zone processes;
- stability of hydrous phases in HP and UHP rocks, their role as water carriers and as low-density buoyant media for exhumation;
- dating eclogite-facies rocks in belt and in sedimentary molasses.

- **Mantle metasomatism by subduction fluids.**

Targets

- Interaction fluids/melts with supra-subduction HP and UHP mantle peridotites (Alps, China, Western Norway) down to about 200 km depth.

- **Role of fluids in subduction-zones, mass transfer and genesis of magmas at convergent plate margins.**

Targets:

- fluid and multiphase solid inclusions in HP-UHP rocks and metamorphic veins.
- fluid and incompatible element recycling using fluid-mobile elements - boron, chlorine, lithium, halogens, chalcophile and large-ion lithophile element - in rock- and vein- minerals and in fluid inclusions.

- **Volatile and incompatible element recycling from oceans to the deep mantle.**

Targets:

- water and carbon storage in hydrates and carbonates, their cycles in subduction-zones, and the significance of fluid-related polycrystalline inclusions.
- O-H, B, Cl and noble gas isotope imprints of HP-UHP rocks, to assess the extent of fluid-rock re-equilibration during subduction and the length-scales of fluid migration in deep subduction environments.

- **Seismic structures in fossil subduction-zone rocks as monitors of fossil earthquakes.**

Targets:

- The use of pseudotachylite and co-seismic structures in fossil rocks to define the mechanisms assisting the seismic failure of rocks from different subduction-zone domains.

Production

M. Scambelluri published **65** papers on international ISI magazines, **13** papers on national magazines and **10** papers as proceedings of international meetings and excursion guidebooks. Citations: 2906, H Index = 32 (ISI web of Science); 2935, H Index 32 (Scopus); 3622 H Index 34 (Google Scholar).

Funding agencies, granted projects, partnership to international programs

Italian Ministry of University and research (MIUR; PRIN – COFIN projects):

PRIN-COFIN 2003, 2005, 2007, 2009, 2012.

European Union:

- 2013 Marie Curie Initial Training Network (Call FP7-People-2013-ITN) “ZIP Zooming in Between the plates (Coordinator: Philippe Agard, UPMC).

- 2016 ERC – Starting Grant True Depths - subduction from Piezobarometry on Host –inclusions Systems, H2020 (Coordinator: Dr. M. Alvaro, Pavia University)

Partnership to USA programs

- 2016 PIRE: ExTerra Field Institute and Research Endeavor (E-FIRE), Founded by NSF. International senior personnel and Advisory Board member.

Stages

- November 1987 - July-1988: Research stage at the ETH Zentrum, Zuerich, to develop a petrologic study of eclogites and fluids in the eclogitic metagabbros of the Ligurian Alps.

- January - February 1999: Research stage at the ETH Zentrum, Zuerich, for a study of fluid inclusion in metamorphic harzburgites of the Betic Cordillera (South Eastern Spain).

- September 2003: Research stage at the Research School of Earth Sciences, Australian National University, to study the variability of light elements and water in mantle minerals.

- September - October 2014: invited professor at the Institute of Earth Sciences (ISTeP), University Pierre et Marie Curie (UPMC), Paris.

Collaborations

- *Thomas Pettke, Joerg Hermann e Daniela Rubatto*, Institute of Geological Sciences, University of Bern, Svizzera;

- *Stefano Poli, Enrico Cannà, Massimo Tiepolo*: Dipartimento di Scienze della Terra, Università di Milano;

- *Nadia Malaspina*: Dipartimento di Scienze Geologiche e Geotecnologie, Università di Milano Bicocca,

- *Matteo Alvaro*: Dipartimento di Scienze della Terra e dell’Ambiente, Università di Pavia;

- *Samuele Agostini*, Istituto di Geoscienze e Georisorse, IGG-CNR, Pisa

- *Gray Bebout*: Department of Earth and Environmental Sciences, Lehigh University, Pennsylvania, USA;

- *Taras Gerya*: Institut für Geophysik, ETH Zentrum, Zurich, Svizzera;

- *Mark Kendrick*: School of Earth Sciences, The University of Melbourne, Australia;

- *Timm John*: **Institut für Mineralogie** University of Munster, Germany.

- *Othmar Muentener*, Institute of Geological Sciences, University of Lausanne, Svizzera;

- *Philippe Agard*: University Pierre et Marie Curie, Paris, France.

Organization of scientific activities, symposia, invited talks

Organized sessions, symposia

Marco Scambelluri has given invited talks at international and national conferences, seminars at national and international doctorate schools and in Italian and foreign Universities and Research Centres.

Seminars and series of lectures: Tokyo Institute of Technology, Japan; Research School of Earth Sciences, ANU, Australia; Stanford, USA; Kyoto University, Japan; University of Bern, Switzerland; Ecole Normale Supérieure, Lyon, France; University of Granada, Spain; Budapest, Hungary; School of Earth and Space Sciences, University of Science and Technology of China Hefei; E-FIRE retreat San Francisco, USA).

Invited talks: Keynote at IGC 2004 in Florence, Italy, at the Goldschmidt Conference 2009 in Davos, Switzerland; Invited talks at Geomar, Kiel, Germany; Kyoto and Beppu Island, Japan; Session “V40 Serpentinization and Dehydration as Major Processes for Deep Earth Elemental Cycling” AGU fall Meeting 2012, San Francisco, USA; Session DI44A The Distribution and Pathways of Melts, Fluids, and Volatiles in Subduction Systems: A Multidisciplinary Approach II, AGU fall Meeting 2016, San Francisco, USA; Plenary Lecture at European Mineralogical Conference – EMC2016, Rimini, Italy).

Member of the ILP IX (International Lithosphere Program) taskforce on Subduction Channel Processes. He has organized symposia at International Meetings like EGU (2007; 2009; 2011), Goldschmidt (2011), International Geological Congress (2004 and 2012), and has taken part to the organization of networks for International Doctorate Schools (partner of Network ISPET – International Seminars in Petrology).

Editorial activity and reviews

Since 2011 Marco Scambelluri is Chief Editor of *Lithos* (Elsevier, IF 3.677). He is member of the editorial board of the Italian Journal of Geoscience. Guest editor of the Special Issue: “Subduction versus intraplate lithospheric mantle: agents and processes” published on *Lithos*. Referee for funding agencies (Italian MIUR; NSF, USA; Australian ARC; Swiss SNSF) and for national and international magazines.

Teaching and training activity

The teaching activity of Marco Scambelluri is in the frame of the Bachelor and Master Courses in Earth Sciences at the University of Genova. Since the 1990 he held courses in Petrography, Petrology, Applied Petrography, Tectonics and Metamorphism of basement rocks, and practical courses and field courses in petrography and petrology of metamorphic and igneous rocks.

Marco Scambelluri is member the Council of the Doctorate School in Geological and Environmental Science of the University of Genova. He supervised the PhD Earth Sciences theses of Franca Vallis, Laura Federico (now Associate Professor - University of Genova), Nadia Malaspina (now with permanent research position – Milano Bicocca University), Cristina Malatesta (Post-Doc – University of Genova), Enrico Cannà (Post-Doc – University of Milano), Mattia Gilio (Post-Doc – University of Pavia), Nicola Campomenosi (PhD - University of Genova). He has been responsible for the partner Genova University within the Marie Curie Multipartner Initial Training Network *ZIP Zooming In between Plates: deciphering the nature of the plate interface in subduction zones*, that promoted the high scientific formation of 12 PhDs and 2 post-Docs.

Publications since 2010

- Scambelluri M., Van Roermund H.L.M., Pettke T. (2010) Mantle wedge peridotites: Fossil reservoirs of deep subduction zone processes Inferences from high and ultrahigh-pressure rocks from Bardane (Western Norway) and Ulten (Italian Alps). *Lithos* 120, 186-201.
- Scambelluri M., Rampone E., Braga R., Malaspina N. (2010) The Variscan garnet peridotites from the Eastern Alps (Ulten Zone). records of subduction metasomatism in the mantle wedge *Journal of the Virtual Explorer, Electronic Edition*, ISSN 1441-8142, volume 36, paper 28 In: (Eds.) Beltrando M., Peccerillo A., Mattei M., Conticelli S., Doglioni D., *The Geology of Italy*, 2010. doi: 10.3809/jvirtex.2009.00259
- Malaspina N., Scambelluri M., Poli S., Van Roermund, H.L.M., Langenhorst F. (2010). The oxidation state of mantle wedge majoritic garnet websterites metasomatized by C-bearing subduction fluids. *Earth and Planetary Science Letters*, 298, 417-426.
- Malaspina N., Scambelluri M., Pennacchioni G., Spagnolo C. 2011 Fluid-induced plastic deformation in the crustal Austroalpine system (Western Italian Alps): a petrologic and fluid inclusion analysis. *Italian Journal of Geosciences* 130, 61-74.
- John T., Scambelluri M., Frische M., Barnes J.D., Bach W. (2011) Dehydration of subducting serpentinite: Implications for halogen mobility in subduction zones and the deep halogen cycle. *Earth and Planetary Science Letters*, 308, 65-76.
- Kendrick M.A., Scambelluri M., Honda M., Phillips D. (2011) High noble gas and chlorine abundances delivered to the mantle by serpentine subduction. *Nature Geoscience* 4, 808-812.
- Malatesta C., Crispini L., Federico L., Capponi G., Scambelluri M. (2012) The exhumation of high pressure ophiolites (Voltri Massif, Western Alps): Insights from structural and petrologic data on metagabbro bodies. *Tectonophysics*, 568–569, 102-123
- Malatesta C., Gerya T., Scambelluri M., Crispini L., Capponi G. (2012) Intraoceanic subduction of “heterogeneous” oceanic lithosphere in narrow basins: 2D numerical modeling. *Lithos* 140–141, 234–251, doi:10.1016/j.lithos.2012.01.003
- Scambelluri M., Tonarini S. (2012) Boron isotope evidence for shallow fluid transfer across subduction zones by serpentinized mantle. *Geology* 40, n. 10, 907-910 doi 10.1130/G33233.1.
- Kendrick M., Honda M., Pettke T., Scambelluri M., Phillips D., Giuliani A. 2013. Subduction zone fluxes of halogens and noble gases in seafloor and forearc serpentinites. *Earth and Planetary Science Letters* 365, 86–96

- Scambelluri M. 2013. Comments on the paper 'Subduction of a fossil slow–ultraslow spreading ocean: a petrology-constrained geodynamic model based on the Voltri Massif, Ligurian Alps, NW Italy' by G. B. Piccardo, *International Geology Review*, Volume 55, Issue 7, 804-811 DOI:10.1080/00206814.2013.780367
- Halama R., Bebout G.E., John T., Scambelluri M. (2014) Nitrogen recycling in subducted mantle rocks and implications for the global nitrogen cycle. *International Journal of Earth Science* 103, 2081-2099.
- Scambelluri M., Pettke T., Rampone E. Godard M, Reusser E. 2014. Petrology and trace element budgets of high-pressure peridotites indicate subduction dehydration of serpentinitized mantle (Cima di Gagnone, Central Alps, Switzerland). *Journal of Petrology* 55, 459-498.
- Cannaò E., Agostini S., Scambelluri M., Tonarini S., Godard M. 2015. B, Sr and Pb isotope geochemistry of high-pressure Alpine metaperidotites monitors fluid-mediated element recycling during serpentinite dehydration in subduction melange (Cima di Gagnone, Swiss Central Alps). *Geochimica et Cosmochimica Acta* 163 (2015) 80–100
- Collins N.C. Bebout G.E., Angiboust S., Agard P., Scambelluri M., Crispini L., John T. 2015 Subduction Zone Metamorphic Pathway for Deep Carbon Cycling: II. Evidence from HP/UHP Metabasaltic Rocks and Ophicarbonates *Chemical Geology* 412, 132-150.
- Scambelluri M., Pettke T., Cannaò E. 2015. Fluid-related inclusions in Alpine high-pressure peridotite reveal trace element recycling during subduction-zone dehydration of serpentinitized mantle (Cima di Gagnone, Swiss Alps). *Earth and Planetary Science Letters* 429, 45-49.
- Scambelluri M., Cannaò E., Gilio M., Godard M. 2015. Petrologic and geochemical role of serpentinite in subduction zones and plate interface domains. *Rend. Online Soc. Geol. It.*, 37, 61-64
- Scambelluri M., Bebout G.E., Belmonte D., Gilio M., Campomenosi N., Collins N., Crispini L. 2016. Carbonation of subduction-zone serpentinite (high-pressure ophicarbonate; Ligurian Western Alps) and implications for the deep carbon cycling. *Earth and Planetary Science Letters* 441, 155-166.
- Plümper, O., John, T.; Podladchikov, Y., Vrijmoed J., Scambelluri M. 2016 Fluid escape from subduction zones controlled by channel-forming reactive porosity. *Nature Geoscience* 10, Pages: 150-156
- Peters D., Bretscher A., John T., Scambelluri M., Pettke T. 2017 Fluid-mobile elements in serpentinites: Constraints on serpentinitisation environments and element cycling in subduction zones. *Chemical Geology* 466 (2017) 654–666.
- Barnes, J.D., Manning, C., Scambelluri, M., and Selverstone, J., 2016 Behavior of halogens during subduction zone processes. In: *The Role of Halogens in Terrestrial and Extraterrestrial Geochemical Processes*. Harlov, D. and Aranovich, L. (Eds.) Springer.
- Scambelluri M., Pennacchioni G., Gilio M., Bestmann M., Plümper O., Nestola F. 2017 Fossil intermediate-depth earthquakes in subducting slabs linked to differential stress release. *Nature Geoscience* 10, 960–966.