

Curriculum Vitæ

FRANCIS ALBARÈDE

PROFESSOR OF GEOCHEMISTRY



ECOLE NORMALE SUPÉRIEURE DE LYON
46, Allée d'Italie
69364 Lyon Cedex 7, France

phone: (+33) 472 72 84 14
fax: (+33) 472 72 86 77
e-mail: albaredede@ens-lyon.fr

185 publications and 4 books. See
<http://perso.ens-lyon.fr/francis.albaredede>
By May 30st, 2010: 9173 total citations, H-
index: 54

Education

- 1968 Maîtrise de Géologie (Bachelor degree) in Montpellier
- 1971 Thèse de 3^{ème} Cycle on the modeling of multi-phase U-Pb zircon geochronology (University of Paris 7).
- 1976 PhD on ³⁹Ar-⁴⁰Ar geochronology in polytectonic areas with applications to the Pyrenées (University of Paris 7).

Current fields of interest

- Geochemistry of the interior of the Earth: analytical developments, physics and chemistry of mantle dynamics.
- Planets and the Solar nebula: the early history of terrestrial planets and how one of them became our Earth
- Cross-field applications of geochemical concepts and analytical techniques: biology, archeometry.

Positions held:

- 1969-1971 Assistant University of Montpellier
- 1971-1974 Assistant University of Paris 7

- 1974-1977 and 1978-1979 Assistant Professor, Univ. Paris 7
- 1977-1978 Post-Doctoral Fellow at *Caltech*
- 1979-1991 Associate Professor at *Ecole Nationale Supérieure de Géologie*, Nancy
- 1991- now Professor at *Ecole Normale Supérieure*, Lyon
- 1990 Full Professor
- 1997 Professor Classe Exceptionnelle
- 2008-2014 Adjunct Faculty Rice University

Distinctions:

- 1988 *Silver Medal* CNRS
- 1994-2004 *Senior Member* of the Institut Universitaire de France
- 1996 *Miller Professor* of the University of California at Berkeley
- 1998 *Geochemistry Fellow* (Europ. Ass. Geochem. & Geochem. Soc.)
- 1999 *Crosby Lecturer* at the Massachusetts Institute of Technology
- 2000 *Steinbach Visiting Scholar* (Woods Hole Oceanographic Institution)
- 2000 *Member* of the Academia Europae
- 2000 *Norman Bowen Award* of the Volcanology, Geochemistry and Petrology Section of the American Geophysical Union
- 2001 *Arthur Holmes Medal* of the European Union of Geosciences
- 2002 *Fellow* of the American Geophysical Union
- 2002 *Highly Cited Researcher* certificate, Institute of Scientific Information
- 2003 *Moore Scholar*, California Institute of Technology, Pasadena
- 2003 *Nature Lifeline*.
- 2004 *Jaeger-Hales Lecturer* Australian National University
- 2006 *Invited Professor*, Earthquake Res. Inst., Tokyo University
- 2007-2008 *Member* of the *Nature Club*
- 2008 *Wiess Visiting Professor* Rice University, Houston.
- 2008 *VM Goldschmidt Award* of the Geochemical Society.
- 2010 *McDonnell Fellow* of the Washington University in Saint Louis, Missouri.

Civil distinctions:

- 2006 Chevalier des Palmes Académiques
- 2008 Chevalier de la Légion d'Honneur

Others:

- 1985-1993 Associate Editor of *Geochimica et Cosmochimica Acta*
1987-2000 Associate Editor of *Chemical Geology*
1993-2000 Editor of *Earth and Planetary Science Letters*
2001-2004 Senior Editor of the *Journal of Geophysical Research (Solid Earth)*
1994-1996 Director of the *Geochemical Society*
2001-2002 President of the *European Association of Geochemistry*
2006-2010 Chair of the Publication Committee of the *American Geophysical Union*
2007-2009 Member and Chair of the *NASA Cosmochemistry Panel*
2010-2012 International Secretary of the *American Geophysical Union*

Publications

- Albarède, F. and Fourcade S. (1969) Sur la présence de gneiss à orthopyroxène dans le socle hercynien du massif nord-Pyrénéen de Bessèdes-de-Sault (Aude). *C.R. Acad. Sci. Paris* 269, 1823-1826.
Albarède, F. and Bottinga Y. (1972) Kinetic disequilibrium in trace element partitioning between phenocrysts and host lava. *Geochim. Cosmochim. Acta* 36, 141-156.
Hamet J. and Albarède, F. (1973) Rb-Sr geochronology of the Ceneri Zone (Southern Alps). *Fortschr. Mineral.* 50, 80-82.
Allègre C.J., Albarède, F., Grünenfelder M. and Köppel V. (1974) $^{238}\text{U}/^{206}\text{Pb}$ - $^{235}\text{U}/^{207}\text{Pb}$ - $^{232}\text{Th}/^{208}\text{Pb}$ zircon - Geochronology in Alpine and non-Alpine environment. *Contrib. Mineral. Petrol.* 43, 163-194.
Albarède, F. (1975) The heat flow-heat generation relationship: an interaction model of fluids with cooling intrusions. *Earth Planet. Sci. Letters* 27, 73-78.
Albarède, F. (1976) Thermal models of post-tectonic decompression as exemplified by the Haut-Allier granulites (Massif Central). *Bull. Soc. Geol. France* 18, 1023-1032.
Albarède, F. (1976) Some trace element relationships among liquid and solid phases in the course of the fractional crystallization of magmas. *Geochim. Cosmochim. Acta* 40, 667-673.
Albarède, F. et Condomines M. (1976) *La Géochimie*. Collection Que sais-je? 128 p. Presses Universitaires de France.
Albarède, F. and Provost A. (1977) Petrological and geochemical mass-balance equations: an algorithm for least-square fitting and general error analysis. *Computers Geosci.* 3, 309-326.
Allègre C.J., Treuil M., Minster J.F. and Albarède, F. (1977) Systematic use of trace element in igneous process. Part I: Fractional crystallization processes in volcanic suites. *Contrib. Mineral. Petrol.* 60, 57-75.
Stettler A. and Albarède, F. (1977) ^{39}Ar - ^{40}Ar pattern and light noble gas systematics of two mm-sized rock fragments from Mare Crisium. *Proc. Luna 24 Conf.* 4p.
Vitrac-Michard A., Albarède, F. and Azambre B. (1977) Age Rb-Sr et ^{39}Ar - ^{40}Ar de la syénite nephelinique de Fitou (Corbières Orientales). *Bull. Soc. Fr. Mineral. Cristall.* 100, 251-254.
Albarède, F. (1978) The recovery of spatial isotope distributions from stepwise degassing data. *Earth Planet. Sci. Letters* 39, 387-397.
Albarède, F. and Michard-Vitrac A. (1978) Datation du métamorphisme des terrains secondaires des Pyrénées par les méthodes ^{39}Ar - ^{40}Ar et ^{87}Rb - ^{87}Sr . Ses relations avec les péridotites associées. *Bull. Soc. Géol. France* 20, 681-687.
Albarède, F. and Michard-Vitrac A. (1978) Age and significance of the North Pyrenean metamorphism. *Earth Planet. Sci. Letters* 40, 327-332.
Albarède, F., Feraud G., Kaneoka I. and Allègre C.J. (1978) ^{39}Ar - ^{40}Ar dating: the importance of K-feldspars on multi-mineral data of polygenic areas. *J. Geol.* 86, 581-598.
Stettler A. and Albarède, F. (1978) ^{39}Ar - ^{40}Ar systematics of two millimeter-sized rock fragments from Mare Crisium. *Earth Planet. Sci. Letters* 38, 401-406.
Albarède, F., Dupuis C., and Taylor H.P. Jr. (1980) $^{18}\text{O}/^{16}\text{O}$ evidence for non-cogenetic magmas associated in a 300 Ma old concentric pluton at Ploumanac'h. *J. Geol. Soc. London* 137, 641-647.
Michard-Vitrac A., Albarède, F., Dupuis C., and Taylor H.P. Jr. (1980) The genesis of Variscan (hercynian) plutonic rocks: inferences from Sr, Pb and O studies on the Maladeta igneous complex, Central Pyrénées, Spain. *Contrib. Mineral. Petrol.* 72, 57-72.
Albarède, F., Michard A., Minster J.F. and Michard G. (1981) $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in hydrothermal waters and deposits from the East Pacific Rise at

PhD supervision. Marc Chaussidon (1986), Marc Brouxel (1988), Stéphanie Duchêne (1997), Chloé Maréchal (1999), Maud Boyet (2003), Gry Barfod (2003), Arnaud Agranier (2004), Audrey Bouvier (2005), Frédéric Moynier (2006).

Recent invited talks (last 2 years)

- Rogue mantle helium and neon, *Fall AGU Meeting* (2007) San Francisco
Ridges and hot spots: Reconciling isotopes and major elements, *Fall AGU Meeting* (2008) San Francisco
The physics of mantle geochemical heterogeneities, *Goldschmidt Conf. Plenary* (2008) Vancouver
Mantle heterogeneities, *Cider Workshop* (2009) Point Reyes CA
Water, accretion and planetary dynamics, *Gordon Conf.* (2009) Mount Holyoke MA.

21°N. *Earth Planet. Sci. Letters* 55, 229-236.

Michard-Vitrac A., Albarède, F. and Allègre C.J. (1981) Lead isotopic composition of Hercynian granitic K-feldspars constrains continental genesis. *Nature* 291, 460-464.

Albarède, F. (1982) The ^{39}Ar - ^{40}Ar technique of dating, in *Numerical Dating in Stratigraphy*, pp.181-197. G.S. Odin John Wiley and Sons, Ltd.

Alibert C., Michard A. and Albarède, F. (1983) The transition from alkali basalts to kimberlites: isotope and trace element evidence from melilitites. *Contrib. Mineral. Petrol.* 82, 176-186.

Michard A., Albarède, F., Michard G., Minster J.F. and Charlou J.L. (1983) Rare-earth elements and uranium in high-temperature solutions from East Pacific Rise hydrothermal vent field (13°N). *Nature* 303, 795-797.

Albarède, F. (1983) Inversion of batch melting equations and the trace element pattern of the mantle. *J. Geophys. Res.* 88, 10573-10583.

Hékinian R., Francheteau J., Renard V., Ballard R.D., Choukroune P., Cheminée J.L., Albarède, F., Minster J.F., Charlou J.L., Marty J.C. and Boulègue J. (1983) Intense hydrothermal activity at the axis of the East Pacific Rise near 13°N: submersible witnesses the growth of sulfide chimney. *Marine Geophys. Res.* 6, 1-14.

Albarède, F. (1983) Limitations thermiques à l'ascension des magmas hydratés. *C.R. Acad. Sci. Paris* 296, 1441-1444.

Juteau M., Michard A., Zimmermann J.L. and Albarède, F. (1984) Isotopic heterogeneities in the granitic intrusion of Monte Capanne (Elba Island, Italy) and dating concepts. *J. Petrol.* 25, 532-545.

Michard G., Albarède, F., Michard A., Minster J.-F., Charlou J.-L. and Tan N. (1984) Chemistry of solutions from the 13°N East Pacific Rise hydrothermal site. *Earth Planet. Sci. Letters* 67, 297-307.

Albarède, F. and Juteau M. (1984) Unscrambling the lead model ages. *Geochim. Cosmochim. Acta* 48, 207-212.

Michard A. and Albarède, F. (1985) Hydrothermal uranium uptake at ridge crests. *Nature* 317, 244-246.

Michard A., Gurriet P., Soudant M. and Albarède, F. (1985) Nd isotopes in French Phanerozoic shales: external vs. internal aspects of crustal evolution. *Geochim. Cosmochim. Acta* 49, 601-610.

Hamelin B., Manhès G., Albarède, F. and Allègre C.J. (1985) Precise lead isotope measurements by the double spike technique: a reconsideration. *Geochim. Cosmochim. Acta* 49, 173-182.

Lapierre H., Albarède, F., Albers J., Cabanis B. and Coulon C. (1985) The middle Devonian volcanism in the Eastern Klamath Mountains, California: evidence for an immature island arc. *Can. J. Earth Sci.* 22, 214-227.

Lapierre H., Cabanis B., Coulon C., Brouxel M. and Albarède, F. (1985) Geodynamic setting of early devonian Kuroko-type sulfide deposits in the eastern Klamath mountains (Northern California) inferred from the petrological and geochemical characteristics of the associated island-arc volcanic rocks. *Econ. Geol.* 80, 2100-2113.

Albarède, F. (1985) Open magma chambers: regime and trace element evolution. *Nature* 318, 356-358.

Royer J.-J., Michard A., Danis M. and Albarède, F. (1985) Arguments isotopiques et hydrochimiques en faveur d'une venue hydrothermale dans la nappe du Trias inférieur (région de Vittel, Vosges). *C.R. Acad. Sc. Paris*, 301, 163-166.

Albarède, F. (1985) L'âge de la Terre, des météorites et les radioactivités éteintes, in *Méthodes de datation par les phénomènes nucléaires naturels; applications*, pp. 47-54, E.Roth and B.Poty, Masson, Paris.

Albarède, F., Michard A. et Cuney M. (1985) Les chronomètres Uranium-Thorium-Plomb, in *Méthodes de datation par les phénomènes nucléaires naturels; applications*, pp.125-173, E.Roth and B.Poty, Masson, Paris.

Juteau M., Michard A. and Albarède, F. (1986) The Pb-Sr-Nd isotope

- geochemistry of some recent circum-Mediterranean granites. *Contrib. Mineral. Petrol.* 92, 331-340.
- Michard A. and Albarède, F. (1986) The REE content of some hydrothermal fluids. *Chem. Geol.* 55, 51-60.
- Albarède, F., Michard A. (1986) Transfer of continental Mg, S, O and U to the mantle through hydrothermal alteration of oceanic crust. *Chem. Geol.* 57, 1-15.
- Alibert C., Michard A. and Albarède, F. (1986) Isotope and trace element geochemistry of Colorado Plateau volcanics. *Geochim. Cosmochim. Acta* 50, 2735-2750.
- Aplin A., Michard A. and Albarède, F. (1986) $^{143}\text{Nd}/^{144}\text{Nd}$ in Pacific ferromanganese encrustations and nodules. *Earth Planet. Sci. Letters* 81, 7-14.
- Albarède, F. and Brouxel M. (1987) The Sm/Nd secular evolution of the continental crust and the depleted mantle. *Earth Planet. Sci. Letters* 82, 25-35.
- Albarède, F. and Michard A. (1987) Evidence for slowly changing $^{87}\text{Sr}/^{86}\text{Sr}$ in runoff from freshwater limestones of southern France. *Chem. Geol.* 64, 55-65.
- Grandjean P., Cappetta H., Michard A., and Albarède, F. (1987) The assessment of REE and $^{143}\text{Nd}/^{144}\text{Nd}$ in fish teeth as a paleoceanographic tracer. *Earth Planet. Sci. Letters* 84, 181-196.
- Brouxel M., Lapiere H., Michard A., and Albarède, F. (1987) The deep layers of a Paleozoic island arc. *Earth Planet. Sci. Letters* 85, 386-400.
- Lapiere H., Brouxel M., Albarède, F., Coulon C., Lecuyer C., Martin P., Mascle G. and Rouer O. (1987). Paleozoic and Lower Mesozoic magmas from the eastern Klamath Mountains (North California) and the geodynamic evolution of northwestern America. *Tectonophysics*. 140, 155-177.
- Chaussidon M., Albarède, F. and Sheppard S.M.F. (1987) Sulphur isotope heterogeneity in the mantle from ion microprobe measurement of sulphide inclusions in diamond. *Nature* 330, 242-244.
- Jaegy R., Albarède, F. and Michard G. (1987) Mesures de ^{14}C dans quelques eaux thermales des Pyrénées-Orientales. *Comptes Rendus Acad. Sci.* 304, 819-821.
- Grandjean P., Cappetta H. and Albarède, F. (1988) The REE and ϵ_{Nd} of 40-70 Ma old fish debris from the West-African Platform. *Geophys. Res. Letters* 15, 389-392.
- Meghraoui M., Philip H., Albarède, F. and Cisternas A. (1988) Trench investigations through the trace of the 1980 el Asnam thrust fault: evidence for paleoseismicity. *Bull. Seism. Soc. Amer.* 78, 979-999.
- Juteau M., Pagel M., Michard A. and Albarède, F. (1988) Assimilation of continental crust by komatiites in the Precambrian basement of the Carswell structure (Saskatchewan, Canada). *Contrib. Mineral. Petrol.* 99, 219-225.
- Brouxel M., Lapiere H., Michard A., Albarède, F. (1988) Geochemical study of an early Paleozoic island-arc-back-arc basin system. Part 2: Eastern Klamath, early to middle Paleozoic island-arc volcanic rocks (northern California). *Geol. Soc. Amer. Bull.* 100, 1120-1130.
- Alibert C. and Albarède, F. (1988) Relationships between mineralogical, chemical, and isotopic properties of some North-American Kimberlites. *J. Geophys. Res.* 93, 7643-7671.
- Albarède, F. and Tamagnan V. (1988) Modelling the recent evolution of the Piton de la Fournaise volcano (Réunion Island), 1931-1986. *J. Petrol.* 29, 997-1030.
- Meghraoui M., Jaegy R., Lammali K. and Albarède, F. (1988). Late Holocene earthquake sequences on the El Asnam (Algeria) thrust fault. *Earth Planet. Sci. Letters* 90, 187-203.
- Chaussidon M., Albarède, F. and Sheppard S.M.F. (1989) Sulphur isotope variations in the mantle from ion microprobe analyses of micro-sulphide inclusions. *Earth Planet. Sci. Letters* 92, 144-156.
- Albarède, F. (1989). Sm/Nd constraints on the growth of continental crust. *Tectonophysics*. 161, 299-305.
- Cheminée, J.L., Hékinian, R., Talandier, J., Albarède, F., Devey, C.W., Francheteau, J., & Lancelot, Y., (1989) Geology of an active hot-spot: Teahitia-Mehetia region of the south central Pacific. *Marine Geophys. Res.* 11, 27-50.
- Grandjean P. and Albarède, F. (1989) Ion probe measurement of rare earth elements in biogenic phosphates. *Geochim. Cosmochim. Acta* 53, 3179-3183.
- Devey C.W., Albarède, F., Cheminée J-L., Michard A., Mühe R., and Stoffers P. (1990) Active submarine volcanism on the Society hotspot swell (W. Pacific): A geochemical study. *J. Geophys. Res.* 95, 5049-5066.
- Graham D., Lupton J., Albarède, F., and Condomines M. (1990) A 360,000 year helium isotope record from Piton de la Fournaise, Réunion Island. *Nature* 347, 545-548
- Abouchami W., Boher M., Michard A., and Albarède, F. (1990) A major 2.1 Ga old event of mafic magmatism in West Africa: an early stage of crustal accretion. *J. Geophys. Res.* 95, 17605-17629.
- Lecuyer C., Brouxel M. and Albarède, F. (1990) Hydrothermal alteration of the Lower Paleozoic Trinity ophiolite (California): Metamorphic parageneses, water-rock ratios and geochemical mass balance between oceanic crust and seawater. *Chem. Geol.* 89, 87-115.
- Frey F.A., Garcia M.O., Wise W.S., Kennedy A., Gurrier P and Albarède, F. (1991) The evolution of the Mauna Kea Volcano, Hawaii: Petrogenesis of Tholeiitic and Alkalic Basalts. *J. Geophys. Res.* 96, 14347-14375.
- Delouie E., Albarède, F., and Sheppard S.M.F. (1991) Hydrogen isotope heterogeneities in the mantle from ion probe analysis of amphiboles from ultramafic rocks. *Earth Planet. Sci. Letters* 105, 543-553.
- Delouie E., France-Lanord C. and Albarède, F. (1991) D/H analysis of minerals by ion probe. *Geochim. Cosmochim. Acta* 55, 53-62.
- Boher M., Abouchami W., Michard A., Albarède, F., Arndt N.T. (1991) Crustal Growth in West-Africa at 2.1 Ga. *J. Geophys. Res.* 97, 345-369.
- Chaussidon M. and Albarède F (1991) The secular evolution of boron isotopes in the continental crust. *Earth Planet. Sci. Letters* 108, 229-241.
- Chaussidon M., Albarède, F. and Sheppard S.M.F. (1991) Ion probe d34S study of small scale variations in a hydrothermal chimney, East Pacific Rise at 21°N, in *Source, Transport and Deposition of Metals*, Pagel M. and Leroy J., eds., Balkema, Rotterdam, 609-614.
- Rossy M., Azambre B., and Albarède, F. (1992) REE and Sr-Nd Isotope Geochemistry of the Alkaline Magmatism from the Cretaceous North-Pyrenean Rift Zone (France and Spain). *Chem. Geol.* 97, 33-46.
- Albarède, F., How deep do common basaltic magmas form and differentiate? *J. Geophys. Res.* 97, 10,997-11,009.
- Azambre B., Rossy M., and Albarède, F. (1992) Petrology of the alkaline magmatism from the Cretaceous North-Pyrenean Rift Zone (France and Spain). *Eur. J. Mineral.* 4, 813-834.
- Albarède, F. (1993) Residence time analysis of geochemical fluctuations in volcanic series. *Geochim. Cosmochim. Acta* 57, 615-621.
- Grandjean-Lecuyer P., Feist R., and Albarède, F. (1993). Rare earth elements in old biogenic apatites. *Geochim. Cosmochim. Acta* 57, 2507-2513.
- Chaussidon M., Netter P., Kessler M., Membre H., Fener P., Delons S., Albarède, F. (1993) Dialysis-associated arthropathy: Secondary-Ion Mass Spectrometry evidence of aluminium silicate in b2-microglobulin amyloid synovial tissue and articular cartilage. *Nephron* 65, 559-563.
- Albarède, F. and Goldstein, S.L. (1993) World map of Nd isotopes in seafloor ferromanganese deposits. *Geology*, 20, 761-763.
- Blichert-Toft, J. and Albarède, F. (1994) Short-lived chemical heterogeneities in the Archean mantle with implications for mantle convection. *Science* 263, 1593-1596.
- Grasset, O. and Albarède, F. (1994) Hybridization of mingling magmas with different densities. *Earth Planet. Sci. Letters*, 121, 327-332.
- Albarède, F. and Semhi, K. (1995) Patterns of elemental transport in the bedload of the Meurthe River (NE France). *Chem. Geol.*, 122, 129-145
- Albarède, F. (1995) *Introduction to Geochemical Modeling*. University Press, Cambridge, 554 pp.
- Barbey, P., Allé, P., E, M. and Albarède, F. (1995) In-situ rare earth element distribution in zircons: a record of processes involved in genesis and evolution of crustal magmas. *Chem. Geol.* 125, 1-17.
- Bonnefoi, C., Provost, A., and Albarède, F. (1995) The 'Daly gap' as a magmatic catastrophe. *Nature* 378, 270-272.
- Albarède, F. (1996) High-Resolution Geochemical Stratigraphy of Mauna Kea Flows from the Hawaii Scientific Drilling Project Core. *J. Geophys. Res.* 101, 11,841-11,853.
- Girard, C. and Albarède, F. (1996) Trace elements in conodont phosphates from the Frasnian/Famennian Boundary. *Pal. Pal. Pal.* 126, 181-195.
- Albarède, F., Luais B., Fitton G., Semet M., Kaminski E., Upton B.G.J., Bachelery P., Cheminée J-L. (1997) The geochemical regimes of Piton de la Fournaise volcano (Réunion) during the last 530,000 years. *J. Petrol.* 38, 171-201.
- Albarède, F., Goldstein, S.L., and Dautel, D. (1997) The Nd isotopic composition of Mn-nodules from the Southern and Indian Oceans, the global oceanic Nd budget and their bearing on deep ocean circulation. *Geochim. Cosmochim. Acta*, 61, 1277-1291.
- Blichert-Toft, J. and Albarède, F. (1997) The Lu-Hf isotope geochemistry of chondrites and the evolution of the mantle-crust system. *Earth Planet. Sci. Letters* 148, 243-258.
- Blichert-Toft, J., Chauvel, C., and Albarède, F. (1997) Separation of Hf and Lu for high-precision isotope analysis of rock samples by magnetic sector-multiple collector ICP-MS. *Contrib. Mineral. Petrol.* 127, 248-260.
- Duchêne, S., Blichert-Toft, J., Luais, B., Télouk, P., Lardeaux, J.-M., Albarède, F. (1997) The Lu-Hf age of Alpine eclogite exhumation. *Nature*, 387, 586-589.
- Arndt, N.T., Albarède, F. and Nisbet, E.G. (1997) Mafic and ultramafic magmatism. In *Greenstone Belts*, M.J. de Wit and L.D. Ashwal (Editors). Oxford, 233-254.
- Duchêne, S., Lardeaux, J.-M., Albarède, F. (1997) A depth-time path analysis of eclogite exhumation. *Tectonophysics* 280, 125-140.
- Luais, B., Télouk, P., and Albarède, F. (1997) High-precision Nd isotopic measurements using plasma-source mass spectrometry. *Geochim. Cosmochim. Acta* 61, 4847-4854.
- Lecroart, P., Albarède, F., and Cazenave, A. (1997) Correlation between MORB chemistry and the geoid. *Earth Planet. Sci. Letters* 153, 37-55.
- Duchêne, S., Albarède, F., and Lardeaux, J.-M. (1998) Mineral zoning and exhumation history in the Münchberg eclogites (Bohemia). *Amer. J. Sci.* 298, 30-59.
- Albarède, F. (1998) Time-dependent models of U-Th-He and K-Ar evolution and the layering of mantle convection. *Chem. Geol.* 145, 413-429.
- Arndt, N.T., Gimibre, C., Chauvel, C., Albarède, F., Cheadle, F., Herzberg, C., Jenner, G., Lahaye, Y. (1998) Were komatiites wet? *Geology* 26, 739-742.
- Albarède, F., Simonetti, A., Vervoort, J.D., Blichert-Toft, J. and Abouchami, W. (1998) A Hf-Nd isotopic correlation in ferromanganese nodules. *Geophys. Res. Letters* 20, 3895-3898.
- Albarède, F. (1998) The growth of continental crust. *Tectonophysics* 296, 1-14.
- Blichert-Toft, J., Albarède, F., and Kornprobst, J. (1999) The Lu-Hf isotope systematics of garnet pyroxenites from Beni Bousera, Morocco: Implications for basalt origin. *Science* 283, 1303-1306.
- Blichert-Toft, J. and Albarède, F. (1999) Hf isotopic compositions of the Hawaii Scientific Drilling Project core and the source mineralogy of Hawaiian basalts. *Geophys. Res. Letters* 26, 935-938.
- Maréchal, C., Télouk, P., and Albarède, F. (1999) Precise analysis of copper and zinc isotopic compositions by plasma-source mass spectrometry. *Chem. Geol.* 156, 251-273.
- Duchêne, S. and Albarède, F. (1999) Simulated garnet-clinopyroxene geothermometry of eclogites. *Contrib. Mineral. Petrol.* 135, 75-91.
- Bonnefoi, C., Provost, A., and Albarède, F. (1999) The thermochemi-

- cal dynamics of magma chambers: a simple model. *J. Geophys. Res.* 104, 7103-7116.
- Vervoort, J.D., Patchett, J., Blichert-Toft, J., and Albarède, F. (1999) Relationship between Lu-Hf and Sm-Nd systems in the global sedimentary system. *Earth Planet. Sci. Letters* 168, 79-99.
- Blichert-Toft, J., Frey, F.A., and Albarède, F. (1999) Hf isotope evidence for pelagic sediments in the source of Hawaiian basalts. *Science* 285, 879-882.
- Blichert-Toft, J., Albarède, F., Rosing, M., Frei R., and Bridgwater D. (1999) The Nd and Hf isotopic evolution of the mantle through the Archean. Results from the Isua supracrustals, West Greenland, and from the Birimian terranes of West Africa. *Geochim. Cosmochim. Acta* 63, 3901-3914.
- Blichert-Toft, J., Gleason, J.D., Télouk, P. and Albarède, F. (1999) The Lu-Hf geochemistry of shergottites and the evolution of the Martian mantle-crust system *Earth Planet. Sci. Letters* 173, 25-39.
- Albarède, F. and van der Hilst, R.D. (1999) On the nature and scale of mantle convection. *EOS Trans. Amer. Geophys. Union* 80, 535-539.
- Albarède, F., Blichert-Toft, J., Vervoort, J.D., Gleason, J.D., and Rosing, M. (2000) Hf-Nd isotope evidence for a transient dynamic regime in the early terrestrial mantle. *Nature* 404, 488-490.
- Coltice, N., Albarède, F., and Gillet P. (2000) ^{40}K - ^{40}Ar constraints on the recycling of continental crust into the mantle. *Science* 288, 845-847.
- White, W.M. and Albarède, F. (2000) High-precision analysis of Pb isotopic ratios using multi-collector ICP-MS. *Chem. Geol.* 167, 257-270.
- Maréchal, C.N., Nicolas, E., Douchet, C., and Albarède, F. (2000) The abundance of zinc isotopes as a marine biogeochemical tracer. *Geochim. Geophys. Geosyst.* 1, 1999GC000029.
- Vervoort, J.D., Patchett, J., Albarède, F., Blichert-Toft, J., Rudnick, R., and Downes, H. (2000) Hf-Nd isotopic evolution of the lower crust. *Earth Planet. Sci. Letters* 181, 115-129.
- Gasperini, D., Blichert-Toft, J., Bosch, D., Del Moro, A., Macera, P., Télouk, P., and Albarède, F. (2000) Evidence from Sardinian basalt geochemistry for recycling of plume heads into the Earth's mantle. *Nature* 408, 701-704.
- Sanloup, C., Blichert-Toft J., Télouk, P., Gillet, P. and Albarède, F. (2000) Zr isotope anomalies in chondrites and the presence of ^{92}Nb in the early Solar System. *Earth Planet. Sci. Letters*, 184, 75-81.
- Albarède, F. (2001), *F. La Géochimie*. Gordon and Breach, 200pp.
- Albarède, F. (2001) Radiogenic ingrowth in systems with multiple reservoirs: applications to the differentiation of the mantle-crust system. *Earth Planet. Sci. Letters* 188, 59-73.
- Cocherie A. and Albarède, F. (2001) An improved U-Th-Pb age calculation for electron microprobe dating of monazite. *Geochim. Cosmochim. Acta* 65, 4509-4522.
- Maréchal, C. and Albarède, F. (2002) Ion-exchange fractionation of copper and zinc isotopes. *Geochim. Cosmochim. Acta* 66, 1499-1509.
- G.H. Barfod, F. Albarède, A.H. Knoll, S. Xiao, P. Telouk, R. Frei, and J. Baker (2002) New Lu-Hf and Pb-Pb age constraints on the earliest animal fossils. *Earth Planet. Sci. Letters* 201, 203-212.
- Q. Yin, S. B. Jacobsen, K. Yamashita, J. Blichert-Toft, P. Telouk, and F. Albarède (2002) A short timescale for terrestrial planet formation from Hf-W chronometry of meteorites *Nature* 418, 949-952.
- N. Matielli, D. Weis, J. Blichert-Toft, and F. Albarède (2002) Hf isotope evidence for a Miocene change in the Kerguelen mantle plume composition. *J. Petrol.* 43, 1327-1339.
- Albarède, F. (2002) The thermal history of leaky chronometers above their closure temperature. *Geophys. Res. Letters* 30, DOI: 10.1029/2002GL016484.
- Geist, D., White, W.M., Albarède, F., Harpp, K., Reynolds, R., Blichert-Toft, J., and Kurz, M. (2002). Volcanic evolution in the Galapagos: the dissected shield of Volcan Equador. *Geochim. Geophys. Geosyst.* 3, 1061, doi:10.1029/2002GC000355. Correction (2003). *Geochim. Geophys. Geosyst.* 4, 1013, doi:10.1029/2002GC000490
- Albarède, F. and R.D. van der Hilst (2002) Zoned mantle convection. *Phil. Trans. Roy. Soc. A.* 362, 2569-2592.
- D. Gasperini, J. Blichert-Toft, D. Bosch, A. Del Moro, P. Macera, and F. Albarède (2002) Upwelling of deep mantle material through a plate window: evidence from the geochemistry of Italian basaltic volcanics. *J. Geophys. Res.* 107, doi:10.1029/2001JB000418.
- J. Blichert-Toft, M. Boyet, P. Télouk, and F. Albarède (2002) ^{176}Lu - ^{177}Hf and ^{147}Sm - ^{143}Nd in eucrites and the differentiation of the HED parent body. *Earth Planet. Sci. Lett.* 204, 167-181.
- J.M. Luck, D. Ben Othman, J.A. Barrat, and F. Albarède (2003) Coupled ^{63}Cu and ^{18}O excesses in chondrites *Geochim. Cosmochim. Acta* 67, 143-151.
- J. Blichert-Toft, D. Weis, C. Maerschalk, and F. Albarède (2003) Hawaiian hotspot dynamics as inferred from the Hf and Pb isotope evolution of Mauna Kea volcano. *Geochim. Geophys. Geosyst.* 4, doi: 10.1029/2002GC000340.
- Albarède, F. (2003) *Geochemistry: An Introduction*. Cambridge Univ. Press, 248pp.
- Pichat, S., Douchet, S., and F. Albarède (2003) Zinc isotope variations in deep-sea carbonates from the Eastern Equatorial Pacific over the last 175 ka. *Earth Planet. Sci. Lett.* 210, 167-178.
- Boyet, M., Blichert-Toft, J., Rosing, M., Storey, M., Télouk, P. Albarède, F. (2003) ^{142}Nd evidence for early Earth differentiation. *Earth Planet. Sci. Letters*. Lett. 214, 427-442.
- Barfod, G.H., Otero, O., and Albarède, F. (2003) Phosphate Lu-Hf geochronology. *Chem. Geol.* 200, 241-253.
- Stracke A., Zindler, A., Salters, V.J.M., McKenzie, D., Blichert-Toft, J., Albarède, F., and Grönvold, K., 2003. Theistareykir revisited. *Geochim. Geophys. Geosyst.* 4, 8507, doi:10.1029/2001GC000201.
- Télouk, P., Rose-Koga, E.F., and Albarède, F. (2003). Preliminary results from a new 157 nm laser ablation instrument: new opportunities in the analysis of solid samples. *Geostandards Newsletter* 27, 5-11.
- Bedini R.-M., Blichert-Toft J., Boyet M., and Albarède F. (2004) Isotopic constraints on the cooling of the continental lithosphere. *Earth Planet. Sci. Letters* 223, 99-111.
- McKenzie D., Stracke A., Blichert-Toft J., Albarède F., Grönvold K., and O'Nions R. K. (2004) Source enrichment processes responsible for isotopic anomalies in oceanic island basalts. *Geochim. Cosmochim. Acta* 68, 2699-2724.
- Albarède F., Télouk P., Blichert-Toft J., Boyet M., Agranié A., and Nelson B. (2004) Precise and accurate isotopic measurements using multiple-collector ICPMS. *Geochim. Cosmochim. Acta* 68, 2725-2744.
- Albarède F. and Beard, B.L. (2004) Analytical methods for non-traditional isotopes In *Geochemistry of Non-Traditional Stable Isotopes*. Johnson, C.M., Beard, B.L. and Albarède, F. ed., *Rev. Mineral. Geochem.* 55, 113-152.
- Albarède F. (2004) The stable isotope geochemistry of copper and zinc. In *Geochemistry of Non-Traditional Stable Isotopes*, Johnson, C.M., Beard, B.L. and Albarède, F. ed., *Rev. Mineral. Geochem.* 55, 409-427.
- Pichat S., Sims K., Mc Manus J. F., Brown-leger S., and Albarède F. (2004) Lower export production during glacial periods in the equatorial Pacific derived from ($^{231}\text{Pa}/^{230}\text{Th}$)₀ measurements in deep-sea sediments. *Paleoceanogr.* 19, doi:10.1029/2003PA000994.
- Albarède F., Stracke A., Salters V. J. M., Weis D., Blichert-Toft J., Telouk P., and Agranié A. (2005) Comment to "Pb isotopic analysis of standards and samples using a ^{207}Pb - ^{203}Pb double spike and thallium to correct for mass bias with a double-focusing MC-ICP-MS" by Baker et al. *Chem. Geol.* 217, 171-174.
- Blichert-Toft J., Agranié A., Andres M., Kingsley R., Schilling J.-G., and Albarède F. (2005) Geochemical segmentation of the Mid-Atlantic Ridge North of Iceland and ridge-hotspot interaction in the North Atlantic. *Geochim. Geophys. Geosyst.* 6, doi:10.1029/2004GC000788.
- Boyet M., Garcia M. O., Pick R., and Albarède F. (2005) A search for ^{142}Nd evidence of primordial mantle heterogeneities in plume basalts. *Geophys. Res. Lett.* 32, doi:10.1029/2004GL021873.
- Barfod G. H., Krogstad E. J., Frei R., and Albarède F. (2005) Lu-Hf and Pb/Sr geochronology of apatites from Proterozoic terranes: A first look at Lu-Hf isotopic closure in metamorphic apatite. *Geochim. Cosmochim. Acta* 69, 1847-1859.
- Albarède F. (2005) The survival of mantle geochemical heterogeneities. In *Structure, Composition, and Evolution of Earth's Mantle*, *Geophys. Monograph* (ed. R. van der Hilst, J. Bass, J. Matas, and J. Trampert). Amer. Geophys. Union 160, 27-46.
- Agranié A., Blichert-Toft J., Graham D. W., Debaille V., Schiano P., and Albarède F. (2005) The spectra of isotopic heterogeneities along the Mid-Atlantic Ridge. *Earth Planet. Sci. Lett.* 238 96-109.
- Luck J. M., Ben Othman D., and Albarède F. (2005) Zn and Cu isotopic variations in chondrites and iron meteorites: Early solar nebula reservoirs and parent-body processes. *Geochim. Cosmochim. Acta* 22, 5351-5363.
- Bouvier, A., Blichert-Toft, J., Vervoort, J.D. and Albarède, F. (2005) The age of SNC meteorites and the antiquity of the Martian surface. *Earth Planet. Sci. Letters*. 240, 221-233.
- Harrison, T.M., Blichert-Toft, J., Müller, W., Albarède, F., Holden, P., and Mojzsis, S.J. (2005) Heterogeneous Hadean Hafnium: Evidence of continental crust at ca. 4.5 Ga. *Science* 310, 1947-1950.
- Debaille, V., Blichert-Toft, J., Agranié, A., Doucelance, R., Schiano, P. and Albarède, F. (2006) Geochemical component relationships in MORB from the Mid-Atlantic Ridge, 22-35°N *Earth Planet. Sci. Letters* 241, 844-862.
- Albarède, F., Scherer, E.E., Blichert-Toft, J., Rosing, M.T., Simionovic, A., and Bizzarro, M. (2006) Gamma-ray irradiation in the early Solar System and the conundrum of the ^{176}Lu decay constant, *Geochim. Cosmochim. Acta* 70, 1261-1270.
- Rosing, M.T., Bird, D.K., Sleep, N.H., Glassley, W., and Albarède, F. (2006) The rise of continents—An essay on the geologic consequences of photosynthesis *Pal. Pal. Act.* 232, 99-113.
- Graham, D.W., Blichert-Toft, J., Russo, C.J., and Albarède, F. (2006) Cryptic striations in the upper mantle revealed by hafnium isotopes in southeast Indian ridge basalts *Nature* 440, 199-202.
- Fujii, T., Moynier, F., and Albarède, F. (2006) Nuclear field vs nucleosynthetic effects as cause of isotopic anomalies in the early Solar System. *Earth Planet. Sci. Letters*. 247, 1-9.
- Zanda, B., Hewins, R.H., Bourot-Denise, M., Bland, P.A., and Albarède, F. (2006) Formation of solar nebula reservoirs by mixing chondritic components *Earth Planet. Sci. Letters* 248, 650-660.
- Moynier, F., Bouvier, A., Blichert-Toft, J., Télouk, P., Gasperini, D., and Albarède, F., (2006) Europium isotopic variations in Allende CAIs and the nature of mass-dependent fractionation in the solar nebula. *Geochim. Cosmochim. Acta.* 70, 4287-4294.
- Fujii, T., Moynier, F., Télouk, P., and Albarède, F. (2006) Mass-independent isotope fractionation of molybdenum and ruthenium and the origin of isotopic anomalies in Murchison. *Astrophys. J.* 647, 1506-1516.
- Fujii, T., Moynier, F., Télouk, P. and Albarède, F. (2006) Isotope Fractionation of Iron(III) in Chemical Exchange Reactions Using Solvent Extraction with Crown Ether. *J. Phys. Chem. A*, 110, 11108-11112.
- Moynier, F., Albarède, F., and Herzog, G.F. (2007) Isotopic composition of zinc, copper, and iron in lunar samples. *Geochim. Cosmochim. Acta.* 71, 4365-4379.
- Mezzen C. M., Blichert-Toft J., Ludden J. N., Humler E., Mevel C., and Albarède F. (2007) Isotopic portrayal of the Earth's upper mantle flow field. *Nature* 447, 1069-1074.
- Bouvier A., Blichert-Toft J., Moynier F., Vervoort J. D., and Albarède F. (2007) Pb-Pb dating constraints on the accretion and cooling history of chondrites. *Geochim. Cosmochim. Acta* 71, 1583-1604.
- Gaffney A. M., Blichert-Toft J., Nelson B. K., Bizzarro M., Rosing M., and Albarède F. (2007) Constraints on source-forming processes of West Greenland kimberlites inferred from Hf-Nd isotope systematics. *Geochim. Cosmochim. Acta* 71, 2820-2836.
- Moynier F., Blichert-Toft J., Telouk P., Luck J.-M., and Albarède F. (2007) Comparative stable isotope geochemistry of Ni, Cu, Zn, and Fe in chondrites and iron meteorites. *Geochim. Cosmochim. Acta* 71,

4365-4379.

Cadoux A., Blichert-Toft J., Pinti D. L., and Albarède F. (2007) A unique lower mantle source for Southern Italy volcanics. *Earth Planet. Sci. Letters* **259**, 227-238.

Blichert-Toft J. and Albarède F. (2008) Hafnium isotopes in Jack Hills zircons and the formation of the Hadean crust. *Earth Planet. Sci. Letters* **265**, 686-702.

Bosch D., Blichert-Toft J., Moynier F., Nelson B.K., Telouk P., Gillot P.-Y., and Albarède F. (2008) Pb, Hf and Nd isotope compositions of the two Réunion volcanoes (Indian Ocean): A tale of two small-scale mantle "blobs"? *Earth Planet. Sci. Letters* **265**, 748-768.

Bouvier A., Blichert-Toft J., Vervoort J. D., Gillet P., and Albarède F. (2008) The case for old basaltic shergottites. *Earth Planet. Sci. Letters* **266**, 105-124.

Albarède F. (2008) Rogue mantle helium and neon. *Science* **319**, 943-945.

Balter V., Blichert-Toft J., Braga J., Telouk P., Thackeray F., and Albarède F. (2008) U-Pb dating of fossil enamel from the Swartkrans Pleistocene hominid site, South Africa. *Earth Planet. Sci. Letters* **267**, 236-246.

Iwamori H. and Albarède F. (2008) Decoupled isotopic record of ridge and subduction zone processes in oceanic basalts by independent component analysis. *Geochem. Geophys. Geosyst.* **9**, 10.1029/2007GC001753.

Albarède, F. (2009) *Geochemistry: An Introduction*. 2nd Ed. Cambridge Univ. Press.

Bouvier A., Blichert-Toft J., and Albarède F. (2009) Martian meteorite chronology and the evolution of the interior of Mars. *Earth Planet. Sci. Letters* **280**, 285-295.

Blichert-Toft J., and Albarède F. (2009) Mixing of isotopic heterogeneities in the Mauna Kea plume conduit *Earth Planet. Sci. Letters* **282**, 190-200.

G.F. Herzog, F. Moynier, F. Albarède, A.A. Berezhnoy (2009) Isotopic and elemental abundances of copper and zinc in lunar samples, Zagami, Pele's hairs, and a terrestrial basalt. *Geochim. Cosmochim. Acta* **73**, 5884-5904.

Fujii, T., Moynier, F., Telouk, P. and Albarède, F. (2009) Nuclear field shift effect in the isotope exchange reaction of cadmium using a crown ether. *Chem. Geol.* **267**, 157-163.

Moynier, F., Pichat, S. Pons, M.-L., Fike, D., Balter, B., and Albarède, F. (2009) Isotopic fractionation and transport mechanisms of Zn in plants. *Chem. Geol.* **267**, 125-130

Fujii T., Moynier F., and Albarède F. (2009) The nuclear field shift effect in chemical exchange reactions. *Chem. Geol.* **267**, 139-156.

Moynier F., Fujii T., and Albarède F. (2009) Nuclear field shift effect as a possible cause of Te isotopic anomalies in the early Solar System - an alternative explanation of Fehr et al. (2006 and 2009). *Meteoritics Planet. Sci.* **44**, 1735-1742.

Albarède F. (2009) Volatile accretion history of the terrestrial planets

and dynamic implications. *Nature*. **461**, 1227-1233.

Blichert-Toft J., Moynier F., Lee C.-T.A., Telouk P. and Albarède F. (2010) The early formation of the IVA iron meteorite parent body. *Earth Planet. Sci. Letters*. **296**, 469-480.

Albarède, F. and Blichert-Toft, J. (2009) The terrestrial cradle of life. In: *Origins of life: Self-organization and/or biological evolution?* Balter, V., Zazzo, A., Moloney, A. P., Moynier, F., Schmidt, O., Monahan, F. J., and Albarède, F. (2010) Bodily variability of zinc natural isotope abundances in sheep. *Rapid Commun. Mass Spectrom.* **24**, 605-612.

Blichert-Toft, J., Moynier, F., Lee, C. T. A., Telouk, P., and Albarède, F. (2010) The early formation of the IVA iron meteorite parent body. *Earth Planet. Sci. Letters* **296**, 469-480.

Blichert-Toft, J., Zanda, B., Ebel, D. S., and Albarède, F. (2010). The Solar System primordial lead. *Earth Planet. Sci. Letters* **300**, 152-163. Iwamori, H., Albarède, F., and Nakamura, H. (2010) Global structure of mantle isotopic heterogeneity and its implications for mantle differentiation and convection. *Earth Planet. Sci. Letters* **299**, 339-351.

Lee, C. T. A., Luffi, P., Le Roux, V., Dasgupta, R., Albarède, F., and Leeman, W. P. (2010) The redox state of arc mantle using Zn/Fe systematics. *Nature* **468**, 681-685.

Rose-Koga, E. F. and Albarède, F. (2010) A data brief on magnesium isotope compositions of marine calcareous sediments and ferromanganese nodules. *Geochemistry Geophysics Geosystems* **11**, DOI: 10.1029/2009GC002899.

Desaulty, A. M., Telouk, P., Albalat, E., and Albarède, F. (2011) Isotopic Ag-Cu-Pb record of silver circulation through 16th-18th century Spain. *Proc. Nat. Acad. Sci.* **108**, 9002-9007.

Leger, A., Grasset, O., Fegley, B., Codron, F., Albarède, F., Barge, P., Barnes, R., Cance, P., Carpy, S., Catalano, F., Cavarroc, C., Demangeon, O., Ferraz-Mello, S., Gabor, P., Griessmeier, J. M., Leibacher, J., Libourel, G., Maurin, A. S., Raymond, S. N., Rouan, D., Samuel, B., Schaefer, L., Schneider, J., Schuller, P. A., Selsis, F., and Sotin, C., (2011) The extreme physical properties of the CoRoT-7b super-Earth. *Icarus* **213**, 1-11

Moynier, F., Paniello, R. C., Gounelle, M., Albarède, F., Beck, P., Podosek, F., and Zanda, B. (2011). Nature of volatile depletion and genetic relationships in enstatite chondrites and aubrites inferred from Zn isotopes. *Geochim. Cosmochim. Acta* **75**, 297-307.

Albarède, F., Telouk, P., Lamboux, A., Jaouen, K., and Balter, V., (2011) Isotopic evidence of unaccounted for Fe and Cu erythropoietic pathways. *Metallomics* **3**, DOI: 10.1039/C1MT00025J.