

## Supplementary Materials – Data Reduction and References

### Introduction

This file contains data reduction and selection procedures for mineral and whole rock data used in our papers on oceanic basalts. It is organized as follows:

- Mineral Data Selection and Reduction (mainly used in Oceanic Island Volcanism I).
- Mineral References by Island (mainly used in Oceanic Island Volcanism I).
- Whole-Rock Data Selection and Reduction (applicable to Oceanic Island Volcanism I & II).
- Whole-Rock References for Differentiation Suites (used in Oceanic Island Volcanism I).
- Whole-Rock References by Island (applicable to Oceanic Island Volcanism I & II).

### Mineral Data Selection and Reduction

“Basaltic” (evolved rocks such as andesites and hawaiites were not included) mineral analyses were downloaded from the GEOROC site (<http://georoc.mpch-mainz.gwdg.de/>). The ~ 1200 analyses represent “fresh” non-xenolithic minerals primarily from extrusive volcanic rocks. Only analyses with totals for the major element oxides within 2% of expected and with stoichiometric totals within 2% of ideal were used in plotting. Island chains with islands representing tholeiites include Iceland, Hawaii (Kilauea and Mauna Loa) Galapagos (Isabela) and Marquesas (Eiao). Representatives for alkali basalts include Tristan da Cunha, Canaries (Tenerife), Austral-Cook (Tubuai), Gough, Comoros (Anjouan, Grande Comore, Mayotte, Moheli), Jan Mayen, and Society (Mehetia, Tahaa, Moorea, Tahiti, Moua Pihaa). The following chart summarizes the distribution of analyses by island chain and mineral type.

Table A: Distribution of Mineral Analyses Used in Diagrams								
Chain	Type	Chromite	Magnetite	Olivine	Augite	Lo-Ca Px	Plagioclase	Ilmenite
Galapagos	Tholeiitic		5	11	9		11	4
Hawaii M	Tholeiitic	10		72	26	19	32	
Hawaii K	Tholeiitic	37	3	267	156	8	101	3
Iceland	Tholeiitic			30	6		26	9
Marquesas	Tholeiitic		2		4			
Austral-C	Alkaline		8	11	12		1	
Canaries	Alkaline		5	29	8			
Comoros	Alkaline			20	26		4	
Gough	Alkaline		1	5	7		5	4
Jan Mayen	Alkaline	17	32	17	67		14	8
Society	Alkaline			6	8			
Tristan	Alkaline				13			
Totals		64	56	468	342	27	194	28

Notes: The number in each cell gives the total number of analyses in the data set. Note that small numbers of analyses may appear on diagrams, especially in the case of minor elements, due to undetected/undetermined data. Chain = island chain; for Hawaii M and K stand for Mauna Loa and Kilauea volcano. Austral-C = Austral-Cook. Lo-Ca Px = low-Ca pyroxene, mostly orthopyroxene.

## Mineral References by Island

### THOLEIITIC ISLAND SOURCES

#### Galapagos

- [4580] Blichert-Toft, Janne; White, William M (2001) Hf isotope geochemistry of the Galapagos Islands. *Geochemistry, Geophysics, Geosystems - G 3*, vol.2001, 20 pp. Paper 2000GC000138, 28 Sep 2001. <http://cal.csa.com/htbin/ids631/procskel.cgi>.
- [628] Geist, D.J., Howard, K.A., Jellinek, A.M., and Rayder, S. (1994) The volcanic history of Volcan Alcedo, Galapagos Archipelago; a case study of rhyolitic oceanic volcanism. *Bulletin of Volcanology*, vol.56, pp. 243-260.
- [627] Geist, D., Howard, K.A., and Larson, P. (1995) The generation of oceanic rhyolites by crystal fractionation; the basalt-rhyolite association at Volcan Alcedo, Galapagos Archipelago. *Journal of Petrology*, vol. 36, pp. 965-982.
- [848] Geist, D., Naumann, T.R., and Larson, P. (1998) Evolution of Galapagos magmas; mantle and crustal fractionation without assimilation. *Journal of Petrology*, vol. 39, pp. 953-971.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [1351] Hofmann, A.W., and White, W.M. (1983) Ba, Rb, and Cs in the Earth's mantle. *Zeitschrift fur Naturforschungen* vol. 38A, pp. 256-266.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [1497] Kurz, M.D., and Geist, D. (1999) Dynamics of the Galapagos hotspot from helium isotope geochemistry. *Geochimica et Cosmochimica Acta*, vol.63, pp.4139-4156.
- [609] McBirney, A.R, Cullen, A.B., Geist, D., Vicenzi, E.P., Duncan, R.A., Hall, M.L., and Estrella, M. (1985) The Galapagos volcano Alcedo; a unique ocean caldera. *Journal of Volcanology and Geothermal Research*, vol.26, pp.173-177.
- [618] McBirney, A.R., and Williams, H. (1969) *Geology and petrology of the Galapagos islands*. Memoir - Geological Society of America, vol. 118, 197 pp.
- [5038] Naumann, T., Geist, D., and Kurz, M. (2002) Petrology and geochemistry of Volcan Cerro Azul; petrologic diversity among the western Galapagos volcanoes. *Journal of Petrology*, vol.43, pp. 859-883.
- [613] Nusbaum, R.L., Colgan, M.W., Lawton, D.E., and Glascock, M.D. (1991) Mineralogic constraints on the magmatic history of Volcan Darwin flank lava at Urvina Bay, Isla Isabela, Galapagos Islands. *Journal of Volcanology and Geothermal Research*, vol. 47, pp. 359-366.
- [600] Reynolds, R.W., and Geist, D.J. (1995) Petrology of lavas from Sierra Negra Volcano, Isabela Island, Galapagos Archipelago. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.100, pp.24,537-24,553.
- [604] Righter, K, Chesley, J.T., Geist, D., and Ruiz, J. (1998) Behavior of Re during magma fractionation; an example from Volcan Alcedo, Galapagos. *Journal of Petrology*, vol.39, pp.785-795.

- [592] Schimizu, H., Masuda, A., and Masui, N. (1981) Rare-earth element geochemistry of volcanic and related rocks from the Galapagos Islands. *Geochemical Journal*, vol.15, pp.81-93.
- [595] White, W.M. (1979) Pb isotope geochemistry of the Galapagos Islands. *Year Book - Carnegie Institution of Washington*, no.78, pp.331-335.
- [599] White, W.M., and Hofman, A.W. Geochemistry of the Galapagos Islands; implications for mantle dynamics and evolution. *Year Book - Carnegie Institution of Washington*, no.77, pp.596-605.
- [606] White, W.M., McBirney, A.R., and Duncan, R.A. (1993) Petrology and geochemistry of the Galapagos Islands; portrait of a pathological mantle plume. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol. 98, no.11, pp.19,533-19,563.

#### Hawaii (Kilauea)

- [171] Anderson, A.T., and Brown, G.G. (1993) CO<sub>2</sub> contents and formation pressures of some Kilauean melt inclusions. *American Mineralogist*, vol.78, pp.794-803.
- [207] Anderson, A.T., and Wright, T.L. (1972) Phenocrysts and glass inclusions and their bearing on oxidation and mixing of basaltic magmas, Kilauea Volcano, Hawaii. *American Mineralogist*, vol.57, pp.188-216.
- [1446] Aramaki, S. (1965) Notes on rock-forming minerals (35) plagioclase phenocrysts from the 1955 lava flow of Kilauea, Hawaii. *Journal of the Geological Society of Japan*, vol. 71, p. 425.
- [1466] Arousseau, M., and Merwin, H.E. (1928) Olivine: I from the Hawaiian Islands; II. Pure Forsterite. *American Mineralogist*, vol. 13, pp. 559-564.
- [393] Basaltic Volcanism Study Project (1981) Basaltic volcanism on the terrestrial planets. Pergamon Press, New York, NY. 1286 pp.
- [4066] Burkhard, D.J.M. (2001) Crystallization and oxidation of Kilauea basalt glass; processes during reheating experiments. *Journal of Petrology*, vol.42, pp.507-527.
- [68] Clague, D.A., Weber, W.S., and Dixon, J.E. (1991) Picritic glasses from Hawaii. *Nature (London)*, vol. 353, pp.553-556.
- [212] Easton, R.M., and Garcia, M.O. (1980) Petrology of the Hilina formation, Kilauea volcano, Hawaii. *Bulletin Volcanologique*, vol. 43, pp. 657-673.
- [400] Evans, B.W., and Moore, J.G. (1968) Mineralogy as a function of depth in the prehistoric Makaopuhi tholeiitic lava lake, Hawaii. *Contributions to Mineralogy and Petrology*, vol.17, pp.85-115.
- [1374] Evans, B.W., and Wright, T.L. (1972) Composition of liquidus chromite from the 1959 (Kilauea Iki) and 1965 (Makaopuhi) eruptions of Kilauea Volcano, Hawaii. *American Mineralogist*, vol.57, pp.217-230.
- [234] Fleet, M.E., and Stone, W.E. (1990) Nickeliferous sulfides in xenoliths, olivine megacrysts and basaltic glass. *Contributions to Mineralogy and Petrology*, vol.105, pp.629-636.
- [224] Fodor, R.V., and Moore, R.B. (1994) Petrology of gabbroic xenoliths in 1960 Kilauea basalt; crystalline remnants of prior (1955) magmatism. *Bulletin of Volcanology*, vol.56, pp. 62-74.
- [223] Garcia, M.O., Ho, R.A., Rhodes, J.M., and Wolfe, E.W. (1989) Petrologic constraints on

- rift-zone processes; results from episode 1 of the Puu Oo eruption of Kilauea Volcano, Hawaii. *Bulletin of Volcanology*, vol.52, pp.81-96.
- [2778] Garcia, M.O., Pietruszka, A.J., Rhodes, J.M., and Swanson, K. (2000) Magmatic processes during the prolonged Pu'u 'O'o eruption of Kilauea Volcano, Hawaii. *Journal of Petrology*, vol.41, pp. 967-990.
- [220] Garcia, M.O., Rhodes, J.M., Trusdell, F.A., and Pietruszka, A.J. (1996) Petrology of lavas from the Puu Oo eruption of Kilauea Volcano; 3, The Kupaianaha episode (1986-1992). *Bulletin of Volcanology*, vol.58, pp. 359-379.
- [217] Garcia, M.O., Rhodes, J.M., Wolfe, E.W., Ulrich, G.E., and Ho, R.A. (1992) Petrology of lavas from episodes 2-47 of the Puu Oo eruption of Kilauea Volcano, Hawaii; evaluation of magmatic processes. *Bulletin of Volcanology*, vol.55, pp.1-16.
- [228] Garcia, M.O., and Wolfe, E.W. (1988) Petrology of the erupted lava. U. S. Geological Survey Professional Paper, Report: P 1463, pp.127-143.
- [269] Gunn, B.M. (1971) Trace element partition during olivine fractionation of Hawaiian basalts. *Chemical Geology*, vol.8, pp.1-13.
- [120] Harris, D.M., and Anderson, A. T. (1983) Concentrations, sources, and losses of H<sub>2</sub>O, CO<sub>2</sub> and S in Kilauean basalt. *Geochimica et Cosmochimica Acta*, vol.47, pp.1139-1150.
- [165] Helz, R.T. (1987) Diverse olivine types in lava of the 1959 eruption of Kilauea Volcano and their bearing on eruption dynamics. U. S. Geological Survey Professional Paper, Report: P 1350, pp. 691-722.
- [231] Helz, R.T., and Wright, T.L. (1992) Differentiation and magma mixing on Kilauea's East Rift Zone; A further look at the eruptions of 1955 and 1960; 1, The late 1955 lavas. *Bulletin of Volcanology*, vol.54, pp.361-384.
- [226] Ho, R.A., and Garcia, M.O. (1988) Origin of differentiated lavas at Kilauea Volcano, Hawaii; implications from the 1955 eruption. *Bulletin of Volcanology*, vol.50, pp.35-46.
- [130] Kaneoka, I., and Takaoka, N. (1978) Excess <sup>129</sup>Xe and high <sup>3</sup>He/<sup>4</sup>He ratios in olivine phenocrysts of Kapuho Lava and xenolithic dunites from Hawaii. *Earth and Planetary Science Letters*, vol.39, pp.382-386.
- [17] Kurz, M.D., Garcia, M.O., Frey, F.A., and O'Brien, P.A. (1987) Temporal helium isotopic variations within Hawaiian volcanoes; basalts from Mauna Loa and Haleakala. *Geochimica et Cosmochimica Acta*, vol.51, pp. 2905-2914.
- [115] Kurz, M.D., Jenkins, W.J., and Hart, S.R. (1982) Helium isotopic systematics of oceanic islands and mantle heterogeneity. *Nature (London)*, vol.297, pp.43-47.
- [137] Kurz, M.D., Jenkins, W.J., Hart, S.R., and Clague, D.A. (1983) Helium isotopic variations in volcanic rocks from Loihi Seamount and the Island of Hawaii. *Earth and Planetary Science Letters*, vol. 66, pp. 388-406.
- [186] Kyser, T.K., O'neil, J.R., and Carmichael, S.E. (1981) Oxygen isotope thermometry of basic lavas and mantle nodules. *Contributions to Mineralogy and Petrology*, vol.77, pp.11-23.
- [204] Leeman, W.P., and Scheidegger, K.F. (1977) Olivine/liquid distribution coefficients and a test for crystal-liquid equilibrium. *Earth and Planetary Science Letters*, vol.35, pp.247-257.
- [840] MacDonald, G.A., and Katsura, T. (1961) Variations in the lava of the 1959 eruption in Kilauea Iki. *Pacific Science*, vol.15, pp.358-369.
- [281] Moore, J.G., and Evans, B.W. (1967) The role of olivine in the crystallization of the

- prehistoric Makaopuhi tholeiitic lava lake, Hawaii. *Contributions to Mineralogy and Petrology*, vol.15, pp.202-223.
- [732] Moore, R.B., Helz, R.T., Dzurisin, D., Eaton, G.P., Koyanagi, R.Y., Lipman, P.W., Lockwood, J.P., and Puniwai, G.S. (1980) The 1977 eruption of Kilauea Volcano, Hawaii. *Journal of Volcanology and Geothermal Research*, vol.7, pp.189-210.
- [287] Muir, I.D., and Tilley, C.E. (1957) The picrite-basalts of Kilauea, [Part] 1 of Contributions to the petrology of Hawaiian basalts. *American Journal of Science*, vol.255, pp.241-253.
- [259] Muir, I.D., and Tilley, C.E. (1963) Contributions to the petrology of Hawaiian basalts; [Part] 2, The tholeiitic basalts of Mauna Loa and Kilauea, with chemical analyses by J. H. Scoon. *American Journal of Science*, vol.261, pp.111-128.
- [3632] Mukasa, S.B. (1986) Common Pb isotopic compositions of the Lima, Arequipa and Toquepala segments in the Coastal Batholith, Peru; implications for magmagenesis. *Geochimica et Cosmochimica Acta*, vol.50, pp.771-782.
- [1391] Murata, K.J., Bastron, H., and Brannock, W.W. (1965) X-ray determinative curve for Hawaiian olivines of composition  $FO_{76-88}$ . U. S. Geological Survey Professional Paper, Report: P 0525-C, pp.C35-C37.
- [230] Murata, K.J., and Richter, D.H. (1966) Chemistry of the lavas of the 1959-60 eruption of Kilauea Volcano, Hawaii. U. S. Geological Survey Professional Paper, Report: P 0537-A, pp.A1-A26.
- [55] Nicholls, J., and Stout, M.Z. (1988) Picritic melts in Kilauea; evidence from the 1967-1968 Halemaumau and Hiiaka eruptions. *Journal of Petrology*, vol.29, pp.1031-1057.
- [152] Rhodes, J.M. (1995) The 1852 and 1868 Mauna Loa picrite eruptions; clues to parental magma compositions and the magmatic plumbing system. IN. J.M. Rhodes and J.P. Lockwood (eds.) *Mauna Loa revealed; structure, composition, history, and hazards*, Geophysical Monograph, vol.92, pp.241-262.
- [283] Richter, D.H., and Moore, J.G. (1966) Petrology of the Kilauea Iki lava lake, Hawaii. U. S. Geological Survey Professional Paper, Report: P 0537-B, pp.B1-B26.
- [136] Rison, W., and Craig, H. (1983) Helium isotopes and mantle volatiles in Loihi Seamount and Hawaiian Island basalts and xenoliths. *Earth and Planetary Science Letters*, vol.66, pp.407-426.
- [105] Scowen, P.A.H., Roeder, P.L., and Helz, R.T. (1991) Reequilibration of chromite within Kilauea Iki lava lake, Hawaii. *Contributions to Mineralogy and Petrology*, vol.107, pp.8-20.
- [50] Wilkinson, J.F.G., and Hensel, H.D. (1988) The petrology of some picrites from Mauna Loa and Kilauea volcanoes, Hawaii. *Contributions to Mineralogy and Petrology*, vol. 98, pp. 326-345.
- [222] Wright, T.L., and Helz, R.T. (1996) Differentiation and magma mixing on Kilauea's East Rift Zone; a further look at the eruptions of 1955 and 1960; 2, The 1960 lavas. *Bulletin of Volcanology*, vol.57, pp. 602-630.
- [733] Wright, T.L., and Peck, D.L. (1978) Crystallization and differentiation of the Alae magma, Alae lava lake, Hawaii. U. S. Geological Survey Professional Paper, Report: P 935-C, 20 pp.
- [1422] Yoder, H.S., and Tilley, C.E. (1962) Origin of basalt magmas; an experimental study of natural and synthetic rock systems. *Journal of Petrology*, vol.3, pp.342-529.

## Hawaii (Mauna Loa)

- [2880] Abouchami, W., Galer, S.J.G., and Hofmann, A.W. (2000) High precision lead isotope systematics of lavas from the Hawaiian Scientific Drilling Project. *Chemical Geology*, vol.169, pp.187-209.
- [3445] Bennett, V.C., Norman, M.D., and Garcia, M.O. (2000) Rhenium and platinum group element abundances correlated with mantle source components in Hawaiian picrites; sulphides in the plume. *Earth and Planetary Science Letters*, vol.183, pp.513-526.
- [6] Baker, M.B., Alves, S., and Stolper, E.M. (1996) Petrography and petrology of the Hawaii Scientific Drilling Project lavas; inferences from olivine phenocryst abundances and compositions. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,715-11,727.
- [90] Bennett, V.C., East, T.M., and Norman, M.D. (1996) Two mantle-plume components in Hawaiian picrites inferred from correlated Os-Pb isotopes. *Nature (London)*, vol.381, pp.221-224.
- [1300] Blichert-Toft, J., and Albarede, F. (1999) Hf isotopic compositions of the Hawaii Scientific Drilling Project core and the source mineralogy of Hawaiian basalts. *Geophysical Research Letters*, vol.26, pp.535-538.
- [1494] Brandon, A.D., Norman, M.D., Walker, R.J., and Morgan, J.W. (1999)  $^{186}\text{Os}$ - $^{187}\text{Os}$  systematics of Hawaiian picrites. *Earth and Planetary Science Letters*, vol.174, pp.25-42.
- [347] Brandon, A.D., Walker, R.J., Morgan, J.W., Norman, M.D., and Prichard, H.M. (1998) Coupled  $^{186}\text{Os}$  and  $^{187}\text{Os}$  evidence for core-mantle interaction. *Science*, vol.280, pp.1570-1573.
- [75] Cohen, A.S., and O'Nions, R.K. (1993) Melting rates beneath Hawaii; evidence from uranium series isotopes in Recent lavas. *Earth and Planetary Science Letters*, vol.120, pp.169-175.
- [353] Cohen, A.S., and O'nions, R.K. (1994) Erratum: melting rates beneath Hawaii: evidence from Uranium series isotopes in recent lavas. *Earth and Planetary Science Letters*, vol. 121, p. 669.
- [92] Cohen, A.S., O'Nions, R.K., and Kurz, M.D. (1996) Chemical and isotopic variations in Mauna Loa tholeiites. *Earth and Planetary Science Letters*, vol.143, pp.111-124.
- [37] Crisp, J., Cashman, K.,V., Bonini, J.A., Hougén, S.B., and Pieri, D.C. (1994) Crystallization history of the 1984 Mauna Loa lava flow. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.99, pp.7177-7198.
- [182] Eiler, J.M., Farley, K.A., Valley, J.W., Hofmann, A.W., and Stolper, E.M. (1996) Oxygen isotope constraints on the sources of Hawaiian volcanism. *Earth and Planetary Science Letters*, vol.144, pp.453-468.
- [10] Eiler, J.M., Valley, J.W., and Stolper, E.M. (1996) Oxygen isotope ratios in olivine from the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,807-11,813.
- [88] Fodor, R.V., and Galar, P. (1997) A view into the subsurface of Mauna Kea Volcano, Hawaii; crystallization processes interpreted through the petrology and petrography of gabbroic and ultramafic xenoliths. *Journal of Petrology*, vol.38, pp.581-624.
- [5] Garcia, M.O. (1996) Petrography and olivine and glass chemistry of lavas from the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*,

- vol.101, pp.11,701-11,713.
- [151] Garcia, M.O., Hulsebosch, T.P., and Rhodes, J.M. (1995) Olivine-rich submarine basalts from the southwest rift zone of Mauna Loa Volcano; implications for magmatic processes and geochemical evolution. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 219-239.
- [249] Hart, S.R., and Ravizza, G.E. (1996) Os partitioning between phases in lherzolite and basalt. IN A. Basu and S.R. Hart (eds.) Earth Processes, Reading the Isotopic Code. AGU, WASHINGTON DC, pp. 123-134.
- [73] Hauri, E.H., and Kurz, M.D. (1997) Melt migration and mantle chromatography; 2, A time-series Os isotope study of Mauna Loa Volcano, Hawaii. Earth and Planetary Science Letters, vol.153, pp.21-36.
- [9] Hauri, E.H., Lassiter, J.C., and DePaolo, D.J. (1996) Osmium isotope systematics of drilled lavas from Mauna Loa, Hawaii. Journal of Geophysical Research, B, Solid Earth and Planets, vol.101, pp.11,793-11,806.
- [14] Hemond, C., Hofmann, A.W., Heusser, G., Condomines, M., Raczek, I., and Rhodes, J.M. (1994) U-Th-Ra systematics in Kilauea and Mauna Loa basalts, Hawaii. Chemical Geology, vol.116, pp.163-180.
- [1] Hofmann, A.W., and Jochum, K.P. (1996) Source characteristics derived from very incompatible trace elements in Mauna Loa and Mauna Kea basalts, Hawaii Scientific Drilling Project. Journal of Geophysical Research, B, Solid Earth and Planets, vol.101, pp.11,831-11,839.
- [155] Jochum, K.P., and Hofmann, A.W. (1995) Contrasting Th/U in historical Mauna Loa and Kilauea lavas. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 307-314.
- [1051] Jochum, K.P., Hofmann, A.W., Bessette, D., Stoll, B., and Graup, G. (1999) Sr-XRF microprobe trace element study on melt inclusions from Hawaiian basalts. Hasylab Jahresbericht.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. Geochimica et Cosmochimica Acta, vol.57, pp.3585-3595.
- [191] Kurz, M.D., Colodner, D., Trull, T.W., Moore, R.B., and O'Brien, K. (1990) Cosmic ray exposure dating with in situ produced cosmogenic (super 3) He; results from young Hawaiian lava flows. Earth and Planetary Science Letters, vol.97, pp.177-189.
- [156] Kurz, M.D., and Kammer, D.P. (1991) Isotopic evolution of Mauna Loa Volcano. Earth and Planetary Science Letters, vol.103, pp.257-269.
- [154] Kurz, M.D., Kenna, T.C., Kammer, D.P., Rhodes, J.M., and Garcia, M.O. (1995) Isotopic evolution of Mauna Loa Volcano; a view from the submarine southwest rift zone. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 289-306.
- [8] Kurz, M.D., Kenna, T.C., Lassiter, J.C, and DePaolo, D.J. (1996) Helium isotopic evolution of Mauna Kea Volcano; first results from the 1-km drill core. Journal of Geophysical Research, B, Solid Earth and Planets, vol.101, pp.11,781-11,791.
- [32] Lipman, P.W., Rhodes, J.M., and Dalrymple, G.B. (1990) The Ninole Basalt; implications for the structural evolution of Mauna Loa Volcano, Hawaii. Bulletin of Volcanology,

- vol.53, pp.1-19.
- [150] Montierth, C., Johnston, A.D., and Cashman, K.V. (1995) An empirical glass-composition-based geothermometer for Mauna Loa lavas. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 207-217.
- [15] Moore, J.G., Bryan, W.B., Beeson, M.H., and Normark, W.R. (1995) Giant blocks in the South Kona Landslide, Hawaii. *Geology*, vol.23, pp.125-128.
- [196] Moore, J.G., and Clague, D.A. (1992) Volcano growth and evolution of the Island of Hawaii; with Suppl. Data 92-34. *Geological Society of America Bulletin*, vol.104, pp.1471-1484.
- [1479] Nicholls, J., and Stout, M.Z. (1997) Epitactic overgrowths and intergrowths of clinopyroxene on orthopyroxene; implications for paths of crystallization, 1881 lava flow, Mauna Loa Volcano, Hawaii. *The Canadian Mineralogist*, vol.35, pp.909-922.
- [1266] Norman, M.D., and Garcia, M.O. (1999) Primitive magmas and source characteristics of the Hawaiian Plume; petrology and geochemistry of shield picrites. *Earth and Planetary Science Letters*, vol.168, pp.27-44.
- [18] Pegrarn, W.J., and Allegre, C.J. (1992) Osmium isotopic compositions from oceanic basalts. *Earth and Planetary Science Letters*, vol.111, pp.59-68.
- [152] Rhodes, J.M. (1995) The 1852 and 1868 Mauna Loa picrite eruptions; clues to parental magma compositions and the magmatic plumbing system. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp.241-262.
- [2] Rhodes, J.M. (1996) Geochemical stratigraphy of lava flows sampled by the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,729-11,746.
- [153] Rhodes, J.M., and Hart, S.R. (1995) Episodic trace element and isotopic variations in historical Mauna Loa lavas; implications for magma and plume dynamics. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 263-288.
- [83] Sims, K.W.W., and DePaolo, D.J. (1997) Inferences about mantle magma sources from incompatible element concentration ratios in oceanic basalts. *Geochimica et Cosmochimica Acta*, vol.61, pp.765-784.
- [61] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S.J., and Clague, D.A. (1995) Mechanisms of magma generation beneath Hawaii and mid-ocean ridges; uranium/thorium and samarium/neodymium isotopic evidence. *Science*, vol.267, pp.508-512.
- [1496] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S., Clague, D., and Jull, M. (1999) Porosity of the melting zone and variations in the solid mantle upwelling rate beneath Hawaii; inferences from  $^{238}\text{U}$ - $^{230}\text{Th}$ - $^{226}\text{Ra}$  and  $^{235}\text{U}$ - $^{231}\text{Pa}$  disequilibria. *Geochimica et Cosmochimica Acta*, vol.63, pp.4119-4138.
- [2497] Sobolev, A.V., Hofmann, A.W., and Nikogosian, I.K. (2000) Recycled oceanic crust observed in 'ghost plagioclase' within the source of Mauna Loa lavas. *Nature*, vol. 404, pp. 986-990.
- [169] Sobolev, A.V., and Nikogosian, I.K. (1994) Petrology of Long-lived mantle plume magmatism: Hawaii, Pacific, and Reunion Island, Indian Ocean. *Petrology*, vol. 2, pp.

111-144.

- [2661] Stracke, A., Salters, V.J.M., and Sims, K.W.W. (1999) Assessing the presence of garnet-pyroxenite in the mantle sources of basalts through combined hafnium-neodymium-thorium isotope systematics. *Geochemistry, Geophysics, Geosystems - G 3*, vol.1. <http://cal.csa.com/htbin/ids631/procskel.cgi>.
- [93] Valbracht, P.J., Staudigel, H., Honda, M., McDougall, I., and Davies, G.R. (1996) Isotopic tracing of volcanic source regions from Hawaii; decoupling of gaseous from lithophile magma components. *Earth and Planetary Science Letters*, vol.144, pp.185-198, ill pp.
- [349] Wagner, T.P., Clague, D.A., Hauri, E.H., and Grove, T.L. (1998) Trace element abundances of high-MgO glasses from Kilauea, Mauna Loa and Haleakala volcanoes, Hawaii. *Contributions to Mineralogy and Petrology*, vol.131, pp.13-21.
- [190] Williams, R.W., and Gill, J.B. (1992) The isotope and U-series disequilibria in some alkali basalts. *Geophysical Research Letters*, vol.19, pp.139-142.
- [4] Yang, H.J., Frey, F.A., Rhodes, J.M., and Garcia, M.O. (1996) Evolution of Mauna Kea Volcano; inferences from lava compositions recovered in the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,747-11,767.

## Iceland

- [4738] Breddam, K. (2002) Kistufell; primitive melt from the Iceland mantle plume. *Journal of Petrology*, vol.43, pp.345-373.
- [1535] Carmichael, I.S.E. (1967) The mineralogy of Thingmuli, a Tertiary volcano in eastern Iceland. *American Mineralogist*, vol.52, pp.1815-1841.
- [2881] Dixon, E.T., Honda, M., McDougall, I., Campbell, I.H., and Sigurdsson, I. (2000) Preservation of near-solar neon isotopic ratios in Icelandic basalts. *Earth and Planetary Science Letters*, vol.180, pp.309-324.
- [1620] Hansteen, T.H. (1991) Multi-stage evolution of the picritic Maelifell rocks, SW Iceland; constraints from mineralogy and inclusions of glass and fluid in olivine. *Contributions to Mineralogy and Petrology*, vol.109, pp.225-239.
- [5162] Larsson, D., Gronvold, K., Oskarsson, N., and Gunnlaugsson, E. (2002) Hydrothermal alteration of plagioclase and growth of secondary feldspar in the Hengill volcanic centre, SW Iceland. *Journal of Volcanology and Geothermal Research*, vol.114, pp.275-290.
- [1145] Mäkipää, H. (1978) Petrological relations in some Icelandic basaltic hyaloclastites. *Bulletin of the Geological Society of Finland*, no.50, pp.81-112.
- [1022] Mühlenbachs, K., Anderson, A.T., and Sigvaldason, G.E. (1974) Low-<sup>18</sup>O basalts from Iceland. *Geochimica et Cosmochimica Acta*, vol.38, pp.577-588.
- [4692] Skovgaard, A.C., Storey, M., Baker, J., Blusztajn, J., and Hart, S.R. (2001) Osmium-oxygen isotopic evidence for a recycled and strongly depleted component in the Iceland mantle plume. *Earth and Planetary Science Letters*, vol.194, pp.259-275.

## Marquesas

- [789] Caroff, M., Maury, R.C., Vidal, P., Guille, G., Dupuy, C., Cotten, J., Guillou, H., and Gillot, P.-Y. (1995) Rapid temporal changes in ocean island basalt composition; evidence from an 800 m deep drill hole in Eiao Shield (Marquesas). *Journal of Petrology*, vol.36, pp.1333-1365.

## ALKALINE ISLAND SOURCES

## Austral-Cook

- [1482] Brousse, R., and Maury R.C. (1980) Volcanology and petrology of Tubuai Island, Austral Islands, South Pacific. *Cahiers Indo-Pacifique*, vol. 2, pp. 131-193.

## Canaries

- [934] Arana, V., Marti, J., Aparicio, A., Garcia-Cacho, L., and Garcia-Garcia, R. (1994) Magma mixing in alkaline magmas; an example from Tenerife, Canary Islands. *Lithos*, vol.32, pp.1-19.
- [1501] Neumann, E.R., Wulff-Pedersen, E., Simonsen, S.L., Pearson, N.J., Marti, J., and Mitjavila, J. (1999) Evidence for fractional crystallization of periodically refilled magma chambers in Tenerife, Canary Islands. *Journal of Petrology*, vol.40, pp.1089-1123.
- [1464] Scott, P.W. (1976) Crystallization trends of pyroxenes from the alkaline volcanic rocks of Tenerife, Canary Islands. *Mineralogical Magazine*, vol.40, pp.805-816.

## Comores

- [1279] Flower, M.F.J. (1973) Evolution of Basaltic and Differentiated Lavas from Anjouan, Comores Archipelago. *Contributions to Mineralogy and Petrology*, vol.38, pp.237-260.
- [1307] Flower, M.F.J. (1973) Trace-element distribution in lavas from Anjouan and Grande Comoro, western Indian Ocean. *Chemical Geology*, vol.12, pp.81-98.
- [1303] Spaeth, A., le Roex, A.P., and Duncan, R.A. (1996) The geochemistry of lavas from the Comores Archipelago, western Indian Ocean; petrogenesis and mantle source region characteristics. *Journal of Petrology*, vol.37, pp.961-991.
- [1423] Strong, D.F. (1972) The Petrology of the Lavas of Grande Comore. *Journal of Petrology*, vol.13, pp.181-217.

## Gough

- [1308] Berlin, R., and Henderson, C.M.B. (1969) The distribution of Sr and Ba between the alkali feldspar, plagioclase and groundmass phases of porphyritic trachytes and phonolites. *Geochimica et Cosmochimica Acta*, vol.33, pp.247-255.
- [540] Carmichael, I.S.E. (1965) Trachytes and their feldspar phenocrysts. *Mineralogical Magazine*, vol.34, pp.107-125.
- [582] Le Maitre, R.W. (1962) Petrology of volcanic rocks, Gough island, south Atlantic. *Geological Society of America Bulletin*, vol.73, pp.1309-1340.
- [539] Le Maitre, R.W. (1965) The significance of the gabbroic xenoliths from Gough island, south Atlantic. *Mineralogical Magazine*, vol.34, pp.303-317.
- [528] Le Roex, A.P. (1985) Geochemistry, mineralogy, and magmatic evolution of the basaltic

and trachytic lavas from Gough Island, South Atlantic. *Journal of Petrology*, vol.26, pp.149-186.

#### Jan Mayen

- [540] Carmichael, I.S.E. (1965) Trachytes and their feldspar phenocrysts. *Mineralogical Magazine*, vol.34, pp.107-125.
- [3714] Carstens, H. (1962) Lavas of the southern part of Jan Mayen. *Arbok - Norsk Polarinstitut*, pp.69-82.
- [1376] Flower, M.F.J. (1969) Phlogopite from Jan Mayen island (north Atlantic). *Earth and Planetary Science Letters*, vol.6, pp.461-466.
- [1468] Hawkins, T.R.W., and Roberts, B. (1972) The petrology of the volcanic and intrusive rocks of Nord-Jan, Jan Mayen. *Arbok - Norsk Polarinstitut*, pp.19-41.
- [1321] Imsland, P. (1984) Petrology, mineralogy, and evolution of the Jan Mayen magma system. *Visindafelag Islendinga*, vol.43, 332 pp.
- [1220] Maaloe, Sven., Sorensen, I., and Hertogen, J. (1986) The trachybasaltic suite of Jan Mayen. *Journal of Petrology*, vol.27, pp.439-466.
- [1469] Weigand, P.W. (1972) Bulk-rock and mineral chemistry of recent Jan Mayen basalts. *Arbok - Norsk Polarinstitut*, pp.42-52.

#### Society

- [566] Binard, N., Maury, R.C., Guille, G., Talandier, J., Gillot, P.Y., and Cotten, J. (1993) Mehetia Island, South Pacific; geology and petrology of the emerged part of the Society hot spot. *Journal of Volcanology and Geothermal Research*, vol.55, pp.239-260.
- [548] Blanchard, F., Liotard, J.M., and Brousse, R. (1981) Mantle origin of Moorea benmoreites, Society Islands, Pacific Ocean. *Bulletin Volcanologique*, vol.44, pp.691-710.
- [574] Brousse, R. (1984) Moua Pihaa, an active submarine volcano southeast of the Society Archipelago, Pacific Ocean. *Comptes-Rendus des Seances de l'Academie des Sciences, Serie 2: Mecanique-Physique, Chimie, Sciences de l'Univers, Sciences de la Terre*, vol.299, pp.995-998.
- [1178] Joron, J.L., Schiano, P., Turpin, L., Treuil, M., Gisbert, T., Leotot, C., and Brousse, R. (1991) Exceptional rare earth element enrichments in Tahaa Volcano (French Polynesia). *Comptes Rendus de l'Academie des Sciences, Serie 2, Mecanique, Physique, Chimie, Sciences de l'Univers, Sciences de la Terre*, vol.313, pp.523-530.
- [3081] Philpotts, J.A., and Schnetzler, C.C. (1970) Phenocryst-matrix partition coefficients for K, Rb, Sr and Ba, with applications to anorthosite and basalt genesis. *Geochimica et Cosmochimica Acta*, vol.34, pp.307-322.
- [556] Schiano, P., Clocchiatti, R., and Joron, J.L. (1992) Melt and fluid inclusions in basalts and xenoliths from Tahaa Island, Society Archipelago; evidence for a metasomatized upper

- mantle. *Earth and Planetary Science Letters*, vol.111, pp.69-82.
- [3082] Schnetzler, C.C., and Philpotts, J.A. (1968) Partition coefficients of rare-earth elements and barium between igneous matrix material and rock-forming-mineral phenocrysts; [Part] 1. IN L.H. Ahrens (ed.) *Origin and distribution of the elements. International Series of Monographs on Earth Sciences*, vol.30, pp.929-938.
- [573] Tracy, R.J. (1980) Petrology and genetic significance of an ultramafic xenolith suite from Tahiti. *Earth and Planetary Science Letters*, vol.48, pp.80-96.
- [552] Tracy, R.J., and Robinson, P. (1977) Zoned titanian augite in alkali olivine basalt from Tahiti and the nature of titanium substitutions in augite. *American Mineralogist*, vol.62, pp.634-645.

#### Tristan da Cunha

- [2719] Anderson, A.T. (1968) The oxygen fugacity of alkaline basalt and related magmas, Tristan da Cunha. *American Journal of Science*, vol.266, pp.704-727.
- [504] Asavin, A.M., Kogarko, L.N., Kryuchkova, O.I., Tyurin, D.A., and Kolesov, G.M. (1997) The Grand Canary, Saint Helena, and Tristan da Cunha oceanic islands; variations of trace element partition coefficients in pyroxene-melt equilibria during alkaline magma evolution. *Geokhimiya*, vol.1997, pp.479-487.
- [517] Barsikov, V.L., Kogarko, L.N., Polyakov, A.I., Ignatenko, K.I., and Zinoveyev, A.I. (1979) Differentiation of basaltoid melts and formation of the volcanic rock series of the South Atlantic islands. *Geochemistry International*, vol.16, pp.1-12.
- [1308] Berlin, R., and Henderson, C.M.B. (1969) The distribution of Sr and Ba between the alkali feldspar, plagioclase and groundmass phases of porphyritic trachytes and phonolites. *Geochimica et Cosmochimica Acta*, vol.33, pp.247-255.
- [540] Carmichael, I.S.E. (1965) Trachytes and their feldspar phenocrysts. *Mineralogical Magazine*, vol.34, pp.107-125.
- [523] Kogarko, L.N., Barsukov, V.L., Asavin, A.M., Polyakov, A.I., Chernogovorova, S.M., Korovkina, N.A., and Ramendik, G.I. (1986) Geochemistry of the iron-group elements during the fractional differentiation of oceanic-island alkali series. *Geochemistry International*, vol.23, pp.51-65.
- [537] Le Maitre, R.W. (1969) Kaersutite-bearing plutonic xenoliths from Tristan da Cunha, south Atlantic. *Mineralogical Magazine*, vol.37, pp.185-197.

## Whole-Rock Data Selection and Reduction

References below are separated into two groups: 1) those used in diagrams illustrating the effects of differentiation on the major elements and trace elements and those 2) utilized to create whole-rock major element, trace element and isotopic data averages. The averaged data appear in an associated EXCEL spreadsheet. Guidelines for the data used and methods applied to data reduction are as follows:

1. Analyses were downloaded from the GEOROC web site <http://georoc.mpch-mainz.gwdg.de/>.
2. All data are from papers published since 1980.
3. As a first screen, all rocks with listed names other than basalts, basanites, nephelinites, ankaramites and picrites were deleted.
4. For the major elements alone - all samples with any missing major elements were eliminated from the average major element composition (but not necessarily from the trace element averages).
5. Samples were screened using Mg# values. All samples have  $Mg\# \geq 0.40$  and  $\leq 0.77$ .
6. In general, averages are for individual islands but in a few cases (e.g. Cap Verde) the averages involve more than one island. The Hawaiian averages represent individual volcanoes (Kilauea and Mauna Loa) and the later stages of volcanism on Kauai.

## Whole-Rock References for Differentiation Suites

The references for the differentiated suites from Iceland, Moorea and Tristan are organized according to Island.

Tristan da Cunha:

- [521] Le Roex, A.P., Cliff, R.A., and Adair, B.J.I. (1990) Tristan da Cunha, South Atlantic; geochemistry and petrogenesis of a basanite-phonolite lava series. *Journal of Petrology*, vol.31, pp.779-812.

Moorea, Society Islands:

- [547] Bellon, H., and Blanchard, F. (1981) Geochronology (K/Ar) of volcanism on Moorea, central Pacific. *Tectonophysics*, vol.72, pp.T33-T43.
- [548] Blanchard, F., Liotard, J.M., and Brousse, R. (1981) Mantle origin of Moorea benmoreites, Society Islands, Pacific Ocean. *Bulletin Volcanologique*, vol.44, pp.691-710.
- [5216] David, K., Schiano, P., and Allegre, C.J. (2000) Assessment of the Zr/Hf fractionation in oceanic basalts and continental materials during petrogenetic processes. *Earth and Planetary Science Letters*, vol.178, pp.285-301.
- [546] Dostal, J., Dupuy, C., and Liotard, J.M. (1982) Geochemistry and origin of basaltic lavas from Society Islands, French Polynesia; South Central Pacific Ocean. *Bulletin Volcanologique*, vol.45, pp.51-62.
- [562] Hemond, C., Devey, C.W., and Chauvel, C. (1994) Source compositions and melting processes in the Society and Austral plumes (South Pacific Ocean); element and isotope (Sr, Nd, Pb, Th) geochemistry. *Chemical Geology*, vol.115, pp.7-45.

Iceland (Torfajökull [1508], Hekla [1213])

- [1508] McGarvie, D.W., MacDonald, R., Pinkerton, H., and Smith, R.L. (1990) Petrogenetic evolution of the Torfajökull volcanic complex, Iceland; 2, The role of magma mixing. *Journal of Petrology*, vol.31, pp.461-481.
- [1213] Sigmarsson, O., Condomines, M., and Fourcade, S. (1992) A detailed Th, Sr and O isotope study of Hekla; differentiation processes in an Icelandic volcano. *Contributions to Mineralogy and Petrology*, vol.112, pp.20-34.

## Whole-Rock References for Averaged Data

### Ascension References

- [1392] Cohen, R.S., and O'Nions, R.K. (1982) Identification of recycled continental material in the mantle from Sr, Nd and Pb isotope investigations. *Earth and Planetary Science Letters*, vol.61, pp.73-84.
- [825] Garg, A.N. (1981) The role of crystal chemical effects in zirconium-hafnium fractionation in oceanic basalts from Ascension Island. *Chemical Geology*, vol.34, pp.235-241.
- [1195] Halliday, A.N., Davies, G.R., Lee, D.-C., Tommasini, S., Paslick, C.R., Fitton, J.G., and James, D.E. (1992) Lead isotope evidence for young trace element enrichment in the oceanic upper mantle. *Nature (London)*, vol.359, pp.623-627.
- [1197] Halliday, A.N., Lee, D.-C., Tommasini, S., Davies, G.R., Paslick, C.R., Fitton, J.G., and James, D.E. (1995) Incompatible trace elements in OIB and MORB and source enrichment in the sub-oceanic mantle. *Earth and Planetary Science Letters*, vol.133, pp.379-395.
- [823] Harris, C., Bell, J.D., and Atkins, F.B. (1982) Isotopic composition of lead and strontium in lavas and coarse-grained blocks from Ascension Island, South Atlantic. *Earth and Planetary Science Letters*, vol.60, pp.79-85.
- [831] Kar, A., Weaver, B., Davidson, J., and Colucci, M. (1998) Origin of differentiated volcanic and plutonic rocks from Ascension Island, South Atlantic Ocean. *Journal of Petrology*, vol.39, pp.1009-1024.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [833] Sheppard, S.M.F., and Harris, C. (1985) Hydrogen and oxygen isotope geochemistry of Ascension Island lavas and granites; variation with crystal fractionation and interaction with sea water. *Contributions to Mineralogy and Petrology*, vol.91, pp.74-81.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [829] Weaver, B., Kar, A., Davidson, J., and Colucci, M. (1996) Geochemical characteristics of volcanic rocks from Ascension Island, South Atlantic Ocean. *Geothermics*, vol.25, pp.449-470.
- [482] Weaver, B.L., Wood, D.A., Tarney, J., and Joron, J.L. (1987) Geochemistry of ocean island basalts from the South Atlantic; Ascension, Bouvet, St. Helena, Gough and Tristan da Cunha. IN J.G. Fitton and B.G.J. Upton (eds.) *Alkaline igneous rocks*. Geological Society of London Special Publications, vol.30, pp.253-267.
- [822] Weis, D. (1983) Pb isotopes in Ascension Island rocks; oceanic origin for the gabbroic to granitic plutonic xenoliths. *Earth and Planetary Science Letters*, vol.62, pp.273-282.
- [827] Weis, D., Demaiffe, D., Cauet, S., and Javoy, M. (1987) Sr, Nd, O and H isotopic ratios in Ascension Island lavas and plutonic inclusions; cogenetic origin. *Earth and Planetary Science Letters*, vol.82, pp.255-268.
- [3061] Yi, W., Halliday, A.N., Alt, J.C., Lee, D.-C., Rehkaemper, M., Garcia, M.O., and Su, Y. (2000) Cadmium, indium, tin, tellurium, and sulfur in oceanic basalts; implications for chalcophile element fractionation in the Earth. *Journal of Geophysical Research, B, Solid*

Earth and Planets, vol.105, pp.18,927-18,948.

- [3112] Yi, W., Halliday, A.N., Lee, D.-C., and Christensen, J.N. (1995) Indium and tin in basalts, sulfides, and the mantle. *Geochimica et Cosmochimica Acta*, vol.59, pp.5081-5090.

#### Gough References

- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [528] Le Roex, A.P. (1985) Geochemistry, mineralogy, and magmatic evolution of the basaltic and trachytic lavas from Gough Island, South Atlantic. *Journal of Petrology*, vol.26, pp.149-186.
- [103] Roy-Barman, M., and Allegre, C.J. (1995)  $^{187}\text{Os}/^{186}\text{Os}$  in oceanic island basalts; tracing oceanic crust recycling in the mantle. *Earth and Planetary Science Letters*, vol.129, pp.145-161.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [482] Weaver, B.L., Wood, D.A., Tarney, J., and Joron, J.L. (1987) Geochemistry of ocean island basalts from the South Atlantic; Ascension, Bouvet, St. Helena, Gough and Tristan da Cunha. IN J.G. Fitton and B.G.J. Upton (eds.) *Alkaline igneous rocks*. Geological Society of London Special Publications, vol.30, pp.253-267.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.

#### Gran Canaria, Canaries References:

- [922] Cousens, B.L. Spera, F.J., and Dobson, P.F. (1993) Post-eruptive alteration of silicic ignimbrites and lavas, Gran Canaria, Canary Islands; strontium, neodymium, lead, and oxygen isotopic evidence. *Geochimica et Cosmochimica Acta*, vol.57, pp.631-640.
- [901] Cousens, B.L., Spera, F.J., and Tilton, G.R. (1990) Isotopic patterns in silicic ignimbrites and lava flows of the Mogan and lower Fataga formations, Gran Canaria, Canary Islands; temporal changes in mantle source composition. *Earth and Planetary Science Letters*, vol.96, pp.319-335.
- [707] Feraud, G., Schmincke, H.-U., Lietz, J., Gastaud, J., Pritchard, G., and Bleil, U. (1981) New K-Ar ages, chemical analyses and magnetic data of rocks from the islands of Santa Maria (Azores), Porto Santo and Madeira (Madeira Archipelago) and Gran Canaria (Canary Islands). *Bulletin Volcanologique*, vol.44, pp.359-375.

- [876] Furnes, H., and El-Anbaawy, M. I. H. (1980) Chemical changes and authigenic mineral formation during palagonitization of a basanite hyaloclastite, Gran Canaria, Canary Islands. *Neues Jahrbuch fuer Mineralogie. Abhandlungen*, vol.139, pp.279-302.
- [851] Hoernle, K. (1998) Geochemistry of Jurassic oceanic crust beneath Gran Canaria (Canary Islands); implications for crustal recycling and assimilation. *Journal of Petrology*, vol.39, pp.859-880.
- [947] Hoernle, K., and Schmincke, H.-U. (1993) The petrology of the tholeiites through melilite nephelinites on Gran Canaria, Canary Islands; crystal fractionation, accumulation, and depths of melting. *Journal of Petrology*, vol.34, pp.573-597.
- [900] Hoernle, K., Tilton, G., and Schmincke, H.-U. (1991) Sr-Nd-Pb isotopic evolution of Gran Canaria; evidence for shallow enriched mantle beneath the Canary Islands. *Earth and Planetary Science Letters*, vol.106, pp.44-63.
- [511] Kogarko, L.N., Asavin, A.M., Barsukov, V.L., Kolesov, G.M., Kruchkova, O.I., Polyakov, A.I., and Ramendik, G.I. (1984) A geochemical model for rare-earth fractionation in alkali-basalt series in South Atlantic islands. *Geochemistry International*, vol.21, pp.27-39.
- [936] Mangas, J., Perez-Torrado, F.J., Massare, D., and Clocchiatti, R. (1993) Phonolitic origin of Roque Nublo ignimbrites of Gran Canaria (Canary Islands, Spain) from clinopyroxene melt inclusion studies. *European Journal of Mineralogy*, vol.5, pp.97-106.
- [874] Schmincke, H.-U. (1982) Volcanic and chemical evolution of the Canary Islands. IN U. von Rad, K. Hinz, M. Sarnthein, and E. Seibold (eds) *Geology of the Northwest African continental margin*. Springer-Verlag, Berlin. pp. 273-306.
- [1475] Schmincke, H.-U., Klügel, A., Hansteen, T.H., Hoernle, K., and van den Bogaard, P. (1998) Samples from the Jurassic ocean crust beneath Gran Canaria, La Palma and Lanzarote (Canary Islands). *Earth and Planetary Science Letters*, vol.163, pp.343-360.
- [896] Schmincke, H.U., and Staudigel, H. (1976) Pillow lavas on central and eastern Atlantic islands (La Palma, Gran Canaria, Porto Santo, Santa Maria); preliminary report. *Bulletin de la Societe Geologique de France*, vol.18, pp.871-883.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [856] Thirlwall, M.F., Jenkins, C., Vroon, P.Z., and Matthey, D.P. (1997) Crustal interaction during construction of ocean islands; Pb-Sr-Nd-O isotope geochemistry of the shield basalts of Gran Canaria, Canary Islands. *Chemical Geology*, vol.135, pp.233-262.
- [1211] Widom, E., Hoernle, K.A., Shirey, S.B., and Schmincke, H.E. (1999) Os isotope systematics in the Canary Islands and Madeira; lithospheric contamination and mantle plume signatures. *Journal of Petrology*, vol.40, pp.279-296.

#### Tenerife, Canaries References:

- [849] Ablay, G.J., Carroll, M.R., Palmer, M.R., Marti, J., and Sparks, R.S.J. (1998) Basanite-phonolite lineages of the Teide-Pico Viejo volcanic complex, Tenerife, Canary Islands. *Journal of Petrology*, vol.39, pp.905-936.
- [961] Ancochea, E., Fuster, J.M., Ibarrola, E., Cendrero, A., Hernan, F., Cantagrel, J.M., and

- Jamond, C. (1990) Volcanic evolution of the island of Tenerife (Canary Islands) in the light of new K-Ar data. *Journal of Volcanology and Geothermal Research*, vol.44, pp.231-249.
- [1488] Ancochea, E., Huertas, M.J., Cantagrel, J.M., Coello, J., Fuster, J.M., Arnaud, N., and Ibarrola, E. (1999) Evolution of the Canadas edifice and its implications for the origin of the Canadas Caldera (Tenerife, Canary Islands). *Journal of Volcanology and Geothermal Research*, vol.88, pp.177-199.
- [1626] Bryan, S.E., Marti, J., and Cas, R.A.F. (1998) Stratigraphy of the Bandas del Sur Formation; an extracaldera record of Quaternary phonolitic explosive eruptions from the Las Canadas edifice, Tenerife (Canary Islands). *Geological Magazine*, vol.135, pp.605-636.
- [912] Cabrera, M.P., and Hernandez-Pacheco, A. (1987) Historic eruptions of Tenerife, Canary Islands, and their volcanologic, petrologic and geochemical aspects. *Revista de Materiales y Procesos Geologicos*, vol.5, pp.143-182.
- [967] Fuster, J.M., Ibarrola, E., Snelling, N.J., Cantagrel, J.M., Huertas, M.J., Coello, J., and Ancochea, E. (1994) K-Ar chronology of the Canadas Formation in the southeastern sector of Tenerife; implications of pyroclastic episodes in volcanic evolution. *Boletin de la Real Sociedad Espanola de Historia Natural, Seccion Geologica*, vol.89, pp.25-41.
- [913] Javoy, M., Stillmann, C.J., and Pineau, F. (1986) Oxygen and hydrogen isotope studies on the basal complexes of the Canary Islands; implications on the conditions of their genesis. *Contributions to Mineralogy and Petrology*, vol.92, pp.225-235.
- [1311] Marti, J., Mitjavila, J., and Villa, I.M. (1990) Stratigraphy and K-Ar ages of the Diego Hernandez wall and their significance on the Las Canadas Caldera formation (Tenerife, Canary Islands). *Terra Nova*, vol.2, pp.148-153.
- [2029] Martin, D., Huertas, M.J., Fuster, J.M., Cantagrel, J.M., Coello, J., and Ibarrola, M.E., (1995) Chronology of the Canadas caldera wall (Tenerife, Canary Islands). *Bol. Real Sociedad Espanola Historia Natural, Secc. Geol.*, vol. 90, pp. 107-124.
- [1501] Neumann, E.R., Wulff-Pedersen, E., Simonsen, S.L., Pearson, N.J., Marti, J., and Mitjavila, J. (1999) Evidence for fractional crystallization of periodically refilled magma chambers in Tenerife, Canary Islands. *Journal of Petrology*, vol.40, pp.1089-1123.
- [920] Ovchinnikova, G.V., Belyatskiy, B.V., Vasil'yeva, I.M., Levskiy, L.K., Grachev, A.F., Aran'a, V., and Mit'yavila, I.J. (1995) Sr-Nd-Pb isotopes of mantle sources of basalts from the Canary Islands. *Petrologiya*, vol.3, pp.195-206.
- [874] Schmincke, H.-U. (1982) Volcanic and chemical evolution of the Canary Islands. IN U. von Rad, K. Hinz, M. Sarnthein, and E. Seibold (eds) *Geology of the Northwest African continental margin*. Springer-Verlag, Berlin. pp. 273-306.
- [899] Sigmarsson, O., Condomines, M., and Ibarrola, E. (1992)  $^{238}\text{U}$ - $^{230}\text{Th}$  radioactive disequilibria in historic lavas from the Canary Islands and genetic implications. *Journal of Volcanology and Geothermal Research*, vol.54, pp.145-156.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [907] Vicente Mingarro, I., and Fernandez Santin, S. (1989) Geochemical study of the historic eruptions of the Canary Islands. *Revista de Materiales y Procesos Geologicos*, vol.6, pp.99-155.

- [1211] Widom, E., Hoernle, K.A., Shirey, S.B., and Schmincke, H.E. (1999) Os isotope systematics in the Canary Islands and Madeira; lithospheric contamination and mantle plume signatures. *Journal of Petrology*, vol.40, pp.279-296.

#### Sao Miguel, Azores References

- [651] Davies, G.R., Norry, M.J., Geralch, D.C., Cliff, R.A. (1989) A combined chemical and Pb-Sr-Nd isotope study of the Azores and Cape Verde hotspots; the geodynamic implications. IN A.D. Saunders and M.J. Norry, *Magmatism in the ocean basins*. Geological Society Special Publications, vol.42, pp.231-255.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [1476] Johnson, C.L., Wijbrans, J.R., Constable, C.G., Gee, J., Staudigel, H., Tauxe, L., Forjaz, V.H., and Salgueiro, M. (1998)  $^{40}\text{Ar}/^{39}\text{Ar}$  ages and paleomagnetism of Sao Miguel lavas, Azores. *Earth and Planetary Science Letters*, vol.160, pp.637-649.
- [1269] Moreira, M., Doucelance, R., Kurz, M.D., Dupre, B., and Allegre, C.J. (1999) Helium and lead isotope geochemistry of the Azores Archipelago. *Earth and Planetary Science Letters*, vol.169, pp.189-205.
- [2705] Renzulli, A., and Santi, P. (2000) Two-stage fractionation history of the alkali basalt-trachyte series of Sete Cidades Volcano (Sao Miguel Island, Azores). *European Journal of Mineralogy*, vol.12, pp.469-494.
- [696] Turner, S., Hawkesworth, C., Rogers, N., and King, P. (1997) U-Th isotope disequilibria and ocean island basalt generation in the Azores. *Chemical Geology*, vol.139, pp.145-164.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [697] Widom, E., Carlson, R.W., Gill, J.B., and Schmincke, H.U. (1997) Th-Sr-Nd-Pb isotope and trace element evidence for the origin of the Sao Miguel, Azores, enriched mantle source. *Chemical Geology*, vol.140, pp.49-68.
- [483] Widom, E., and Shirey, S.B. (1996) Os isotope systematics in the Azores; implications for mantle plume sources. *Earth and Planetary Science Letters*, vol.142, pp.451-465.
- [643] Widom, E., Schmincke, H.U., and Gill, J.B. (1992) Processes and timescales in the evolution of chemically zoned trachyte; Fogo A, Sao Miguel, Azores. *Contributions to Mineralogy and Petrology*, vol.111, pp.311-328.

## Faial, Azores References

- [1257] Feraud, G., Kaneoka, I., and Allegre, C.J. (1980) K/Ar ages and stress pattern in the Azores; geodynamic implications. *Earth and Planetary Science Letters*, vol.46, pp.275-286.
- [1195] Halliday, A.N., Davies, G.R., Lee, D.-C., Tommasini, S., Paslick, C.R., Fitton, J.G., and James, D.E. (1992) Lead isotope evidence for young trace element enrichment in the oceanic upper mantle. *Nature (London)*, vol.359, pp.623-627.
- [1197] Halliday, A.N., Lee, D.-C., Tommasini, S., Davies, G.R., Paslick, C.R., Fitton, J.G., and James, D.E. (1995) Incompatible trace elements in OIB and MORB and source enrichment in the sub-oceanic mantle. *Earth and Planetary Science Letters*, vol.133, pp.379-395.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [661] Lemarchand, F. (1987) The volcanic series of Fayal, Azores; petrology and geochemistry. *Canadian Journal of Earth Sciences*, vol.24, pp.334-353.
- [1269] Moreira, M., Doucelance, R., Kurz, M.D., Dupre, B., and Allegre, C.J. (1999) Helium and lead isotope geochemistry of the Azores Archipelago. *Earth and Planetary Science Letters*, vol.169, pp.189-205.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. *Earth and Planetary Science Letters*, vol.80, pp.299-313.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [696] Turner, S., Hawkesworth, C., Rogers, N., and King, P. (1997) U-Th isotope disequilibria and ocean island basalt generation in the Azores. *Chemical Geology*, vol.139, pp.145-164.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [483] Widom, E., and Shirey, S.B. (1996) Os isotope systematics in the Azores; implications for mantle plume sources. *Earth and Planetary Science Letters*, vol.142, pp.451-465.

## Easter Island References

- [1285] Cheng, Q.C., Macdougall, J.D., and Zhu, P. (1999) Isotopic constraints on the Easter seamount chain source. *Contributions to Mineralogy and Petrology*, vol.135, pp.225-233.
- [2359] Fontignie, D., and Schilling, J.G. (1991)  $^{87}\text{Sr}/^{86}\text{Sr}$  and REE variations along the Easter Microplate boundaries (South Pacific); application of multivariate statistical analyses to ridge segmentation. *Chemical Geology*, vol.89, pp.209-241.

- [801] Haase, K.M., and Devey, C.W. (1996) Geochemistry of lavas from the Ahu and Tupa volcanic fields, Easter Hotspot, Southeast Pacific; implications for intraplate magma genesis near a spreading axis. *Earth and Planetary Science Letters*, vol.137, pp.129-143.
- [806] Haase, K.M., Stoffers, P., and Garbe-Schoenberg, C.D. (1997) The petrogenetic evolution of lavas from Easter Island and neighbouring seamounts, near-ridge hotspot volcanoes in the SE Pacific. *Journal of Petrology*, vol.38, pp.785-813.
- [799] Hanan, B.B., and Schilling, J.-G. (1989) Easter Microplate evolution; Pb isotope evidence. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.94, pp.7432-7448.
- [796] Kaneoka, I., and Katsui, Y. (1985) K-Ar ages of volcanic rocks from Easter Island. *Bulletin of the Volcanological Society of Japan*, vol.30, pp.33-36.
- [1241] Puzankov, Y.M., and Bobrov, V.A. (1997) Geochemistry of volcanic rocks from Easter and Sala y Gomez islands. *Geokhimiya*, vol.1997, pp.697-708.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [3061] Yi, W., Halliday, A.N., Alt, J.C., Lee, D.-C., Rehkaemper, M., Garcia, M.O., and Su, Y. (2000) Cadmium, indium, tin, tellurium, and sulfur in oceanic basalts; implications for chalcophile element fractionation in the Earth. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.105, pp.18,927-18,948.

#### Kergulen References

- [1006] Bardintzeff, J.-M., Leyrit, H., Guillou, H., Guille, G., Bonin, B., Giret, A., and Brousse, R. (1994) Transition between tholeiitic and alkali basalts; petrographical and geochemical evidence from Fangataufa Pacific Ocean, and Kerguelen, Indian Ocean. *Geochemical Journal*, vol.28, pp.489-515.
- [986] Cheminee, J.-L., and Nougier, J. (1972) Distribution of Uranium, Thorium and Potassium in the Volcanic Suites of Iles Kerguelen. *Antarctic geology and geophysics, International Union of Geological Sciences. Series B*, vol.1, pp.817-823.
- [989] Dosso, L., and Murthy, V.R. (1980) A Nd isotopic study of the Kerguelen Islands; inferences on enriched oceanic mantle sources. *Earth and Planetary Science Letters*, vol.48, pp.268-276.
- [1634] Frey, F.A., Weis, D., Yang, H.J., Nicolaysen, K., Leyrit, H., and Giret, A. (2000) Temporal geochemical trends in Kerguelen Archipelago basalts; evidence for decreasing magma supply from the Kerguelen Plume. *Chemical Geology*, vol.164, pp.61-80.
- [999] Gautier, I., Weis, D., Mennessier, J.-P., Vidal, P., Giret, A., and Loubet, M. (1990) Petrology and geochemistry of the Kerguelen Archipelago basalts (South Indian Ocean); evolution of the mantle sources from ridge to intraplate position. *Earth and Planetary Science Letters*, vol.100, pp.59-76.
- [988] Giret, A., and Lameyre, J. (1983) A study of Kerguelen plutonism; petrology, geochronology and geological implications. IN R.L. Oliver, P.R. James, and J.B. Jago (eds.) *Antarctic earth science; fourth international symposium*. Cambridge University, Cambridge. pp. 646-651.
- [1500] Nicolaysen, K., Frey, F.A., Hodges, K.V., Weis, D., and Giret, A. (2000)  $^{40}\text{Ar}/^{39}\text{Ar}$  geochronology of flood basalts from the Kerguelen Archipelago, southern Indian Ocean;

- implications for Cenozoic eruption rates of the Kerguelen plume. *Earth and Planetary Science Letters*, vol.174, pp.313-328.
- [515] Patchett, P.J. (1983) Hafnium isotope results from mid-ocean ridges and Kerguelen. *Lithos*, vol.16, pp.47-51.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [997] Salters, V.J.M., and Hart, S.R. (1991) The mantle sources of ocean ridges, islands and arcs; the Hf-isotope connection. *Earth and Planetary Science Letters*, vol.104, pp.364-380.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [1001] Storey, M., Saunders, A.D., Tarney, J., Leat, P., Thirlwall, M.F., Thompson, R.N., Menzies, M.A., and Marriner, G.F. (1988) Geochemical evidence for plume-mantle interactions beneath Kerguelen and Heard islands, Indian Ocean. *Nature (London)*, vol.336, pp.371-374.
- [1008] Weis, D., Frey, F.A., Leyrit, H., and Gautier, I. (1993) Kerguelen Archipelago revisited; geochemical and isotopic study of the Southeast Province lavas. *Earth and Planetary Science Letters*, vol.118, pp.101-119.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [973] Yang, H.-J., Frey, F.A., Weis, D., Giret, A., Pyle, D., and Michon, G. (1998) Petrogenesis of the flood basalts forming the northern Kerguelen Archipelago; implications for the Kerguelen Plume. *Journal of Petrology*, vol.39, pp.711-748.

#### Pitcairn References

- [760] Bardintzeff, J.-M., Demange, J., and Gachon, A. (1986) Petrology of the volcanic bedrock of Mururoa Atoll (Tuamotu Archipelago, French Polynesia). *Journal of Volcanology and Geothermal Research*, vol.28, pp.55-83.
- [1006] Bardintzeff, J.-M., Leyrit, H., Guillou, H., Guille, G., Bonin, B., Giret, A., and Brousse, R. (1994) Transition between tholeiitic and alkali basalts; petrographical and geochemical evidence from Fangataufa Pacific Ocean, and Kerguelen, Indian Ocean. *Geochemical Journal*, vol.28, pp.489-515.
- [1186] Caroff, M., Maury, R.C., Guille, G., Bellon, H., and Cotten, J. (1993) Basalts of the Gambier Archipelago, French Polynesia. *Comptes Rendus de l'Academie des Sciences, Serie 2, Mecanique, Physique, Chimie, Sciences de l'Univers, Sciences de la Terre*, vol.317, pp.359-366.
- [1248] Caroff, M., Maury, R.C., Leterrier, J., Joron, J.L., Cotten, J., and Guille, G. (1993) Trace element behavior in the alkali basalt-comenditic trachyte series from Mururoa Atoll, French Polynesia. *Lithos*, vol.30, pp.1-22.
- [778] Cotten, J., Le Dez, A., Bau, M., Caroff, M., Maury, R.C., Dulski, P., Fourcade, S., Bohn, M., and Brousse, R. (1995) Origin of anomalous rare-earth element and yttrium enrichments in subaerially exposed basalts; evidence from French Polynesia. *Chemical Geology*, vol.119, pp.115-138.

- [1177] Destrigneville, C., Schott, J., Caristan, Y., and Agrinier, P. (1991) Evidence of an early alteration process driven by magmatic fluid in Mururoa Volcano. *Earth and Planetary Science Letters*, vol.104, pp.119-139.
- [754] Dostal, J., Cousens, B.L., and Dupuy, C. (1998) The incompatible element characteristics of an ancient subducted sedimentary component in ocean island basalts from French Polynesia. *Journal of Petrology*, vol.39, pp.937-952.
- [1180] Dostal, J., Dupuy, C., and Dudoignon, P. (1996) Distribution of boron, lithium and beryllium in ocean island basalts from French Polynesia; implications for the B/Be and Li/Be ratios as tracers of subducted components. *Mineralogical Magazine*, vol.60, pp.563-580.
- [758] Dupuy, C., Vidal, P., Maury, R.C., and Guille, G. (1993) Basalts from Mururoa, Fangataufa and Gambier islands (French Polynesia); geochemical dependence on the age of the lithosphere. *Earth and Planetary Science Letters*, vol.117, pp.89-100.
- [757] Eiler, J.M., Farley, K.A., Valley, J.W., Stolper, E.M., Hauri, E.H., and Craig, H. (1995) Oxygen isotope evidence against bulk recycled sediment in the mantle sources of Pitcairn Island lavas. *Nature (London)*, vol.377, pp.138-141.
- [80] Guillou, H., Garcia, M.O., and Turpin, L. (1997) Unspiked K-Ar dating of young volcanic rocks from Loihi and Pitcairn hot spot seamounts. *Journal of Volcanology and Geothermal Research*, vol.78, pp.239-249.
- [794] Guillou, H., Gillot, P.Y., and Guille, G. (1994) K/Ar age and position of the Gambier Islands in the Pitcairn hot spot alignment, South Pacific. *Comptes Rendus de l'Academie des Sciences, Serie 2, Sciences de la Terre et des Planetes, Earth and Planetary Sciences*, vol.318, pp.635-641.
- [1267] Guy, C., Daux, V., and Schott, J. (1999) Behaviour of rare earth elements during seawater/basalt interactions in the Mururoa Massif. *Chemical Geology*, vol.158, pp.21-35.
- [1185] Maury, R.C., Caroff, M., Achard, S., Guille, G., Joron, J.L., Gachon, A., Rocaboy, A., and Letierrier, J. (1992) Mururoa Atoll (French Polynesia); II, Magmatic sequence. *Bulletin de la Societe Geologique de France, Huitieme Serie*, vol.163, pp.659-679.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [1179] Wagner, C., Guille, G., Coquillat, J.L., and Velde, D. (1988) Zr-rich clinopyroxenes in a comenditic trachyte from Mururoa (French Polynesia). *Bulletin de Mineralogie*, vol.111, pp.523-534.
- [759] Woodhead, J.D., and Devey, C.W. (1993) Geochemistry of the Pitcairn seamounts; I, Source character and temporal trends. *Earth and Planetary Science Letters*, vol.116 pp.81-99.
- [565] Woodhead, J.D., Greenwood, P., Harmon, R.S., and Stoffers, P. (1993) Oxygen isotope evidence for recycled crust in the source of EM-type ocean island basalts. *Nature (London)*, vol.362, pp.809-813.
- [756] Woodhead, J.D., and McCulloch, M.T. (1989) Ancient seafloor signals in Pitcairn Island lavas and evidence for large amplitude, small length-scale mantle heterogeneities. *Earth*

and Planetary Science Letters, vol.94, pp.257-273.

- [4937] Eisele, J., Sharma, M., Galer S. J. G., Blichert-Toft J., Devey C. W., Hofmann A. W. (2002) The role of sediment recycling in EM-1 inferred from Os, Pb, Hf, Nd, Sr isotope and trace element systematics of the Pitcairn hotspot, Earth Planet. Sci. Lett., vol. 196, pp., 197-212

#### Tristan da Cunha References

- [520] Cliff, R.A., Baker, P.E., and Mateer, N.J. (1991) Geochemistry of Inaccessible Island volcanics. *Chemical Geology*, vol.92, pp.251-260.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [511] Kogarko, L.N., Asavin, A.M., Barsukov, V.L., Kolesov, G.M., Kruchkova, O.I., Polyakov, A.I., and Ramendik, G.I. (1984) A geochemical model for rare-earth fractionation in alkali-basalt series in South Atlantic islands. *Geochemistry International*, vol.21, pp.27-39.
- [521] Le Roex, A.P., Cliff, R.A., and Adair, B.J.I. (1990) Tristan da Cunha, South Atlantic; geochemistry and petrogenesis of a basanite-phonolite lava series. *Journal of Petrology*, vol.31, pp.779-812.
- [542] McDougall, I., and Ollier, C.D. (1982) Potassium-argon ages from Tristan da Cunha, South Atlantic. *Geological Magazine*, vol.119, pp.87-93.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. *Earth and Planetary Science Letters*, vol.80, pp.299-313.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [482] Weaver, B.L., Wood, D.A., Tarney, J., and Joron, J.L. (1987) Geochemistry of ocean island basalts from the South Atlantic; Ascension, Bouvet, St. Helena, Gough and Tristan da Cunha. IN J.G. Fitton and B.G.J. Upton (eds.) *Alkaline igneous rocks*. Geological Society of London Special Publications, vol.30, pp.253-267.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [3061] Yi, W., Halliday, A.N., Alt, J.C., Lee, D.-C., Rehkaemper, M., Garcia, M.O., and Su, Y. (2000) Cadmium, indium, tin, tellurium, and sulfur in oceanic basalts; implications for chalcophile element fractionation in the Earth. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.105, pp.18,927-18,948.

#### Reunion References

- [1230] Albarede, F., Luais, B., Fitton, G., Semet, M., Kaminski, E., Upton, B.G.J., Bachelery, P., and Cheminee, J.L. (1997) The geochemical regimes of Piton de la Fournaise Volcano (Reunion) during the last 530 000 years. *Journal of Petrology*, vol.38, pp.171-201.
- [1192] Albarede, F., and Tamagnan, V. (1988) Modelling the recent geochemical evolution of the Piton de la Fournaise Volcano, Reunion Island, 1931-1986. *Journal of Petrology*, vol.29, pp.997-1030.
- [1229] Fisk, M.R., Upton, B.G.J., Ford, C.E., and White, W.M. (1988) Geochemical and experimental study of the genesis of magmas of Reunion Island, Indian Ocean. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.93, pp.4933-4950.
- [1454] Gillot, P.Y., and Nativel, P. (1982) K-Ar chronology of the ultimate activity of Piton des Neiges Volcano, Reunion Island, Indian Ocean. *Journal of Volcanology and Geothermal Research*, vol.13, pp.131-146.
- [1244] Gillot, P.Y., and Nativel, P. (1989) Eruptive history of the Piton de la Fournaise Volcano, Reunion Island, Indian Ocean. *Journal of Volcanology and Geothermal Research*, vol.36, pp.53-65.
- [496] Graham, D., Lupton, J.E., Albarede, F., and Condomines, M. (1990) Extreme temporal homogeneity of helium isotopes at Piton de la Fournaise, Reunion Island. *Nature (London)*, vol.347, pp.545-548.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. *Earth and Planetary Science Letters*, vol.80, pp.299-313.

#### Floreana, Galapagos References

- [4580] Blichert-Toft, Janne; White, William M (2001) Hf isotope geochemistry of the Galapagos Islands. *Geochemistry, Geophysics, Geosystems - G 3*, vol.2001, 20 pp. Paper 2000GC000138, 28 Sep 2001. <http://ca1.csa.com/htbin/ids631/procskel.cgi>.
- [584] Bow, C.S., and Geist, D.J. (1992) Geology and petrology of Floreana Island, Galapagos Archipelago, Ecuador. *Journal of Volcanology and Geothermal Research*, vol.52, pp.83-105.
- [1497] Kurz, M.D., and Geist, D. (1999) Dynamics of the Galapagos hotspot from helium isotope geochemistry. *Geochimica et Cosmochimica Acta*, vol.63, pp.4139-4156.
- [592] Shimizu, H., Masuda, A., and Masui, N. (1981) Rare-earth element geochemistry of volcanic and related rocks from the Galapagos Islands. *Geochemical Journal*, vol.15, pp.81-93.
- [606] White, W.M., McBirney, A.R., and Duncan, R.A. (1993) Petrology and geochemistry of the Galapagos Islands; portrait of a pathological mantle plume. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol. 98, no.11, pp.19,533-19,563.

## Isabela, Galapagos References

- [4580] Blichert-Toft, Janne; White, William M (2001) Hf isotope geochemistry of the Galapagos Islands. *Geochemistry, Geophysics, Geosystems - G 3*, vol.2001, 20 pp. Paper 2000GC000138, 28 Sep 2001. <http://cal.csa.com/htbin/ids631/procskel.cgi>.
- [628] Geist, D.J., Howard, K.A., Jellinek, A.M., and Rayder, S. (1994) The volcanic history of Volcan Alcedo, Galapagos Archipelago; a case study of rhyolitic oceanic volcanism. *Bulletin of Volcanology*, vol.56, pp. 243-260.
- [627] Geist, D., Howard, K.A., and Larson, P. (1995) The generation of oceanic rhyolites by crystal fractionation; the basalt-rhyolite association at Volcan Alcedo, Galapagos Archipelago. *Journal of Petrology*, vol. 36, pp. 965-982.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [1351] Hofmann, A.W., and White, W.M. (1983) Ba, Rb, and Cs in the Earth's mantle. *Zeitschrift fur Naturforschungen* vol. 38A, pp. 256-266.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [1497] Kurz, M.D., and Geist, D. (1999) Dynamics of the Galapagos hotspot from helium isotope geochemistry. *Geochimica et Cosmochimica Acta*, vol.63, pp.4139-4156.
- [609] McBirney, A.R., Cullen, A.B., Geist, D., Vicenzi, E.P., Duncan, R.A., Hall, M.L., and Estrella, M. (1985) The Galapagos volcano Alcedo; a unique ocean caldera. *Journal of Volcanology and Geothermal Research*, vol.26, pp.173-177.
- [600] Reynolds, R.W., and Geist, D.J. (1995) Petrology of lavas from Sierra Negra Volcano, Isabela Island, Galapagos Archipelago. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.100, pp.24,537-24,553.
- [604] Righter, K., Chesley, J.T., Geist, D., and Ruiz, J. (1998) Behavior of Re during magma fractionation; an example from Volcan Alcedo, Galapagos. *Journal of Petrology*, vol.39, pp.785-795.
- [592] Shimizu, H., Masuda, A., and Masui, N. (1981) Rare-earth element geochemistry of volcanic and related rocks from the Galapagos Islands. *Geochemical Journal*, vol.15, pp.81-93.
- [606] White, W.M., McBirney, A.R., and Duncan, R.A. (1993) Petrology and geochemistry of the Galapagos Islands; portrait of a pathological mantle plume. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol. 98, no.11, pp.19,533-19,563.

## Tutuila, Samoa, References

- [121] Budahn, J.R., and Schmitt, R.A. (1985) Petrogenetic modeling of Hawaiian tholeiitic basalts; a geochemical approach. *Geochimica et Cosmochimica Acta*, vol.49, pp.67-87.
- [447] Farley, K.A., Natland, J.H., and Craig, H. (1992) Binary mixing of enriched and

- undegassed (primitive?) mantle components (He, Sr, Nd, Pb) in Samoan lavas. *Earth and Planetary Science Letters*, vol.111, pp.183-199.
- [466] McDougall, I. (1985) Age and evolution of the volcanoes of Tutuila, American Samoa. *Pacific Science*, vol.39, pp.311-320.
- [445] Natland, J.H. (1980) The progression of volcanism in the Samoan linear volcanic chain. *American Journal of Science*, vol. 280-A, pp.709-735.
- [463] Natland, J.H., and Turner, D.L. (1985) Age progression and petrological development of Samoan shield volcanoes; evidence from K-Ar ages, lava compositions, and mineral studies. IN T.M. Brocher (ed) *Investigations of the northern Melanesian Borderland, Circum-Pacific Council for Energy and Mineral Resources, Earth Science Series, vol.3*, pp.139-171.
- [452] Palacz, Z.A., and Saunders, A.D. (1986) Coupled trace element and isotope enrichment in the Cook-Austral-Samoa islands, Southwest Pacific. *Earth and Planetary Science Letters*, vol.79, pp.270-280.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [451] Wright, E., and White, W.M. (1987) The origin of Samoa; new evidence from Sr, Nd, and Pb isotopes. *Earth and Planetary Science Letters*, vol.81, pp.151-162.

#### Upolu, Samoa References

- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [440] Matsuda, J., Notsu, K., Okano, J., Yaskawa, K., and Chungue, L. (1984) Geochemical implications from Sr isotopes and K-Ar age determinations for the Cook-Austral Islands chain. *Tectonophysics*, vol.104, pp.145-154.
- [445] Natland, J.H. (1980) The progression of volcanism in the Samoan linear volcanic chain. *American Journal of Science*, vol. 280-A, pp.709-735.
- [463] Natland, J.H., and Turner, D.L. (1985) Age progression and petrological development of Samoan shield volcanoes; evidence from K-Ar ages, lava compositions, and mineral studies. IN T.M. Brocher (ed) *Investigations of the northern Melanesian Borderland, Circum-Pacific Council for Energy and Mineral Resources, Earth Science Series, vol.3*, pp.139-171.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. *Earth and Planetary Science Letters*, vol.80, pp.299-313.

- [452] Palacz, Z.A., and Saunders, A.D. (1986) Coupled trace element and isotope enrichment in the Cook-Austral-Samoa islands, Southwest Pacific. *Earth and Planetary Science Letters*, vol.79, pp.270-280.
- [1210] Patchett, P.J., and Tatsumoto, M. (1980) Hafnium isotope variations in oceanic basalts. *Geophysical Research Letters*, vol.7, pp.1077-1080.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.
- [451] Wright, E., and White, W.M. (1987) The origin of Samoa; new evidence from Sr, Nd, and Pb isotopes. *Earth and Planetary Science Letters*, vol.81, pp.151-162.

Cape Verde Islands (Boa Vista, Fogo, Maio, Santiago, Sao Antao, Sao Nicolao, Sao Vicente)  
References.

- [4284] Christensen, B.P., Holm, P.M., Jambon, A., and Wilson, J.R. (2001) Helium, argon and lead isotopic composition of volcanics from Santo Antao and Fogo, Cape Verde Islands. *Chemical Geology*, vol.178, pp.127-142.
- [651] Davies, G.R., Norry, M.J., Geralch, D.C., Cliff, R.A. (1989) A combined chemical and Pb-Sr-Nd isotope study of the Azores and Cape Verde hotspots; the geodynamic implications. IN A.D. Saunders and M.J. Norry, *Magmatism in the ocean basins*. Geological Society Special Publications, vol.42, pp.231-255.
- [726] Gerlach, D.C., Cliff, R.A., Davies, G.R., Norry, M., and Hodgson, N. (1988) Magma sources of the Cape Verdes Archipelago; isotopic and trace element constraints. *Geochimica et Cosmochimica Acta*, vol.52, pp.2979-2992.
- [1447] Kogarko, L.N., and Titayeva, N.A. (1996) Thorium isotope data on the inhomogeneity of the mantle sources of alkali magmatism in the Cape Verde Islands. *Transactions (Doklady) of the Russian Academy of Sciences. Earth Science Sections*, vol.342, pp.152-154.
- [3364] Mazarovich, A.O., Frikh-Kar, D.I., Kogarko, L.N., Koporulin, V.I., Rikhter, A.V., Akhmetev, M.A., and Zolotarev, B.P. (1990) *Tectonics and Magmatism of Cape Verde Islands*. Nauka, Moscow. 246pp.
- [725] Rocha de Macedo, J. (1989) Petrology and geochemistry of the lavas of Sao Nicolau Island, Cape Verde Archipelago. *Garcia de Orta, Serie de Geologia*, vol.12, pp.1-19.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.

St. Helena References

- [504] Asavin, A.M., Kogarko, L.N., Kryuchkova, O.I., Tyurin, D.A., and Kolesov, G.M. (1997) The Grand Canary, Saint Helena, and Tristan da Cunha oceanic islands; variations of

- trace element partition coefficients in pyroxene-melt equilibria during alkaline magma evolution. *Geokhimiya*, vol.1997, pp.479-487.
- [481] Chaffey, D.J., Cliff, R.A., and Wilson, B.M. (1989) Characterization of the St. Helena magma source. IN A.D. Saunders and M.J. Norry (eds.) *Magmatism in the ocean basins*. Geological Society Special Publications, vol.42, pp.257-276.
- [66] Chaussidon, M., and Marty, B. (1995) Primitive boron isotope composition of the mantle. *Science*, vol.269, pp.383-386.
- [1392] Cohen, R.S., and O'Nions, R.K. (1982) Identification of recycled continental material in the mantle from Sr, Nd and Pb isotope investigations. *Earth and Planetary Science Letters*, vol.61, pp.73-84.
- [1224] Graham, D.W., Humphris, S.E., Jenkins, W.J., and Kurz, M.D. (1992) Helium isotope geochemistry of some volcanic rocks from Saint Helena. *Earth and Planetary Science Letters*, vol.110, pp.121-131.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [511] Kogarko, L.N., Asavin, A.M., Barsukov, V.L., Kolesov, G.M., Kruchkova, O.I., Polyakov, A.I., and Ramendik, G.I. (1984) A geochemical model for rare-earth fractionation in alkali-basalt series in South Atlantic islands. *Geochemistry International*, vol.21, pp.27-39.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. *Earth and Planetary Science Letters*, vol.80, pp.299-313.
- [1274] O'Connor, J.M., and le Roex, A.P. (1992) South Atlantic hot spot-plume systems; 1, Distribution of volcanism in time and space. *Earth and Planetary Science Letters*, vol.113, pp.343-364.
- [18] Pegrarn, W.J., and Allegre, C.J. (1992) Osmium isotopic compositions from oceanic basalts. *Earth and Planetary Science Letters*, vol.111, pp.59-68.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.
- [478] Thirlwall, M.F. (1997) Pb isotopic and elemental evidence for OIB derivation from young HIMU mantle. *Chemical Geology*, vol.139, pp.51-74.
- [3161] Thirlwall, M.F. (2000) Inter-laboratory and other errors in Pb isotope analyses investigated using a  $^{207}\text{Pb}$ - $^{204}\text{Pb}$  double spike. *Chemical Geology*, vol.163, pp.299-322.

- [482] Weaver, B.L., Wood, D.A., Tarney, J., and Joron, J.L. (1987) Geochemistry of ocean island basalts from the South Atlantic; Ascension, Bouvet, St. Helena, Gough and Tristan da Cunha. IN J.G. Fitton and B.G.J. Upton (eds.) Alkaline igneous rocks. Geological Society of London Special Publications, vol.30, pp.253-267.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.

#### Iceland References

- [74] Chaussidon, M., and Jambon, A. (1994) Boron content and isotopic composition of oceanic basalts; geochemical and cosmochemical implications. *Earth and Planetary Science Letters*, vol.121, pp.277-291.
- [2152] Chauvel C., and Hemond C. (2000) Melting of a complete selection of recycled oceanic crust: Trace element and Pb isotopic evidence from Iceland. G3: Geochemistry, Geophysics, Geosystems, vol. 1. On-line journal. (1999GC000002)
- [1107] Elliott, T.R., Hawkesworth, C.J., and Gronvold, K. (1991) Dynamic melting of the Iceland plume. *Nature (London)*, vol.351, pp.201-206.
- [1243] Furman, T., Frey, F.A., and Meyer, P.S. (1992) Petrogenesis of evolved basalts and rhyolites at Austurhorn, southeastern Iceland; the role of fractional crystallization. *Journal of Petrology*, vol.33, pp.1405-1445.
- [1409] Furman, T., Frey, F.A., and Park, K.-H. (1991) Chemical constraints on the petrogenesis of mildly alkaline lavas from Vestmannaeyjar, Iceland; the Eldfell (1973) and Surtsey (1963-1967) eruptions. *Contributions to Mineralogy and Petrology*, vol.109, pp.19-37.
- [853] Gee, M.A.M., Thirlwall, M.F., Taylor, R.N., Lowry, D., and Murton, B.J. (1998) Crustal processes; major controls on Reykjanes Peninsula lava chemistry, SW Iceland. *Journal of Petrology*, vol.39, pp.819-839.
- [1155] Gurenko, A.A., Sobolev, A.V., and Kononkova, N.N. (1991) Alkaline rift basalts of Iceland; new data on petrology. *Geokhimiya*, vol.1991, pp.1262-1274.
- [2919] Hanan, B.B., Blichert-Toft, J., Kingsley, R., and Schilling, J.-G. (2000) Depleted Iceland mantle plume geochemical signature; artifact of multicomponent mixing? G3: Geochemistry, Geophysics, Geosystems, vol.1, 24 pp., paper number 1999GC000009.
- [1515] Hanan, B.B., and Schilling, J.-G.. (1997) The dynamic evolution of the Iceland mantle plume; the lead isotope perspective. *Earth and Planetary Science Letters*, vol.151, pp.43-60.
- [1127] Hards, V.L., Kempton, P.D., and Thompson, R.N. (1995) The heterogeneous Iceland plume; new insights from the alkaline basalts of the Snaefell volcanic centre. *Journal of the Geological Society of London*, vol.152, pp.1003-1009.
- [1133] Hemond, C., Arndt, N.T., Lichtenstein, U., Hofmann, A.W., Oskarsson, N., and Steinthorsson, S. (1993) The heterogeneous Iceland plume; Nd-Sr-O isotopes and trace element constraints. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.98, pp.15,833-15,850.
- [1495] Hilton, D.R., Gronvold, K., Macpherson, C.G., and Castillo, P.R. (1999) Extreme  $^3\text{He}/^4\text{He}$  ratios in Northwest Iceland; constraining the common component in mantle plumes. *Earth and Planetary Science Letters*, vol.173, pp.53-60.
- [1151] Hoj, J.W. (1993) Gabbro-anorthosite nodules from the Krisuvik fissure system and active

- zone of rifting, Reykjanes Peninsula, SW Iceland. *Neues Jahrbuch fuer Mineralogie. Abhandlungen*, vol.165, pp.169-189.
- [2905] Jonasson, K., Holm, P.M., and Pedersen, A.K. (1992) Petrogenesis of silicic rocks from the Krokksfjordur central volcano, NW Iceland. *Journal of Petrology*, vol.33, pp.1345-1369.
- [2260] Kempton, P.D., Fitton, J.G., Saunders, A.D., Nowell, G.M., Taylor, R.N., Hardarson, B.S., and Pearson, G. (2000) The Iceland Plume in space and time; a Sr-Nd-Pb-Hf study of the North Atlantic rifted margin. *Earth and Planetary Science Letters*, vol.177, pp.255-271.
- [1112] MacDonald, R., McGarvie, D.W., Pinkerton, H., Smith, R.L., and Palacz, Z.A. (1990) Petrogenetic evolution of the Torfajökull volcanic complex, Iceland; 1, Relationship between the magma types. *Journal of Petrology*, vol.31, pp.429-459.
- [1508] McGarvie, D.W., MacDonald, R., Pinkerton, H., and Smith, R.L. (1990) Petrogenetic evolution of the Torfajökull volcanic complex, Iceland; 2, The role of magma mixing. *Journal of Petrology*, vol.31, pp.461-481.
- [1242] Nicholson, H., Condomines, M., Fitton, J.G., Fallick, A.E., Grönvold, K., and Rogers, G. (1991) Geochemical and isotopic evidence for crustal assimilation beneath Krafla, Iceland. *Journal of Petrology*, vol.32, pp.1005-1020.
- [1105] Nicholson, H., and Latin, D. (1992) Olivine tholeiites from Krafla, Iceland; evidence for variations in melt fraction within a plume. *Journal of Petrology*, vol.33, pp.1105-1124.
- [674] Nowell, G.M., Kempton, P.D., Noble, S.R., Fitton, J.G., Saunders, A.D., Mahoney, J.J., and Taylor, R.N. (1998) High precision Hf isotope measurements of MORB and OIB by thermal ionisation mass spectrometry; insights into the depleted mantle. *Chemical Geology*, vol.149, pp.211-233.
- [18] Pegram, W.J., and Allegre, C.J. (1992) Osmium isotopic compositions from oceanic basalts. *Earth and Planetary Science Letters*, vol.111, pp.59-68.
- [3375] Pickett, D.A., and Murrell, M.T. (1997) Observations of  $^{231}\text{Pa}/^{235}\text{U}$  disequilibrium in volcanic rocks. *Earth and Planetary Science Letters*, vol.148, pp.259-271.
- [1493] Rehkämper, M., Halliday, A.N., Fitton, J.G., Lee, D.C., Wieneke, M., and Arndt, N.T. (1999) Ir, Ru, Pt, and Pd in basalts and komatiites; new constraints for the geochemical behavior of the platinum-group elements in the mantle. *Geochimica et Cosmochimica Acta*, vol.63, pp.3915-3934.
- [1606] Revillon, S., Arndt, N.T., Hallot, E., Kerr, A.C., and Tarney, J. (1999) Petrogenesis of picrites from the Caribbean Plateau and the North Atlantic magmatic province. *Lithos*, vol.49, pp.1-21.
- [103] Roy-Barman, M., and Allegre, C.J. (1995)  $^{187}\text{Os}/^{186}\text{Os}$  in oceanic island basalts; tracing oceanic crust recycling in the mantle. *Earth and Planetary Science Letters*, vol.129, pp.145-161.
- [997] Salters, V.J.M., and Hart, S.R. (1991) The mantle sources of ocean ridges, islands and arcs; the Hf-isotope connection. *Earth and Planetary Science Letters*, vol.104, pp.364-380.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [1126] Schiellerup, H. (1995) Generation and equilibration of olivine tholeiites in the northern rift zone of Iceland; a petrogenetic study of the Blafjall table mountain. *Journal of Volcanology and Geothermal Research*, vol.65, pp.161-179.

- [1125] Sigmarsson, O. (1996) Short magma chamber residence time at an Icelandic volcano inferred from U-series disequilibria. *Nature (London)*, vol.382, pp.440-442.
- [1213] Sigmarsson, O., Condomines, M., and Fourcade, S. (1992) A detailed Th, Sr and O isotope study of Hekla; differentiation processes in an Icelandic volcano. *Contributions to Mineralogy and Petrology*, vol.112, pp.20-34.
- [1103] Sigmarsson, O., Condomines, M., and Fourcade, S. (1992) Mantle and crustal contribution in the genesis of Recent basalts from off-rift zones in Iceland; constraints from Th, Sr and O isotopes. *Earth and Planetary Science Letters*, vol.110, pp.149-162.
- [1110] Sigmarsson, O., Condomines, M., Grönvold, K., and Thordarson, T. (1991) Extreme magma homogeneity in the 1783-84 Lakagigar eruption; origin of a large volume of evolved basalt in Iceland. *Geophysical Research Letters*, vol.18, pp.2229-2232.
- [1222] Sigmarsson, O., Hemond, C., Condomines, M., Fourcade, S., and Oskarsson, N. (1991) Origin of silicic magma in Iceland revealed by Th isotopes. *Geology*, vol.19, pp.621-624.
- [3350] Sigurdsson, I.A., Steinthorsson, S., and Grönvold, K. (2000) Calcium-rich melt inclusions in Cr-spinels from Borgarfraun, northern Iceland. *Earth and Planetary Science Letters*, vol.183, pp.15-26.
- [4010] Slater, L., Jull, M., McKenzie, D., and Grönvold, K. (1998) Deglaciation effects on mantle melting under Iceland; results from the northern volcanic zone. *Earth and Planetary Science Letters*, vol.164, pp.151-164.
- [4016] Slater, L., McKenzie, D., Grönvold, K., and Shimizu, N. (2001) Melt generation and movement beneath Theistareykir, NE Iceland. *Journal of Petrology*, vol.42, pp.321-354.
- [1209] Stecher, O. (1998) Fluorine geochemistry in volcanic rock series; examples from Iceland and Jan Mayen. *Geochimica et Cosmochimica Acta*, vol.62, pp.3117-3130.
- [982] Stecher, O., Carlson, R.W., and Gunnarsson, B. (1999) Torfajökull; a radiogenic end-member of the Iceland Pb-isotopic array. *Earth and Planetary Science Letters*, vol.165, pp.117-127.
- [3161] Thirlwall, M.F. (2000) Inter-laboratory and other errors in Pb isotope analyses investigated using a  $^{207}\text{Pb}$ - $^{204}\text{Pb}$  double spike. *Chemical Geology*, vol.163, pp.299-322.
- [108] White, A.F., and Hochella, M.F. (1992) Surface chemistry associated with the cooling and subaerial weathering of Recent basalt flows. *Geochimica et Cosmochimica Acta*, vol.56, pp.3711-3721.
- [3061] Yi, W., Halliday, A.N., Alt, J.C., Lee, D.-C., Rehkaemper, M., Garcia, M.O., and Su, Y. (2000) Cadmium, indium, tin, tellurium, and sulfur in oceanic basalts; implications for chalcophile element fractionation in the Earth. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.105, pp.18,927-18,948.
- [3112] Yi, W., Halliday, A.N., Lee, D.-C., and Christensen, J.N. (1995) Indium and tin in basalts, sulfides, and the mantle. *Geochimica et Cosmochimica Acta*, vol.59, pp.5081-5090.
- [4692] Skovgaard, A. C., Storey, M., Baker, J. A., Blusztajn J. (2001) Osmium-oxygen isotopic evidence for a recycled and strongly depleted component in the Iceland mantle plume. *Earth and Planetary Science Letters*, vol 194, pp. 259-275.

#### Kauai (rejuvenated and post shield) References

- [336] Clague, D.A., and Dalrymple, G.B. (1988) Age and petrology of alkalic postshield and

- rejuvenated-stage lava from Kauai, Hawaii. *Contributions to Mineralogy and Petrology*, vol.99, pp.202-218.
- [119] Feigenson, M.D. (1984) Geochemistry of Kauai volcanics and a mixing model for the origin of Hawaiian alkali basalts. *Contributions to Mineralogy and Petrology*, vol.87, pp.109-119.
- [411] Johnston, A.D., Stout, J.H., and Murthy, V.R. (1985) Geochemistry and origin of some unusually oxidized alkaline rocks from Kauai, Hawaii. *Journal of Volcanology and Geothermal Research*, vol.25, pp.225-248.
- [2567] Lassiter, J.C., Hauri, E.H., Reiners, P.W., and Garcia, M.O. (2000) Generation of Hawaiian post-erosional lavas by melting of a mixed lherzolite/pyroxenite source. *Earth and Planetary Science Letters*, vol.178, pp.269-284.
- [335] Maaloe, S., James, D., Smedley, P., Petersen, S., and Garmann, L.B. (1992) The Koloa volcanic suite of Kauai, Hawaii. *Journal of Petrology*, vol.33, pp.761-784.
- [246] Reiners, P.W., and Nelson, B.K. (1998) Temporal-compositional-isotopic trends in rejuvenated-stage magmas of Kauai, Hawaii, and implications for mantle melting processes. *Geochimica et Cosmochimica Acta*, vol.62, pp.2347-2368.
- [1214] Sun, S.S. (1980) Lead isotopic study of young volcanic rocks from mid-ocean ridges, ocean islands and island arcs. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences*, vol.297, pp.409-445.

#### Kilauea, Hawaii, Hawaii References

- [64] Barth, H., Ganz, M., and Brandt, R. (1994) Upper concentration limits for  $^{239}\text{Pu}$  traces in some "KTB"-samples and in one Hawaiian lava. *Geochimica et Cosmochimica Acta*, vol.58, pp.4759-4765.
- [90] Bennett, V.C., East, T.M., and Norman, M.D. (1996) Two mantle-plume components in Hawaiian picrites inferred from correlated Os-Pb isotopes. *Nature (London)*, vol.381, pp.221-224.
- [3445] Bennett, V.C., Norman, M.D., and Garcia, M.O. (2000) Rhenium and platinum group element abundances correlated with mantle source components in Hawaiian picrites; sulphides in the plume. *Earth and Planetary Science Letters*, vol.183, pp.513-526.
- [2820] Blichert-Toft, J., Frey, F.A., and Albarede, F. (1999) Hf isotope evidence for pelagic sediments in the source of Hawaiian basalts. *Science*, vol.285, pp.879-882.
- [1494] Brandon, A.D., Norman, M.D., Walker, R.J., and Morgan, J.W. (1999)  $^{186}\text{Os}$ - $^{187}\text{Os}$  systematics of Hawaiian picrites. *Earth and Planetary Science Letters*, vol.174, pp.25-42.
- [4066] Burkhard, D.J.M. (2001) Crystallization and oxidation of Kilauea basalt glass; processes during reheating experiments. *Journal of Petrology*, vol.42, pp.507-527.
- [65] Cashman, K.V., Mangan, M.T., and Newman, S. (1994) Surface degassing and modifications to vesicle size distributions in active basalt flows. *Journal of Volcanology and Geothermal Research*, vol.61, pp.45-68.
- [252] Chen, C.-Y., Frey F.A., Rhodes J.M., and Easton, R.M. (1996) Temporal geochemical evolution of Kilauea volcano: comparison of Hilina and Puna basalt. IN A. Basu and S.R. Hart (eds.) *Earth Processes, Reading the Isotopic Code*. American Geophysical Union, Washington. pp. 161-181.

- [54] Clague, D.A., Moore, J.G., Dixon, J.E., and Friesen, W.B. (1995) Petrology of submarine lavas from Kilauea's Puna Ridge, Hawaii. *Journal of Petrology*, vol.36, pp.299-349.
- [75] Cohen, A.S., and O'Nions, R.K. (1993) Melting rates beneath Hawaii; evidence from uranium series isotopes in Recent lavas. *Earth and Planetary Science Letters*, vol.120, pp.169-175.
- [353] Cohen, A.S., and O'Nions, R.K. (1994) Erratum: melting rates beneath Hawaii: evidence from Uranium series isotopes in recent lavas. *Earth and Planetary Science Letters*, vol. 121, p. 669.
- [84] Conrad, M.E., Thomas, D.M., Flexser, S., and Vennemann, T.W. (1997) Fluid flow and water-rock interaction in the East Rift Zone of Kilauea Volcano, Hawaii. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.102, pp.15,021-15,037.
- [2653] Crocket, J.H. (2000) PGE in fresh basalt, hydrothermal alteration products, and volcanic incrustations of Kilauea Volcano, Hawaii. *Geochimica et Cosmochimica Acta*, vol.64, pp.1791-1807.
- [224] Fodor, R.V., and Moore, R.B. (1994) Petrology of gabbroic xenoliths in 1960 Kilauea basalt; crystalline remnants of prior (1955) magmatism. *Bulletin of Volcanology*, vol.56, pp. 62-74.
- [184] Garcia, M.O., Ito, E., Eiler, J.M., and Pietruszka, A.J. (1998) Crustal contamination of Kilauea Volcano magmas revealed by oxygen isotope analyses of glass and olivine from Puu Oo eruption lavas. *Journal of Petrology*, vol.39, pp.803-817.
- [2778] Garcia, M.O., Pietruszka, A.J., Rhodes, J.M., and Swanson, K. (2000) Magmatic processes during the prolonged Pu'u 'O'o eruption of Kilauea Volcano, Hawaii. *Journal of Petrology*, vol.41, pp. 967-990.
- [220] Garcia, M.O., Rhodes, J.M., Trusdell, F.A., and Pietruszka, A.J. (1996) Petrology of lavas from the Puu Oo eruption of Kilauea Volcano; 3, The Kupaianaha episode (1986-1992). *Bulletin of Volcanology*, vol.58, pp. 359-379.
- [217] Garcia, M.O., Rhodes, J.M., Wolfe, E.W., Ulrich, G.E., and Ho, R.A. (1992) Petrology of lavas from episodes 2-47 of the Puu Oo eruption of Kilauea Volcano, Hawaii; evaluation of magmatic processes. *Bulletin of Volcanology*, vol.55, pp.1-16.
- [14] Hemond, C., Hofmann, A.W., Heusser, G., Condomines, M., Raczek, I., and Rhodes, J.M. (1994) U-Th-Ra systematics in Kilauea and Mauna Loa basalts, Hawaii. *Chemical Geology*, vol.116, pp.163-180.
- [155] Jochum, K.P., and Hofmann, A.W. (1995) Contrasting Th/U in historical Mauna Loa and Kilauea lavas. IN. J.M. Rhodes and J.P. Lockwood (eds.) *Mauna Loa revealed; structure, composition, history, and hazards*, Geophysical Monograph, vol.92, pp. 307-314.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [4307] Jochum, K.P., Stoll, B., Pfänder, J., Flanz, M., Maissenbacher, P., Hofmann, M., and Hofmann, A.W. (2001) Progress in multi-ion counting spark-source mass spectrometry (MIC-SSMS) for the analysis of geological samples. *Fresenius Journal of Analytical Chemistry*, vol. 370, pp. 647-665.
- [221] Mangan, M.T., Heliker, C.C., Mattox, T.N., Kauahikaua, J.P., and Helz, R.T. (1995)

- Episode 49 of the Pu'u 'O'o-Kupaianaha eruption of Kilauea volcano; breakdown of a steady-state eruptive era. *Bulletin of Volcanology*, vol.57, pp.127-135.
- [161] Martin, C.E. (1991) Osmium isotopic characteristics of mantle-derived rocks. *Geochimica et Cosmochimica Acta*, vol.55, pp.1421-1434.
- [1266] Norman, M.D., and Garcia, M.O. (1999) Primitive magmas and source characteristics of the Hawaiian Plume; petrology and geochemistry of shield picrites. *Earth and Planetary Science Letters*, vol.168, pp.27-44.
- [3375] Pickett, D.A., and Murrell, M.T. (1997) Observations of  $^{231}\text{Pa}/^{235}\text{U}$  disequilibrium in volcanic rocks. *Earth and Planetary Science Letters*, vol.148, pp.259-271.
- [1323] Pietruszka, A.J., and Garcia, M.O. (1999) A rapid fluctuation in the mantle source and melting history of Kilauea Volcano inferred from the geochemistry of its historical summit lavas (1790-1982). *Journal of Petrology*, vol.40, pp.1321-1342.
- [4018] Pietruszka, A.J., Rubin, K.H., and Garcia, M.O. (2001)  $^{226}\text{Ra}$ - $^{230}\text{Th}$ - $^{238}\text{U}$  disequilibria of historical Kilauea lavas (1790-1982) and the dynamics of mantle melting within the Hawaiian Plume. *Earth and Planetary Science Letters*, vol.186, pp.15-31.
- [3665] Quane, S.L., Garcia, M.O., Guillou, H., and Hulsebosch, T.P. (2000) Magmatic history of the East Rift Zone of Kilauea Volcano, Hawaii based on drill core from SOH 1. *Journal of Volcanology and Geothermal Research*, vol.102, pp.319-338.
- [189] Reinitz, I.M., and Turekian, K.K. (1991) The behavior of the uranium decay chain nuclides and thorium during the flank eruptions of Kilauea (Hawaii) between 1983 and 1985. *Geochimica et Cosmochimica Acta*, vol.55, pp.3735-3740.
- [83] Sims, K.W.W., and DePaolo, D.J. (1997) Inferences about mantle magma sources from incompatible element concentration ratios in oceanic basalts. *Geochimica et Cosmochimica Acta*, vol.61, pp.765-784.
- [61] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S.J., and Clague, D.A. (1995) Mechanisms of magma generation beneath Hawaii and mid-ocean ridges; uranium/thorium and samarium/neodymium isotopic evidence. *Science*, vol.267, pp.508-512.
- [1496] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S., Clague, D., and Jull, M. (1999) Porosity of the melting zone and variations in the solid mantle upwelling rate beneath Hawaii; inferences from  $^{238}\text{U}$ - $^{230}\text{Th}$ - $^{226}\text{Ra}$  and  $^{235}\text{U}$ - $^{231}\text{Pa}$  disequilibria. *Geochimica et Cosmochimica Acta*, vol.63, pp.4119-4138.
- [2661] Stracke, A., Salters, V.J.M., and Sims, K.W.W. (1999) Assessing the presence of garnet-pyroxenite in the mantle sources of basalts through combined hafnium-neodymium-thorium isotope systematics. *Geochemistry, Geophysics, Geosystems - G 3*, vol.1. <http://cal.csa.com/htbin/ids631/procskel.cgi>.
- [108] White, A.F., and Hochella, M.F. (1992) Surface chemistry associated with the cooling and subaerial weathering of Recent basalt flows. *Geochimica et Cosmochimica Acta*, vol.56, pp.3711-3721.
- [190] Williams, R.W., and Gill, J.B. (1992) The isotope and U-series disequilibria in some alkali basalts. *Geophysical Research Letters*, vol.19, pp.139-142.
- [222] Wright, T.L., and Helz, R.T. (1996) Differentiation and magma mixing on Kilauea's East Rift Zone; a further look at the eruptions of 1955 and 1960; 2, The 1960 lavas. *Bulletin of Volcanology*, vol.57, pp. 602-630.

## Mauna Loa (Hawaii, Hawaii) References

- [2880] Abouchami, W., Galer, S.J.G., and Hofmann, A.W. (2000) High precision lead isotope systematics of lavas from the Hawaiian Scientific Drilling Project. *Chemical Geology*, vol.169, pp.187-209.
- [199] Aoki, K., Ishikawa, K., and Kanisawa, S. (1981) Fluorine geochemistry of basaltic rocks from continental and oceanic regions and petrogenetic application. *Contributions to Mineralogy and Petrology*, vol.76, pp.53-59.
- [393] Basaltic Volcanism Study Project (1981) Basaltic volcanism on the terrestrial planets. Pergamon Press, New York, NY. 1286 pp.
- [90] Bennett, V.C., East, T.M., and Norman, M.D. (1996) Two mantle-plume components in Hawaiian picrites inferred from correlated Os-Pb isotopes. *Nature (London)*, vol.381, pp.221-224.
- [3445] Bennett, V.C., Norman, M.D., and Garcia, M.O. (2000) Rhenium and platinum group element abundances correlated with mantle source components in Hawaiian picrites; sulphides in the plume. *Earth and Planetary Science Letters*, vol.183, pp.513-526.
- [1300] Blichert-Toft, J., and Albarede, F. (1999) Hf isotopic compositions of the Hawaii Scientific Drilling Project core and the source mineralogy of Hawaiian basalts. *Geophysical Research Letters*, vol.26, pp.535-538.
- [1494] Brandon, A.D., Norman, M.D., Walker, R.J., and Morgan, J.W. (1999)  $^{186}\text{Os}$ - $^{187}\text{Os}$  systematics of Hawaiian picrites. *Earth and Planetary Science Letters*, vol.174, pp.25-42.
- [347] Brandon, A.D., Walker, R.J., Morgan, J.W., Norman, M.D., and Prichard, H.M. (1998) Coupled  $^{186}\text{Os}$  and  $^{187}\text{Os}$  evidence for core-mantle interaction. *Science*, vol.280, pp.1570-1573.
- [121] Budahn, J.R., and Schmitt, R.A. (1985) Petrogenetic modeling of Hawaiian tholeiitic basalts; a geochemical approach. *Geochimica et Cosmochimica Acta*, vol.49, pp.67-87.
- [75] Cohen, A.S., and O'Nions, R.K. (1993) Melting rates beneath Hawaii; evidence from uranium series isotopes in Recent lavas. *Earth and Planetary Science Letters*, vol.120, pp.169-175.
- [353] Cohen, A.S., and O'Nions, R.K. (1994) Erratum: melting rates beneath Hawaii: evidence from Uranium series isotopes in recent lavas. *Earth and Planetary Science Letters*, vol. 121, p. 669.
- [92] Cohen, A.S., O'Nions, R.K., and Kurz, M.D. (1996) Chemical and isotopic variations in Mauna Loa tholeiites. *Earth and Planetary Science Letters*, vol.143, pp.111-124.
- [10] Eiler, J.M., Valley, J.W., and Stolper, E.M. (1996) Oxygen isotope ratios in olivine from the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,807-11,813.
- [2169] Franczyk, K.J., Gibson, E.K., and Tilling, R.I. (1987) Sulfur and carbon abundances in Hawaiian tholeiite lavas; 1972-1975 eruptions of Kilauea and 1975 eruption of Mauna Loa. U. S. Geological Survey Professional Paper, Report: P 1350, pp.791-803.
- [5] Garcia, M.O. (1996) Petrography and olivine and glass chemistry of lavas from the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,701-11,713.
- [249] Hart, S.R., and Ravizza, G.E. (1996) Os partitioning between phases in lherzolite and

- basalt. IN A. Basu and S.R. Hart (eds.) *Earth Processes, Reading the Isotopic Code*. AGU, WASHINGTON DC, pp. 123-134.
- [73] Hauri, E.H., and Kurz, M.D. (1997) Melt migration and mantle chromatography; 2, A time-series Os isotope study of Mauna Loa Volcano, Hawaii. *Earth and Planetary Science Letters*, vol.153, pp.21-36.
- [9] Hauri, E.H., Lassiter, J.C., and DePaolo, D.J. (1996) Osmium isotope systematics of drilled lavas from Mauna Loa, Hawaii. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,793-11,806.
- [14] Hemond, C., Hofmann, A.W., Heusser, G., Condomines, M., Raczek, I., and Rhodes, J.M. (1994) U-Th-Ra systematics in Kilauea and Mauna Loa basalts, Hawaii. *Chemical Geology*, vol.116, pp.163-180.
- [1] Hofmann, A.W., and Jochum, K.P. (1996) Source characteristics derived from very incompatible trace elements in Mauna Loa and Mauna Kea basalts, Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,831-11,839.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [155] Jochum, K.P., and Hofmann, A.W. (1995) Contrasting Th/U in historical Mauna Loa and Kilauea lavas. IN. J.M. Rhodes and J.P. Lockwood (eds.) *Mauna Loa revealed; structure, composition, history, and hazards*, *Geophysical Monograph*, vol.92, pp. 307-314.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [122] Krishnaswami, S., Turekian, K.K., and Bennett, J.T. (1984) The behavior of  $^{232}\text{Th}$  and the  $^{238}\text{U}$  decay chain nuclides during magma formation and volcanism. *Geochimica et Cosmochimica Acta*, vol.48, pp.505-511.
- [154] Kurz, M.D., Kenna, T.C., Kammer, D.P., Rhodes, J.M., and Garcia, M.O. (1995) Isotopic evolution of Mauna Loa Volcano; a view from the submarine southwest rift zone. IN. J.M. Rhodes and J.P. Lockwood (eds.) *Mauna Loa revealed; structure, composition, history, and hazards*, *Geophysical Monograph*, vol.92, pp. 289-306.
- [8] Kurz, M.D., Kenna, T.C., Lassiter, J.C, and DePaolo, D.J. (1996) Helium isotopic evolution of Mauna Kea Volcano; first results from the 1-km drill core. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,781-11,791.
- [187] Kyser, T.K., O'Neil, J.R, and Carmichael, I.S.E. (1982) Genetic relations among basic lavas and ultramafic nodules; evidence from oxygen isotope compositions. *Contributions to Mineralogy and Petrology*, vol.81, pp.88-102.
- [113] Lipman, P.W., Banks, N.G., and Rhodes, J.M. (1985) Degassing-induced crystallization of basaltic magma and effects on lava rheology. *Nature (London)*, vol.317, pp.604-607.
- [32] Lipman, P.W., Rhodes, J.M., and Dalrymple, G.B. (1990) The Ninole Basalt; implications for the structural evolution of Mauna Loa Volcano, Hawaii. *Bulletin of Volcanology*, vol.53, pp.1-19.
- [2168] Lockwood, J.P., Dvorak, J.J., English, T.T., Koyanagi, R.Y., Okamura, A.T., Summers, M.L., and Tanigawa, W.R. (1987) Mauna Loa 1974-1984; a decade of intrusive and extrusive activity. U. S. Geological Survey Professional Paper, Report: P 1350, pp.537-

- 570.
- [196] Moore, J.G., and Clague, D.A. (1992) Volcano growth and evolution of the Island of Hawaii; with Suppl. Data 92-34. Geological Society of America Bulletin, vol.104, pp.1471-1484.
- [170] Newsom, H.E., White, W.M., Jochum, K.P., and Hofmann, A.W. (1986) Siderophile and chalcophile element abundances in oceanic basalts, Pb isotope evolution and growth of the Earth's core. Earth and Planetary Science Letters, vol.80, pp.299-313.
- [1266] Norman, M.D., and Garcia, M.O. (1999) Primitive magmas and source characteristics of the Hawaiian Plume; petrology and geochemistry of shield picrites. Earth and Planetary Science Letters, vol.168, pp.27-44.
- [18] Pegrarn, W.J., and Allegre, C.J. (1992) Osmium isotopic compositions from oceanic basalts. Earth and Planetary Science Letters, vol.111, pp.59-68.
- [20] Rhodes, J.M. (1988) Geochemistry of the 1984 Mauna Loa eruption; implications for magma storage and supply. Journal of Geophysical Research, B, Solid Earth and Planets, vol.93, pp.4453-446.
- [149] Rhodes, J.M. (1983) Homogeneity of lava flows; chemical data for historic Mauna Loa eruptions. Journal of Geophysical Research. B, vol.88, Suppl., no.2, pp.A869-A879.
- [152] Rhodes, J.M. (1995) The 1852 and 1868 Mauna Loa picrite eruptions; clues to parental magma compositions and the magmatic plumbing system. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp.241-262.
- [2] Rhodes, J.M. (1996) Geochemical stratigraphy of lava flows sampled by the Hawaii Scientific Drilling Project. Journal of Geophysical Research, B, Solid Earth and Planets, vol.101, pp.11,729-11,746.
- [153] Rhodes, J.M., and Hart, S.R. (1995) Episodic trace element and isotopic variations in historical Mauna Loa lavas; implications for magma and plume dynamics. IN. J.M. Rhodes and J.P. Lockwood (eds.) Mauna Loa revealed; structure, composition, history, and hazards, Geophysical Monograph, vol.92, pp. 263-288.
- [83] Sims, K.W.W., and DePaolo, D.J. (1997) Inferences about mantle magma sources from incompatible element concentration ratios in oceanic basalts. Geochimica et Cosmochimica Acta, vol.61, pp.765-784.
- [61] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S.J., and Clague, D.A. (1995) Mechanisms of magma generation beneath Hawaii and mid-ocean ridges; uranium/thorium and samarium/neodymium isotopic evidence. Science, vol.267, pp.508-512.
- [1496] Sims, K.W.W., DePaolo, D.J., Murrell, M.T., Baldrige, W.S., Goldstein, S., Clague, D., and Jull, M. (1999) Porosity of the melting zone and variations in the solid mantle upwelling rate beneath Hawaii; inferences from  $^{238}\text{U}$ - $^{230}\text{Th}$ - $^{226}\text{Ra}$  and  $^{235}\text{U}$ - $^{231}\text{Pa}$  disequilibria. Geochimica et Cosmochimica Acta, vol.63, pp.4119-4138.
- [2497] Sobolev, A.V., Hofmann, A.W., and Nikogosian, I.K. (2000) Recycled oceanic crust observed in 'ghost plagioclase' within the source of Mauna Loa lavas. Nature, vol. 404, pp. 986-990.
- [2661] Stracke, A., Salters, V.J.M., and Sims, K.W.W. (1999) Assessing the presence of garnet-pyroxenite in the mantle sources of basalts through combined hafnium-neodymium-thorium isotope systematics. Geochemistry, Geophysics, Geosystems - G 3, vol.1.

- <http://cal.csa.com/htbin/ids631/procskel.cgi>.
- [60] Stille, P., Unruh, D.M., and Tatsumoto, M. (1986) Pb, Sr, Nd, and Hf isotopic constraints on the origin of Hawaiian basalts and evidence for a unique mantle source. *Geochimica et Cosmochimica Acta*, vol.50, pp.2303-2319.
- [2622] Tera, F., Brown, L., Morris, J., Sacks, I.S., Klein, J., and Middleton, R. (1986) Sediment incorporation in island-arc magmas; inferences from  $^{10}\text{Be}$ . *Geochimica et Cosmochimica Acta*, vol.50, pp.535-550.
- [93] Valbracht, P.J., Staudigel, H., Honda, M., McDougall, I., and Davies, G.R. (1996) Isotopic tracing of volcanic source regions from Hawaii; decoupling of gaseous from lithophile magma components. *Earth and Planetary Science Letters*, vol.144, pp.185-198, ill pp.
- [203] Wilkinson, J.F.G. (1989) Undepleted mantle composition beneath Hawaii. *Earth and Planetary Science Letters*, vol. 75, pp. 129-138.
- [50] Wilkinson, J.F.G., and Hensel, H.D. (1988) The petrology of some picrites from Mauna Loa and Kilauea volcanoes, Hawaii. *Contributions to Mineralogy and Petrology*, vol. 98, pp. 326-345.
- [190] Williams, R.W., and Gill, J.B. (1992) The isotope and U-series disequilibria in some alkali basalts. *Geophysical Research Letters*, vol.19, pp.139-142.
- [4] Yang, H.J., Frey, F.A., Rhodes, J.M., and Garcia, M.O. (1996) Evolution of Mauna Kea Volcano; inferences from lava compositions recovered in the Hawaii Scientific Drilling Project. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.101, pp.11,747-11,767.

#### Tahiti, Society Islands References

- [1514] Chauvin, A., Roperch, P., and Duncan, R.A. (1990) Records of geomagnetic reversals from volcanic islands of French Polynesia; 2, Paleomagnetic study of a flow sequence (1.2-0.6 Ma) from the island of Tahiti and discussion of reversal models. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.95, pp.2727-2752.
- [567] Cheng, Q.C., Macdougall, J.D., and Lugmair, G.W. (1993) Geochemical studies of Tahiti, Teahitia and Mehetia, Society Island Chain. *Journal of Volcanology and Geothermal Research*, vol.55, pp.155-184.
- [1414] Diraison, C., Bellon, H., Leotot, C., Brousse, R., and Barszczus, H.G. (1991) Alignment of the Society Islands, French Polynesia; volcanology, geochronology, and hot spot model. *Bulletin de la Societe Geologique de France, Huitieme Serie*, vol.162, pp.479-496.
- [546] Dostal, J., Dupuy, C., and Liotard, J.M. (1982) Geochemistry and origin of basaltic lavas from Society Islands, French Polynesia; South Central Pacific Ocean. *Bulletin Volcanologique*, vol.45, pp.51-62.
- [1191] Dupuy, C., Barszczus, H.G., Dostal, J., Vidal, P., and Liotard, J.M. (1989) Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, Central Pacific. *Chemical Geology*, vol.77, pp.1-18.
- [1181] Duncan, R.A., Fisk, M.R., White, W.M., and Nielsen, R.L. (1994) Tahiti; geochemical evolution of a French Polynesian volcano. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.99, pp.24,341-24,357.
- [557] Hekinian, R., Bideau, D., Stoffers, P., Cheminee, J.-L., Muhe, R., Puteanus, D., and

- Binard, N. (1991) Submarine intraplate volcanism in the South Pacific; geological setting and petrology of the Society and the Austral regions. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.96, pp.2109-2138.
- [562] Hemond, C., Devey, C.W., and Chauvel, C. (1994) Source compositions and melting processes in the Society and Austral plumes (South Pacific Ocean); element and isotope (Sr, Nd, Pb, Th) geochemistry. *Chemical Geology*, vol.115, pp.7-45.
- [183] Hofmann, A.W., Jochum, K.P., Seufert, M., and White, W.M. (1986) Nb and Pb in oceanic basalts; new constraints on mantle evolution. *Earth and Planetary Science Letters*, vol.79, pp.33-45.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [1350] Kogiso, T., Tatsumi, Y., Shimoda, G., and Barszczus, H.G. (1997) High  $\mu$  (HIMU) ocean island basalts in southern Polynesia; new evidence for whole mantle scale recycling of subducted oceanic crust. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.102, pp.8085-8103.
- [571] Leotot, C. (1988) Temporal evolution of Taravao lavas, Society Islands, French Polynesia. *Comptes Rendus de l'Academie des Sciences, Serie 2, Mecanique, Physique, Chimie, Sciences de l'Univers, Sciences de la Terre*, vol.307, pp.1413-1418.
- [1415] Leotot, C., Gillot, P.Y., Guichard, F., and Brousse, R. (1990) Taravao Volcano, Tahiti; a example of polyphase volcanism associated with a trench structure. *Bulletin de la Societe Geologique de France, Huitieme Serie*, vol.6, pp.951-961.
- [551] Terakado, Y. (1980) Fine structures of rare element patterns of Tahitian rocks. *Geochemical Journal*, vol.14, pp.155-166.
- [1236] White, W.M., and Duncan, R.A. (1996) Geochemistry and geochronology of the Society Islands: new evidence for deep mantle recycling. IN A. Basu and S.R. Hart (eds.) *Earth Processes, Reading the Isotopic Code*. American Geophysical Union, Washington. pp 183-206.
- [94] White, W.M., and Hofmann, A.W. (1982) Sr and Nd isotope geochemistry of oceanic basalts and mantle evolution. *Nature (London)*, vol.296, pp.821-825.

#### Eiao, Marquesas References

- [1184] Brousse, R., Barszczus, H.G., Bellon, H., Cantagrel, J.M., Diraison, C., Guillou, H., and Leotot, C. (1990) The Marquesas, French Polynesia; volcanology, geochronology, and discussion of a hot spot model. *Bulletin de la Societe Geologique de France, Huitieme Serie*, vol.6, pp.933-949.
- [1530] Caroff, M., Guillou, H., Lamiaux, M., Maury, R.C., Guille, G., and Cotten, J. (1999) Assimilation of ocean crust by hawaiiitic and mugearitic magmas; an example from Eiao (Marquesas). *Lithos*, vol.46, pp.235-258.
- [789] Caroff, M., Maury, R.C., Vidal, P., Guille, G., Dupuy, C., Cotten, J., Guillou, H., and Gillot, P.-Y. (1995) Rapid temporal changes in ocean island basalt composition; evidence

- from an 800 m deep drill hole in Eiao Shield (Marquesas). *Journal of Petrology*, vol.36, pp.1333-1365.
- [1191] Dupuy, C., Barseczus, H.G., Dostal, J., Vidal, P., and Liotard, J.M. (1989) Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, Central Pacific. *Chemical Geology*, vol.77, pp.1-18.
- [776] Dupuy, C., Vidal, P., Barseczus, H.G., and Chauvel, C. (1987) Origin of basalts from the Marquesas Archipelago (south-central Pacific Ocean); isotope and trace element constraints. *Earth and Planetary Science Letters*, vol.82, pp.145-152.
- [771] Liotard, J.M., and Barseczus, H.G. (1984) Contribution to the petrography and geochemistry of Eiao Island, Marquesas Archipelago, French Polynesia, south-central Pacific Ocean. *Comptes-Rendus des Seances de l'Academie des Sciences, Serie 2: Mecanique-Physique, Chimie, Sciences de l'Univers, Sciences de la Terre*, vol.298, pp.347-350.
- [780] Liotard, J.M., Barseczus, H.G., Dupuy, C., and Dostal, J. (1986) Geochemistry and origin of basaltic lavas from Marquesas Archipelago, French Polynesia. *Contributions to Mineralogy and Petrology*, vol.92, pp.260-268.
- [1520] Vidal, P., Dupuy, C., Barseczus, H.G., and Chauvel, C. (1987) Mantle heterogeneities and origin of basalts of the Marquesas Islands, Polynesia. *Bulletin de la Societe Geologique de France, Huitieme Serie*, vol.3, pp.633-642.

#### Aitutaki, Austral-Cook References

- [754] Dostal, J., Cousens, B.L., and Dupuy, C. (1998) The incompatible element characteristics of an ancient subducted sedimentary component in ocean island basalts from French Polynesia. *Journal of Petrology*, vol.39, pp.937-952.
- [1191] Dupuy, C., Barseczus, H.G., Dostal, J., Vidal, P., and Liotard, J.M. (1989) Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, Central Pacific. *Chemical Geology*, vol.77, pp.1-18.
- [776] Dupuy, C., Vidal, P., Barseczus, H.G., and Chauvel, C. (1987) Origin of basalts from the Marquesas Archipelago (south-central Pacific Ocean); isotope and trace element constraints. *Earth and Planetary Science Letters*, vol.82, pp.145-152.
- [814] Nakamura, Y., and Tatsumoto, M. (1988) Pb, Nd, and Sr isotopic evidence for a multicomponent source for rocks of Cook-Austral Islands and heterogeneities of mantle plumes. *Geochimica et Cosmochimica Acta*, vol.52, pp.2909-2924.
- [452] Palacz, Z.A., and Saunders, A.D. (1986) Coupled trace element and isotope enrichment in the Cook-Austral-Samoa islands, Southwest Pacific. *Earth and Planetary Science Letters*, vol.79, pp.270-280.
- [4070] Schiano, P., Burton, K.W., Dupre, B., Birck, J.L., Guille, G., and Allegre, C.J. (2001) Correlated Os-Pb-Nd-Sr isotopes in the Austral-Cook Chain basalts; the nature of mantle components in plume sources. *Earth and Planetary Science Letters*, vol.186, pp.527-537.
- [809] Turner, D.L., and Jarrard, R.D. (1982) K-Ar dating of the Cook-Austral island chain; a test of the hot-spot hypothesis. *Journal of Volcanology and Geothermal Research*, vol.12, pp.187-220.

## Mangaia, Austral-Cook References

- [754] Dostal, J., Cousens, B.L., and Dupuy, C. (1998) The incompatible element characteristics of an ancient subducted sedimentary component in ocean island basalts from French Polynesia. *Journal of Petrology*, vol.39, pp.937-952.
- [1191] Dupuy, C., Barszczus, H.G., Dostal, J., Vidal, P., and Liotard, J.M. (1989) Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, Central Pacific. *Chemical Geology*, vol.77, pp.1-18.
- [458] Hauri, E.H., and Hart, S.R. (1993) Re-Os isotope systematics of HIMU and EMII oceanic island basalts from the South Pacific Ocean. *Earth and Planetary Science Letters*, vol.114, pp.353-371.
- [2662] Hauri, E.H., and Hart, S.R. (1997) Rhenium abundances and systematics in oceanic basalts. *Chemical Geology*, vol.139, pp.185-205.
- [1350] Kogiso, T., Tatsumi, Y., Shimoda, G., and Barszczus, H.G. (1997) High  $\mu$  (HIMU) ocean island basalts in southern Polynesia; new evidence for whole mantle scale recycling of subducted oceanic crust. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.102, pp.8085-8103.
- [814] Nakamura, Y., and Tatsumoto, M. (1988) Pb, Nd, and Sr isotopic evidence for a multicomponent source for rocks of Cook-Austral Islands and heterogeneities of mantle plumes. *Geochimica et Cosmochimica Acta*, vol.52, pp.2909-2924.
- [452] Palacz, Z.A., and Saunders, A.D. (1986) Coupled trace element and isotope enrichment in the Cook-Austral-Samoa islands, Southwest Pacific. *Earth and Planetary Science Letters*, vol.79, pp.270-280.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [103] Roy-Barman, M., and Allegre, C.J. (1995)  $^{187}\text{Os}/^{186}\text{Os}$  in oceanic island basalts; tracing oceanic crust recycling in the mantle. *Earth and Planetary Science Letters*, vol.129, pp.145-161.
- [4070] Schiano, P., Burton, K.W., Dupre, B., Birck, J.L., Guille, G., and Allegre, C.J. (2001) Correlated Os-Pb-Nd-Sr isotopes in the Austral-Cook Chain basalts; the nature of mantle components in plume sources. *Earth and Planetary Science Letters*, vol.186, pp.527-537.
- [809] Turner, D.L., and Jarrard, R.D. (1982) K-Ar dating of the Cook-Austral island chain; a test of the hot-spot hypothesis. *Journal of Volcanology and Geothermal Research*, vol.12, pp.187-220.
- [1199] Woodhead, J.D. (1996) Extreme HIMU in an oceanic setting; the geochemistry of Mangaia Island (Polynesia), and temporal evolution of the Cook-Austral hotspot. *Journal of Volcanology and Geothermal Research*, vol.72, pp.1-19.

## Tubuai, Austral-Cook References

- [3708] Bellon, H., Brousse, R., and Pantaloni, A. (1980) Ages of Tubuai Island, Austral-Cook Archipelago. *Cahiers du Indo-Pacifique*, vol. 2, pp. 219-240.

- [1482] Brousse, R., and Maury R.C. (1980) Volcanology and petrology of Tubuai Island, Austral Islands, South Pacific. *Cahiers Indo-Pacifique*, vol. 2, pp. 131-193.
- [1577] Caroff, M., Maury, R.C., Guille, G., and Cotton, J. (1997) Partial melting below Tubuai (Austral Islands, French Polynesia). *Contributions to Mineralogy and Petrology*, vol. 127, pp. 369-382.
- [1176] Chauvel, C., Hofmann, A.W., and Vidal, P. (1992) HIMU-EM; the French Polynesian connection. *Earth and Planetary Science Letters*, vol.110, pp.99-119.
- [754] Dostal, J., Cousens, B.L., and Dupuy, C. (1998) The incompatible element characteristics of an ancient subducted sedimentary component in ocean island basalts from French Polynesia. *Journal of Petrology*, vol.39, pp.937-952.
- [815] Dupuy, C., Barszczus, H.G., Liotard, J.M., and Dostal, J. (1988) Trace element evidence for the origin of ocean island basalts; an example from the Austral Islands (French Polynesia). *Contributions to Mineralogy and Petrology*, vol.98, pp.293-302.
- [1191] Dupuy, C., Barszczus, H.G., Dostal, J., Vidal, P., and Liotard, J.M. (1989) Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, Central Pacific. *Chemical Geology*, vol.77, pp.1-18.
- [458] Hauri, E.H., and Hart, S.R. (1993) Re-Os isotope systematics of HIMU and EMII oceanic island basalts from the South Pacific Ocean. *Earth and Planetary Science Letters*, vol.114, pp.353-371.
- [2662] Hauri, E.H., and Hart, S.R. (1997) Rhenium abundances and systematics in oceanic basalts. *Chemical Geology*, vol.139, pp.185-205.
- [173] Jochum, K.P., and Hofmann, A.W. (1997) Constraints on Earth evolution from antimony in mantle-derived rocks. *Chemical Geology*, vol.139, pp.39-49.
- [174] Jochum, K.P., Hofman, A.W., and Seufert, H.M. (1993) Tin mantle-derived rocks; constraints on Earth evolution. *Geochimica et Cosmochimica Acta*, vol.57, pp.3585-3595.
- [818] Maury, R.C., El Azzouzi, M., Liotard, J.M., Guille, G., Barszczus, H.G., Chauvel, C., Diraison, C., Dupuy, C., Vidal, P., and Brousse, R. (1994) Geology and petrology of Tubuai, Austral Islands, French Polynesia. *Comptes Rendus de l'Academie des Sciences, Serie II. Sciences de la Terre et des Planetes*, vol.318, pp.1341-1347.
- [1350] Kogiso, T., Tatsumi, Y., Shimoda, G., and Barszczus, H.G. (1997) High  $\mu$  (HIMU) ocean island basalts in southern Polynesia; new evidence for whole mantle scale recycling of subducted oceanic crust. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.102, pp.8085-8103.
- [18] Pegram, W.J., and Allegre, C.J. (1992) Osmium isotopic compositions from oceanic basalts. *Earth and Planetary Science Letters*, vol.111, pp.59-68.
- [103] Roy-Barman, M., and Allegre, C.J. (1995)  $^{187}\text{Os}/^{186}\text{Os}$  in oceanic island basalts; tracing oceanic crust recycling in the mantle. *Earth and Planetary Science Letters*, vol.129, pp.145-161.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [4070] Schiano, P., Burton, K.W., Dupre, B., Birck, J.L., Guille, G., and Allegre, C.J. (2001) Correlated Os-Pb-Nd-Sr isotopes in the Austral-Cook Chain basalts; the nature of mantle components in plume sources. *Earth and Planetary Science Letters*, vol.186, pp.527-537.
- [1175] Vidal, P., Chauvel, C., and Brousse, R. (1984) Large mantle heterogeneity beneath

French Polynesia. *Nature* (London), vol.307, pp.536-538.

#### References Used for Heard Island

- [1212] Barling, J., and Goldstein, S.L. (1990) Extreme isotopic variations in Heard Island lavas and the nature of mantle reservoirs. *Nature* (London), vol.348, pp.59-62.
- [1007] Barling, J., Goldstein, S.L., and Nicholls, I.A. (1994) Geochemistry of Heard Island (southern Indian Ocean); characterization of an enriched mantle component and implications for enrichment of the sub-Indian Ocean mantle. *Journal of Petrology*, vol.35, pp.1017-1053.
- [1366] Barling, J., Goldstein, S.J., Wheller, G.E., and Nicholls, I.A. (1988) Heard Island; an example of large isotopic variations on a small oceanic island. *Chemical Geology*, vol.70, pp.46.
- [2025] Clarke, I., McDougall, I., and Whitford, D.J. (1983) Volcanic evolution of Heard and McDonald islands, southern Indian Ocean. IN R.L. Oliver, P.R. James, and J.B. Jago (eds) *Antarctic earth science; fourth international symposium*, Cambridge Univ., Cambridge. pp. 631-635.
- [1001] Storey, M., Saunders, A.D., Tarney, J., Leat, P., Thirlwall, M.F., Thompson, R.N., Menzies, M.A., and Marriner, G.F. (1988) Geochemical evidence for plume-mantle interactions beneath Kerguelen and Heard islands, Indian Ocean. *Nature* (London), vol.336, pp.371-374.

#### Jan Mayen References

- [1321] Imsland, P. (1984) Petrology, mineralogy, and evolution of the Jan Mayen magma system. *Visindafelag Islandinga*, vol.43, 332 pp.
- [1220] Maaloe, Sven., Sorensen, I., and Hertogen, J. (1986) The trachybasaltic suite of Jan Mayen. *Journal of Petrology*, vol.27, pp.439-466.
- [1063] Roesler, H.J., and Nestler, P. (1981) Isotopic studies (O and C) of the volcanics of Iceland and Jan Mayen Ridge. *Freiberger Forschungshefte, Reihe B: Metallurgie und Werkstofftechnik*, vol.360, pp.147-158.
- [1209] Stecher, O. (1998) Fluorine geochemistry in volcanic rock series; examples from Iceland and Jan Mayen. *Geochimica et Cosmochimica Acta*, vol.62, pp.3117-3130.
- [1270] Troennes, R.G., Planke, S., Sundvoll, B., and Imsland, P. (1999) Recent volcanic rocks from Jan Mayen; low-degree melt fractions of enriched Northeast Atlantic mantle. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.104, pp.7153-7168.

#### Grande Comore, Comoros References

- [3378] Bourdon, B., Joron, J.-L., and Allegre, C.J. (1999) A method for  $^{231}\text{Pa}$  analysis by thermal ionization mass spectrometry in silicate rocks. *Chemical Geology*, vol.157, pp.147-151.
- [1489] Bourdon, B., Joron, J.-L., Claude-Ivanaj, C., and Allegre, C.J. (1998) U-Th-Pa-Ra

- systematics for the Grande Comore volcanics; melting processes in an upwelling plume. *Earth and Planetary Science Letters*, vol.164, pp.119-133.
- [1304] Chabaux, F., and Allegre, C.J. (1994)  $^{238}\text{U}$ - $^{230}\text{Th}$ - $^{226}\text{Ra}$  disequilibria in volcanics; a new insight into melting conditions. *Earth and Planetary Science Letters*, vol.126, pp.61-74.
- [804] Class, C., and Goldstein, S.L. (1997) Plume-lithosphere interactions in the ocean basins; constraints from the source mineralogy. *Earth and Planetary Science Letters*, vol.150, pp.245-260.
- [850] Class, C., Goldstein, S.L., Altherr, R., and Bachelery, P. (1998) The process of plume-lithosphere interactions in the ocean basins; the case of Grande Comore. *Journal of Petrology*, vol.39, pp.881-903.
- [1298] Claude-Ivanaj, C., Bourdon, B., and Allegre, C.J. (1998) Ra-Th-Sr isotope systematics in Grande Comore Island; a case study of plume-lithosphere interaction. *Earth and Planetary Science Letters*, vol.164, pp.99-117.
- [1331] Deniel, C. (1998) Geochemical and isotopic (Sr, Nd, Pb) evidence for plume-lithosphere interactions in the genesis of Grande Comore magmas (Indian Ocean). *Chemical Geology*, vol.144, pp.281-303.
- [1345] Dupre, B., and Allegre, C.J. (1983) Pb-Sr isotope variation in Indian Ocean basalts and mixing phenomena. *Nature (London)*, vol.303, pp.142-146.
- [1301] Emerick, C.M., and Duncan, R.A. (1982) Age progressive volcanism in the Comores Archipelago, western Indian Ocean and implications for Somali plate tectonics. *Earth and Planetary Science Letters*, vol.60, pp.415-428.
- [459] Reisberg, L., Zindler, A., Marcantonio, F., White, W., Wyman, D., and Weaver, B. (1993) Os isotope systematics in ocean island basalts. *Earth and Planetary Science Letters*, vol.120, pp.149-167.
- [103] Roy-Barman, M., and Allegre, C.J. (1995)  $^{187}\text{Os}/^{186}\text{Os}$  in oceanic island basalts; tracing oceanic crust recycling in the mantle. *Earth and Planetary Science Letters*, vol.129, pp.145-161.
- [476] Salters, V.J.M., and White, W.M. (1998) Hf isotope constraints on mantle evolution. *Chemical Geology*, vol.145, pp.447-460.
- [1303] Spaeth, A., le Roex, A.P., and Duncan, R.A. (1996) The geochemistry of lavas from the Comores Archipelago, western Indian Ocean; petrogenesis and mantle source region characteristics. *Journal of Petrology*, vol.37, pp.961-991.

#### Madeira, Madeira Archipelago References

- [1160] Aires-Barros, L. (1983) Geochemistry of immobile elements in volcanic rocks as characteristic of geotechnical framework; the case of lavas from the islands of Principe and Madiera. *Garcia de Orta, Serie de Geologia*, vol.6, pp.127-135.
- [1162] Aires-Barros, L., Basto, M.J., and Matias, M.J. (1980) Geochemistry of lavas on Madeira; I, The behavior of nickel, copper, zinc, zirconium, yttrium, strontium and rubidium. *Boletim do Museu e Laboratorio Mineralogico e Geologico da Faculdade de Ciencias da Universidade de Lisboa*, vol.16, pp.137-152.
- [707] Feraud, G., Schmincke, H.-U., Lietz, J., Gastaud, J., Pritchard, G., and Bleil, U. (1981) New K-Ar ages, chemical analyses and magnetic data of rocks from the islands of Santa

- Maria (Azores), Porto Santo and Madeira (Madeira Archipelago) and Gran Canaria (Canary Islands). *Bulletin Volcanologique*, vol.44, pp.359-375.
- [2920] Geldmacher, J., van den Bogaard, P., Hoernle, K., and Schmincke, H.-U. (2000) Ar age dating of the Madeira Archipelago and hotspot track (eastern North Atlantic). *Geochemistry, Geophysics, Geosystems - G 3*, vol.1, 31 pp., paper number 1999GC000018. On-line journal.
- [1195] Halliday, A.N., Davies, G.R., Lee, D.-C., Tommasini, S., Paslick, C.R., Fitton, J.G., and James, D.E. (1992) Lead isotope evidence for young trace element enrichment in the oceanic upper mantle. *Nature (London)*, vol.359, pp.623-627.
- [1196] Halliday, A.N., Davies, G.R., Lee, D.-C., Tommasini, S., Paslick, C.R., Fitton, J.G., and James, D.E. (1993) Corrections to 'Lead isotope evidence for young trace element enrichment in the oceanic upper mantle'. *Nature (London)*, vol.362, p.184.
- [1197] Halliday, A.N., Lee, D.-C., Tommasini, S., Davies, G.R., Paslick, C.R., Fitton, J.G., and James, D.E. (1995) Incompatible trace elements in OIB and MORB and source enrichment in the sub-oceanic mantle. *Earth and Planetary Science Letters*, vol.133, pp.379-395.
- [1211] Widom, E., Hoernle, K.A., Shirey, S.B., and Schmincke, H.E. (1999) Os isotope systematics in the Canary Islands and Madeira; lithospheric contamination and mantle plume signatures. *Journal of Petrology*, vol.40, pp.279-296.
- [3061] Yi, W., Halliday, A.N., Alt, J.C., Lee, D.-C., Rehkaemper, M., Garcia, M.O., and Su, Y. (2000) Cadmium, indium, tin, tellurium, and sulfur in oceanic basalts; implications for chalcophile element fractionation in the Earth. *Journal of Geophysical Research, B, Solid Earth and Planets*, vol.105, pp.18,927-18,948.
- [3112] Yi, W., Halliday, A.N., Lee, D.-C., and Christensen, J.N. (1995) Indium and tin in basalts, sulfides, and the mantle. *Geochimica et Cosmochimica Acta*, vol.59, pp.5081-5090.
- [3348] Geldmacher, J., and Hoernle, K.A. (2000) The 72 Ma geochemical evolution of the Madeira Hotspot (eastern North Atlantic); recycling of Paleozoic ( $\leq 500$  Ma) oceanic lithosphere. *Earth and Planetary Science Letters*, vol.183, pp.73-92.