

CURRICULUM VITAE

Andreas Audétat

Born: June 7, 1970 in Bern, Switzerland

Nationality: Swiss

Research Interests

- Formation of magmatic-hydrothermal ore deposits
- Melt inclusions, fluid inclusions
- Experimental geochemistry
- Thermobarometry of mafic to felsic magmas
- LA-ICP-MS analysis

Education

B.Sc. (Mineralogy and Petrology) 1995, ETH Zürich, Switzerland

Ph.D. (Mineral Resources) 1999, ETH Zürich, Switzerland

Professional Experience

2007 - present Senior Scientist, Bayerisches Geoinstitut, Germany
2004 - 2007 Research Associate, Bayerisches Geoinstitut, Germany
2001 - 2004 Research Scientist, Universität Tübingen, Germany
1999 - 2001 Research Scientist, Virginia Tech, USA

Awards and fellowships

2020 Brian J. Skinner award for outstanding paper in Economic Geology
2018 SEG Silver Medal, Society of Economic Geologists
2018 Co-recipient of Brian J. Skinner award for outstanding paper in
Economic Geology
2015 International Exchange Lecturer, Society of Economic Geologists
2013 Co-recipient of Brian J. Skinner award for outstanding paper in
Economic Geology
2006 Goldschmidt Medal of the German Mineralogical Society
2006 Science Price, University of Bayreuth
2010 Fellow of the Society of Economic Geologists
2003 Paul Niggli Medal
2000 ETH Silver Medal for outstanding Ph.D. thesis

Service

2018 - present Editorial Board, Journal of Petrology
2020 - present Editorial Board, Economic Geology

Grants

2021-2023 German Science Foundation Grant DFG AU314-6: 227,900 €

2014-2017 German Science Foundation Grant DFG AU314-5: 156,000 €
2010-2014 German Science Foundation Grant DFG AU314-1: 87,000 €

List of publications (underlined first authors are students of mine)

81. Audétat A., Miyajima N., Wiesner D. and Audinot J.-N. (in press) Confirmation of slow Ti diffusion in quartz by diffusion couple experiments and evidence from natural samples. *Geology*.
80. Audétat A. (in press) Comment on “Ti-in-quartz thermobarometry and TiO₂ solubility in rhyolitic melts: New experiments and parametrization” by Zhang et al. [Earth Planet. Sci. Lett. 538 (2020) 116213]. *Earth Planet. Sci. Lett.*
79. Arató R. and Audétat A. (in press) Titanomagnetite – silicate melt oxybarometry. In: *Magma Redox Geochemistry* (eds. R. Moretti and D. Neuville). *AGU Monograph Series*.
78. Chang J. and Audétat (in press) LA-ICP-MS analysis of crystallized melt inclusions in olivine, plagioclase, apatite and pyroxene: quantification strategies and effects of post-entrapment modifications. *J. Petrol.*
77. Audétat A. and Edmonds M. (2021) Magmatic-hydrothermal fluids. In: *Hydrothermal fluids* (eds. M. Steele-MacInnis and C. E. Manning). *Elements*. 16, 401-406.
76. Rustioni G., Audétat A. and Keppler H. (2021) A systematic assessment of the diamond trap method for measuring fluid compositions in high-pressure experiments. *Am. Mineral.* **106**, 28-37.
75. Rottier B., Audétat A. Kodera P. and Lexa J. (2020) Magmatic evolution of the mineralized Stiavnica volcano (Central Slovakia): evidence from thermobarometry, melt inclusions, and sulfide inclusions. *J. Volcanol. Geoth. Res.* **401**, 106967.
74. Du J. and Audétat A. (2020) Early sulphide saturation is not detrimental to porphyry Cu-Au formation. *Geology* **48**, 519-524.
73. Rottier B., Audétat A., Kodera P. and Lexa J. (2020) Origin and evolution of magmas in the porphyry Au -mineralized Javorie volcano (Central Slovakia): evidence from thermobarometry, melt inclusions, and sulfide inclusions. *J. Petrol.* **60**, 2449-2482.
72. Rustioni G., Audétat A. and Keppler H. (2019) Experimental evidence for fluid-induced melting in subduction zones. *Geochem. Persp. Lett.* **11**, 49-54.
71. Audétat A. (2019) The metal content of magmatic-hydrothermal fluids and its relationship to mineralization potential. *Econ. Geol.* **114**, 1033-1056.
70. Audétat A. and Zhang L. (2019) Abundances of S, Ga, Ge, Cd, In, Tl and 32 other major to trace elements in high-temperature (350-700 °C) magmatic-hydrothermal fluids. *Ore Geol. Rev.* **109**, 630-642.
69. Rottier, B. and Audétat A. (2019) In-situ quantification of chlorine and sulfur in glasses, minerals and melt inclusions by LA-ICP-MS. *Chem. Geol.* **504**, 1-13.
68. Audétat A., Zhang L. and Ni H. (2018) Copper and Li diffusion in plagioclase, pyroxenes, olivine and apatite, and consequences for the composition of melt inclusions. *Geochim. Cosmochim. Acta* **243**, 99-115.

67. Casanova V., Kouzmanov K., Audétat A., Wälle M., Ubrig N., Orтели M. and Fontboté L. (2018) Fluid inclusion studies in opaque ore minerals: II. A comparative study of syngenetic synthetic fluid inclusions hosted in quartz and opaque minerals. *Econ. Geol.* **113**, 1861-1883.
66. Chang J. and Audétat A. (2018) Petrogenesis and metal content of hornblende-rich xenoliths from two Laramide-age magma systems in southwestern USA: Insights into the metal budget of arc magmas. *J. Petrol.* **59**, 1869-1898.
65. Chang J., Li JW. and Audétat A. (2018) Formation and evolution of multistage magmatic-hydrothermal fluids at the Yulong porphyry Cu-Mo deposit, eastern Tibet: Insights from LA-ICP-MS analysis of fluid inclusions. *Geochim. Cosmochim. Acta* **232**, 181-205.
64. Guo H. and Audétat A. (2018) Gold diffusion into and out of quartz-hosted fluid inclusions during re-equilibration experiments at 600-800 °C and 2 kbar. *Chem. Geol.* **476**, 1-10.
63. Guo H., Audétat A. and Dolejs D. (2018) Solubility of gold in oxidized, sulfur-bearing fluids at 500-850 °C and 200-230 MPa: a synthetic fluid inclusion study. *Geochim. Cosmochim. Acta* **222**, 655-670.
62. Zhang D. and Audétat A. (2018) Magmatic-hydrothermal evolution of the barren Huangshan Pluton, Anhui Province, China: A melt and fluid inclusion study. *Econ. Geol.* **113**, 804-823.
61. Arató R. and Audétat A. (2017) FeTiMM – a new oxybarometer for mafic to felsic magmas. *Geochem. Persp. Lett.* **5**, 19-23
60. Arató R. and Audétat A. (2017) Vanadium magnetite–melt oxybarometry of natural, silicic magmas: a comparison of various oxybarometers and thermometers. *Contrib. Min. Petrol.* **172**, article #52.
59. Arató R. and A. A. (2017) Experimental calibration of a new oxybarometer for silicic magmas based on vanadium partitioning between magnetite and silicate melt. *Geochim. Cosmochim. Acta* **209**, 284-295.
58. Audétat A. and Li W. (2017) The genesis of Climax-type porphyry Mo deposits: Insights from fluid inclusions and melt inclusions. *Ore Geol. Rev.* **88**, 436-460.
57. Guo H. and Audétat A. (2017) Transfer of volatiles and metals from mafic to felsic magmas in composite magma chambers: an experimental study. *Geochim. Cosmochim. Acta* **198**, 360-378.
56. Zhang D. and Audétat A. (2017) What caused the formation of the giant Bingham Canyon porphyry Cu-Mo-Au deposit? Insights from melt inclusions and magmatic sulfides. *Econ. Geol.* **112**, 221-244.
55. Zhang D. and Audétat A. (2017) Chemistry, mineralogy and crystallization conditions of porphyry Mo-forming magmas at Urad–Henderson and Silver Creek, Colorado, USA. *J. Petrol.* **58**, 277-296.
54. Audétat A. (2015) Compositional evolution and formation conditions of magmas and fluids related to porphyry Mo mineralization at Climax, Colorado. *J. Petrol.*, **56**, 1519-1546.
53. Audétat A., Garbe-Schönberg C. D., Kronz A., Pettke T., Rusk B., Donovan J. and Lowers H. (2015) Characterization of a natural quartz crystal as reference material for microanalytical determination of Ti, Al, Li, Fe, Mn, Ga and Ge. *Geostand. Geoanal. Res.*, **39**, 171-184.

52. Li W., Audétat A. and Zhang J. (2015) The role of evaporites in the formation of magnetite-apatite deposits along the Middle and Lower Yangtze River, China: evidence from LA-ICP-MS analysis of fluid inclusions. *Ore Geol. Rev.*, **67**, 264-278.
51. Li Y. and Audétat A. (2015) Effects of temperature, silicate melt composition, and oxygen fugacity on the partitioning of V, Mn, Co, Ni, Cu, Zn, As, Mo, Ag, Sn, Sb, W, Au, Pb, and Bi between sulfide phases and silicate melt. *Geochim. Cosmochim. Acta*, **162**, 25-45.
50. Liu X., Xiong X., Audétat A. and Li Y. (2015) Partitioning of Cu between mafic minerals, Fe-Ti-oxides and intermediate-felsic melts. *Geochim. Cosmochim. Acta*, **151**, 86-102.
49. Sun W., Audétat A. and Dolejs D. (2014) Solubility of molybdenite in hydrous granitic melts at 800 °C, 100-200 MPa. *Geochim. Cosmochim. Acta*, **131**, 393-401.
48. Audétat A. and Lowenstern J. B. (2014) Melt inclusions. In: *Geochemistry of mineral deposits* (ed. S. D. Scott). Treatise on Geochemistry 2nd ed., **13**, 143-173.
47. Kularatne K. and Audétat A. (2014) Rutile solubility in hydrous rhyolite melts at 750-900 °C and 2 kbar, with application to titanium-in-quartz (TitaniQ) thermobarometry. *Geochim. Cosmochim. Acta*, **125**, 196-209.
46. Liu X., Xiong X., Audétat A., Li Y., Song M., Sun W. and Ding X. (2014) Partitioning of copper between olivine, orthopyroxene, clinopyroxene, spinel, garnet and silicate melts at upper mantle conditions. *Geochim. Cosmochim. Acta*, **125**, 1-22.
45. Audétat A. (2013) Origin of Ti-rich rims in quartz phenocrysts from the Upper Bandelier Tuff and the Tunnel Spring Tuff, southwestern USA. *Chem. Geol.* **360-361**, 99-104.
44. Bali E., Audétat A. and Keppler H. (2013) Water and hydrogen are immiscible in Earth's mantle. *Nature* **495**, 220-222.
43. Bernini D., Audétat A., Dolejs D. and Keppler H. (2013) Zircon solubility in aqueous fluids at high temperatures and pressures. *Geochim. Cosmochim. Acta* **119**, 178-187.
42. Lerchbaumer L. and Audétat A. (2013) The metal content of silicate melts and aqueous fluids in sub-economically Mo-mineralized granites: Implications for porphyry Mo genesis. *Econ. Geol.* **108**, 987-1013.
41. Li Y. and Audétat A. (2013) Gold solubility and partitioning between sulfide liquid, monosulfide solid solution and hydrous mantle melts: implications for the formation of Au-rich magmas and crust-mantle differentiation. *Geochim. Cosmochim. Acta* **118**, 247-262.
40. Audétat A. and Simon A. C. (2012) Magmatic controls on porphyry Cu genesis. In: *Geology and genesis of major copper deposits and districts of the world: a tribute to Richard Sillitoe* (eds. J. W. Hedenquist, M. Harris and F. Camus) *Society of Economic Geologists, Special Publication* **16**, 553-572.
39. Bali E., Keppler H. and Audétat A. (2012) The mobility of W and Mo in subduction zone fluids and the Mo-W-Th-U systematics of island arc magmas. *Earth Planet. Sci. Lett.*, 195-207.
38. Huang R. and Audétat A. (2012) The titanium-in-quartz (TitaniQ) thermobarometer: a critical examination and re-calibration. *Geochim. Cosmochim. Acta* **84**, 75-89.

37. Lerchbaumer L. and Audétat A. (2012) The quartz capsule – a new method to avoid alloying problems with noble metal capsules in hydrothermal experiments. *Eur. J. Mineral.* **24**, 683-693.
36. Lerchbaumer L. and Audétat A. (2012) High Cu concentrations in vapor-type fluid inclusions: an artifact? *Geochim. Cosmochim. Acta* **88**, 255-274.
35. Li Y. and Audétat A. (2012) Partitioning of V, Mn, Co, Ni, Cu, Zn, As, Mo, Ag, Sn, Sb, W, Au, Pb and Bi between sulfide phases and hydrous basanite melt at upper mantle conditions. *Earth Planet. Sci. Lett.* **355-356**, 327-340.
34. Mann U., Frost D. J., Rubie D. C., Becker H. and Audétat A. (2012) Partitioning of Ru, Rh, Pd, Re, Ir and Pt between liquid metal and silicate at high pressures and high temperatures - implications for the origin of highly siderophile element concentrations in the Earth's mantle. *Geochim. Cosmochim. Acta* **84**, 593-613.
33. Pettke T., Oberli F., Audétat A., Guillong M., Simon A. C., Hanley J. J. and Klemm L. M. (2012) Recent developments in element concentration and isotope ratio analysis of individual fluid inclusions by laser ablation single and multiple collector ICP-MS. *Ore Geol. Rev.* **44**, 10-38.
32. Tan J., Wei J., Audétat A. and Pettke T. (2012) Source of metals in the Guocheng gold deposit, Jiaodong Peninsula, North China Craton: link to early Cretaceous mafic magmatism originating from Paleoproterozoic metasomatized lithospheric mantle. *Ore Geol. Rev.* **48**, 70-87.
31. Zhang L., Audétat A. and Dolejs D. (2012) Solubility of molybdenite (MoS₂) in aqueous fluid at 600-800 °C, 200 MPa: a synthetic fluid inclusion study. *Geochim. Cosmochim. Acta* **77**, 175-185.
30. Audétat A., Dolejs D. and Lowenstern J. B. (2011) Molybdenite saturation in silicic magmas: occurrence and petrological implications. *J. Petrol.* **52**, 891-904.
29. Bali, E., Audétat A. and Keppler H. (2011) The mobility of U and Th in subduction zone fluids: an indicator of oxygen fugacity and fluid salinity. *Contrib. Mineral. Petrol.* **161**, 597-613.
28. Pettke T., Oberli F., Audétat A., Wiechert U. and Heinrich C. A. (2011) Quantification of transient signals in multiple collector inductively coupled plasma mass spectrometry: accurate lead isotope ratio determination by laser ablation of individual fluid inclusions. *J. Anal. At. Spectrom.* **26**, 475-492.
27. Xiong X. L., Keppler H., Audétat A., Ni H., Sun W. D. and Li Y. (2011) Partitioning of Nb and Ta between rutile and felsic melt and the fractionation of Nb/Ta during partial melting of hydrous metabasalt. *Geochim. Cosmochim. Acta* **75**, 1673-1692.
26. Audétat A. (2010) Source and evolution of molybdenum in the porphyry Mo (-Nb) deposit at Cave Peak, Texas. *J. Petrol.* **51**, 1739-1760.
25. Audétat A. and Bali, E. (2010) A new technique to seal volatile-rich samples into platinum capsules. *Eur. J. Mineral.* **22**, 23-27.
24. Li Y. and Audétat A. (2009) A method to synthesize large fluid inclusions in quartz at controlled times and under unfavorable growth conditions. *Am. Mineral.* **94**, 367-371.
23. Li Y., Audétat A., Lerchbaumer L. and Xiong X (2009) Rapid Na, Cu exchange between synthetic fluid inclusions and external aqueous solutions: evidence from LA-ICP-MS analysis. *Geofluids* **9**, 321-329.

22. Xiong X., Keppler, H., Audétat A., Gudfinnsson, G., Sun, W., Song M., Xiao W. and Li Y. (2009) Experimental constraints on rutile saturation during partial melting of metabasalt at the amphibolite to eclogite transition, with application to TTG genesis *Am. Mineral.* **94**, 1175-1186.
21. Audétat A., Pettke T. and Heinrich C. A. (2008) The composition of magmatic-hydrothermal fluids in barren and mineralized intrusions. *Econ. Geol.* **103**, 877-908.
20. Baier J., Audétat A. and Keppler H. (2008) The origin of the negative niobium tantalum anomaly in subduction zone magmas. *Earth Planet. Sci. Letters* **267**, 290-300.
19. Keppler H. and Audétat A. (2008) Vulkaneruptionen: Ursachen und Vorhersagen. *Physik in unserer Zeit* **39**, 132-138.
18. Duc-Tin Q., Audétat A. and Keppler H. (2007): Solubility of tin in (Cl, F)-bearing aqueous fluids at 700°C, 140 MPa: a LA-ICP-MS study on synthetic fluid inclusions. *Geochim. Cosmochim. Acta* **71**, 3323-3335.
17. Audétat A. and Pettke T. (2006) Evolution of a porphyry-Cu mineralized magma system at Santa Rita, New Mexico (U.S.A.). *J. Petrol.* **47**, 2021-2046.
16. Audétat A. and Keppler H. (2005) Solubility of rutile in subduction zone fluids, as determined by experiments in the hydrothermal diamond anvil cell. *Earth Planet. Sci. Letters* **232**, 393-402.
15. Keppler H. and Audétat A. (2005) Fluid-mineral interaction at high pressure. In *Mineral behaviour at extreme conditions* (ed. R. Miletich), EMU notes in mineralogy **7**, 225-251.
14. Pettke T., Audétat A., Schaltegger U. and Heinrich C. A. (2005) Magmatic-to-hydrothermal crystallization in the W-Sn mineralized Mole Granite (NSW, Australia) Part II: Evolving zircon and thorite trace element chemistry. *Chem. Geol.* **220**, 191-213.
13. Schaltegger U., Pettke T., Audétat A., Reusser E. and Heinrich C. A. (2005) Magmatic-to-hydrothermal crystallization in the W-Sn mineralized Mole Granite (NSW, Australia) Part I: Crystallization of zircon and REE-phosphates over three million years – a geochemical and U-Pb geochronological study. *Chem. Geol.* **220**, 215-235.
12. Audétat A. and Keppler H. (2004) Viscosity of fluids in subduction zones. *Science* **303**, 513-516.
11. Audétat A., Pettke T. and Dolejs D. (2004) Magmatic anhydrite and calcite in the ore-forming quartz-monzodiorite magma at Santa Rita, New Mexico (USA): genetic constraints on porphyry-Cu mineralization. *Lithos* **72**, 147-161.
10. Audétat A. and Pettke T. (2003) The magmatic-hydrothermal evolution of two barren granites: a melt- and fluid inclusion study of the Rito del Medio Pluton and Cañada Pinabete Plutons in northern New Mexico (USA). *Geochim. Cosmochim. Acta* **67**, 97-121.
9. Heinrich C. A., Pettke T., Halter W., Aigner M., Audétat A., Günther D., Hattendorf B., Bleiner D., Guillong M. and Horn I. (2003) Quantitative multi-element analysis of minerals, fluid and melt inclusions by Laser-Ablation Inductively-Coupled-Plasma Mass-Spectrometry. *Geochim. Cosmochim. Acta* **67**, 3473-3496.

8. Günther D., Hattendorf B. and Audétat A. (2001) Multi-element analysis of melt and fluid inclusions with improved detection capabilities for Ca and Fe using laser ablation with a dynamic reaction cell ICP-MS. *J. Anal. Atom. Spectrom.* **16**, 1085-1090.
7. Audétat A., Günther D. and Heinrich C. A. (2000) Causes for large-scale metal zonation around mineralized plutons: Fluid inclusion LA-ICP-MS evidence from the Mole Granite, Australia. *Econ. Geol.* **95**, 1563-1581.
6. Audétat A., Günther D. and Heinrich C. A. (2000) Magmatic-hydrothermal evolution in a fractionating granite: A microchemical study of the Sn-W-F-mineralized Mole Granite (Australia). *Geochim. Cosmochim. Acta.* **64**, 3373-3393.
5. Garofolo P., Audétat A., Günther D., Heinrich C. A. and Ridley J. (2000) Estimation and testing of standard molar thermodynamic properties of tourmaline end-members using data of natural samples. *Am. Mineral.* **85**, 78-88.
4. Audétat A. and Günther D. (1999) Mobilization and H₂O-loss from fluid inclusions in natural quartz crystals. *Contrib. Mineral. Petrol.* **137**, 1-14.
3. Heinrich C. A., Günther D., Audétat A., Ulrich T. and Frischknecht R. (1999) Metal fractionation between magmatic brine and vapor, determined by micro-analysis of fluid inclusions. *Geology* **27**, 755-758.
2. Audétat A., Günther D. and Heinrich C.A. (1998) Formation of a magmatic-hydrothermal ore deposit: insights with LA-ICP-MS analysis of fluid inclusions. *Science* **279**, 2091-2094.
1. Günther D., Audétat A., Frischknecht R. and Heinrich C.A. (1998) Quantitative analysis of major, minor and trace elements in fluid inclusions using LA-ICP-MS. *J. Anal. Atom. Spectrom.* **13**, 263-270.