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### Diagrama Ti – V: una nueva propuesta de discriminación para magmas básicos en cinco ambientes tectónicos

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## APÉNDICE 1

### Referencias de la base de datos (Tabla 1)

- [1] Carr, M.J. 1984. Symmetrical and segmented variation of physical and geochemical characteristics of the Central American volcanic front: *Journal of Volcanology and Geothermal Research*, 20, 231-252.
- [2] Hazlett, R.W. 1987. Geology of San Cristobal volcanic complex, Nicaragua: *Journal of Volcanology and Geothermal Research*, 33, 223-230.
- [3] Reagan, M.K., Gill, J.B. 1989. Coexisting calcalkaline and high-niobium basalts from Turrialba volcano, Costa Rica: implications for residual titanates in arc magma sources: *Journal of Geophysical Research*, 94, 4619-4633.
- [4] Carr, M.J., Feigenson, M.D., Bennett, E. A. 1990. Incompatible element and isotopic evidence for tectonic control of source mixing and melt extraction along the Central American arc: *Contributions of Mineralogy and Petrology*, 105, 369-380.
- [5] Walker, J.A., Carr, M.J., Feigenson, M.D., Kalamarides, R.I. 1990. The petrogenetic significance of interstratified high- and low-Ti basalts in central Nicaragua: *Journal of Petrology*, 31, 1141-1164.
- [6] Defant, M.J., Richerson, M., De Boer, J.Z., Stewart, R.H., Maury, R.C., Bellon, H., Drummond, M.S., Feigenson, M.D., Jackson, T.E. 1991. Dacite genesis via both slab melting and differentiation: petrogenesis of La Yenuada volcanic complex, Panama: *Journal of Petrology*, 32, 1101-1142.
- [7] Defant, M.J., Clark, L.F., Stewart, R.H., Drummond, M.S., De Boer, J.Z., Maury, R.C., Bellon, H., Jackson, T. E., Restrepo, J.F. 1991. Andesite and dacite genesis via contrasting processes: the geology and geochemistry of El Valle volcano, Panama: *Contributions of Mineralogy and Petrology*, 106, 309-324.
- [8] Bardintzeff, J.M., Deniel, C. 1992. Magmatic evolution of Pacaya and Cerro Chiquito volcanological complex, Guatemala: *Bulletin of Volcanology*, 54, 267-283.
- [9] Déruelle, B. 1982. Petrology of the Plio-Quaternary volcanism of the south-central and meridional Andes: *Journal of Volcanology and Geothermal Research*, 14, 77-124.
- [10] Frey, F.A., Gerlach, D.C., Hickey, R.L., López-Escobar, L. Munizaga-Villavicencio, F. 1984. Petrogenesis of the Laguna del Maule volcanic complex, Chile (36°S): *Contributions of Mineralogy and Petrology*, 88, 133-149.
- [11] Hickey, R.L., Frey, F.A., Gerlach, D.C., López-Escobar, L., 1986. Multiple sources for basaltic arc rocks from the southern volcanic zone of the Andes (34°-41°S): trace element and isotopic evidence for contributions from subducted oceanic crust, mantle, and continental crust: *Journal of Geophysical Research*, 91, 5963-5983.
- [12] Gerlach, D.C., Frey, F.A., Moreno-Roa, H., López-Escobar, L. 1988. Recent volcanism in the Puyehue-Cordon Caulle region, southern Andes, Chile (40.5°S): petrogenesis of evolved lavas: *Journal of Petrology*, 29, 333-382.
- [13] Tormey, D.R., Hickey-Vargas, R., Frey, F.A., López-Escobar, L. 1991. Recent lavas from the Andean volcanic front (33 to 42° S); interpretation of along-arc compositional variations, *in*, Harmon, Russell S., and Rapela, Carlos W., eds., *Andean magmatism and its tectonic setting*: Boulder, Co., Geological Society of America, Special Paper, 265, 57-77.
- [14] Puig, A., Herve, M., Suarez, M., Saunders, A.D. 1984. Calc-alkaline and alkaline Miocene and calc-alkaline recent volcanism in the southernmost Patagonian cordillera, Chile: *Journal of Volcanology and Geothermal Research*, 20, 149-163.
- [15] Kay, S.M., Kay, R.W., Citron, G. 1982. Tectonic controls on tholeiitic and calc-alkaline magmatism in the Aleutian arc: *Journal of Geophysical Research*, 87, 4051-4072.
- [16] Myers, J.D., Marsh, B. D., Sinha, A K. 1985 Strontium isotopic and selected trace element variations between two Aleutian volcanic centers (Adak and Atka): implications for the development of arc volcanic plumbing systems: *Contributions of Mineralogy and Petrology*, 91, 221-234.
- [17] Brophy, J.G. 1986 The Cold Bay volcanic center, Aleutian volcanic arc; I. Implications for the origin of high-alumina arc basalt: *Contributions of Mineralogy and Petrology*, 93, 368-380.
- [18] Nye, C.J., Reid, M.R. 1986. Geochemistry of primary and least fractionated lavas from Okmok volcano, Central Aleutians; implications for arc magmagenesis: *Journal of Geophysical Research*, 91, 10271-10287.
- [19] Romick, J.D., Perfit, M.R., Swanson, S.E., Shuster, R.D. 1990. Magmatism in the eastern Aleutian arc: temporal

- characteristic of igneous activity on Akutan island: *Contributions of Mineralogy and Petrology*, 104, 700-721.
- [20] Singer, B.S., Myers, J.D., Frost, C.D. 1992. Mid-Pleistocene lavas from the Seguam volcanic center, Central Aleutian arc: closed-system fractional crystallization of a basalt to rhyodacite eruptive suite: *Contributions of Mineralogy and Petrology*, 110, 87-112.
- [21] Singer, B.S., Myers, J.D., Frost, C.D. 1992. Mid-Pleistocene basalt from the Seguam volcanic center, central Aleutian arc, Alaska: local lithospheric structures and source variability in the Aleutian arc: *Journal of Geophysical Research*, 97, 4561-4578.
- [22] Kay, S.M., Kay, R.W. 1994. Aleutian magmas in space and time, *in*, Plafker, George, and Berg, Henry C., eds., *The geology of Alaska: Boulder, Co., Geological Society of America, The geology of North America, G-1*, 687-722.
- [23] Roobol, M.J., Smith, A.L. 1975. A comparison of the recent eruptions of Mt. Pelée, Martinique and Soufrière, St. Vincent: *Bulletin of Volcanology*, 39, 214-254.
- [24] Arculus, R.J. 1976. Geology and geochemistry of the alkali basalt-andesite association of Grenada, Lesser Antilles island arc: *Geological Society of America Bulletin*, 87, 612-624.
- [25] Brown, G.M., Holland, J.G., Sigudsson, H., Tomblin, J.F., Arculus, R. J. 1977. Geochemistry of the Lesser Antilles volcanic island arc: *Geochimica et Cosmochimica Acta*, 41, 785-801.
- [26] Devine, S.D. 1995. Petrogenesis of the basalt-andesite-dacite association of Grenada, lesser Antilles island arc, revisited: *Journal of Volcanology and Geothermal Research*, 69, 1-33.
- [27] Smith, T.E., Thirlwall, M.F., Macpherson, C. 1996. Trace element and isotopic geochemistry of the volcanic rocks of Bequia, Grenadine Islands, Lesser Antilles arc: a study of subduction enrichment and intra-crustal contamination: *Journal of Petrology*, 37, 117-143.
- [28] Saunders, A.D., Tarney, J., Weaver, S.D. 1980. Transverse geochemical variations across the Antarctic Peninsula: implications for the genesis of calc-alkaline magmas: *Earth and Planetary Science Letters*, 46, 344-360.
- [29] Smellie, J.L. 1983. A geochemical overview of subduction-related igneous activity in the South Shetland Islands, Lesser Antarctica: *Antarctic Earth Science*, x, 352-356.
- [30] Pearce, J.A., Baker, E., Harvey, K., Luff, I.W. 1995. Geochemical evidence for subduction fluxes, mantle melting and fractional crystallization beneath the South Sandwich island arc: *Journal of Petrology*, 36, 1073-1109.
- [31] Esperança, S., Crisci, G.M., De Rosa, R., Mazzuoli, R. 1992. The role of the crust in the magmatic evolution of the island of Lipari (Aeolian Islands, Italy): *Contributions of Mineralogy and Petrology*, 112, 450-462.
- [32] Francalanci, L., Taylor, S.R., McCulloch, M.T., Woodhead, J.D. 1993. Geochemical and isotopic variations in the calc-alkaline rocks of Aeolian arc, southern Tyrrhenian Sea, Italy: constraints on magma genesis: *Contributions of Mineralogy and Petrology*, 113, 300-313.
- [33] Whitford, D.J., Nicholls, I.A., Taylor, S.R. 1979. Spatial variations in the geochemistry of Quaternary lavas across the Sunda arc in Java and Bali: *Contributions of Mineralogy and Petrology*, 70, 341-356.
- [34] Foden, J.D., Varne, R. 1980 The petrology and tectonic setting of Quaternary-Recent volcanic centres of Lombok and Sumbawa, Sunda arc: *Chemical Geology*, 30, 210-226
- [35] Le Roex, A., Eerlank, A.J. 1982. Quantitative evaluation of fractional crystallization in Bouvet Island lavas: *Journal of Volcanology and Geothermal Research*, 13, 309-338.
- [36] Stephenson, D., Marshall, T.R. 1984. The petrology and mineralogy of Mt. Popa volcano and the nature of the late-Cenozoic Burma volcanic arc. *Journal of Geological Society of London*, 141, 747-762.
- [37] Wheller, G E., Varne, R., Foden, J.D., Abbott, M.J. 1987. Geochemistry of Quaternary volcanism in the Sunda-Banda arc, Indonesia, and three-component genesis of island-arc basaltic magmas: *Journal of Volcanology and Geothermal Research*, 32, 137-160.
- [38] Stolz, A.J., Varne, R., Wheller, G.E., Foden, J.D., Abbott, M.J. 1988. The geochemistry and petrogenesis of K-rich alkaline volcanics from the Batu Tara volcano, eastern Sunda arc: *Contributions of Mineralogy and Petrology*, 98, 374-389.
- [39] Tatsumi, Y., Murasaki, M., Arsadi, E.M., Nohda, S. 1991. Geochemistry of Quaternary lavas from NE Sulawesi: transfer of subduction components into the mantle wedge: *Contributions of Mineralogy and Petrology*, 107, 137-149.
- [40] Edwards, C., Menzies, M., Thirlwall, M. 1991. Evidence from Muriah, Indonesia, for the interplay of supra-subduction zone, and intraplate processes in the genesis of potassic alkaline magmas: *Journal of Petrology*, 32, 555-592.
- [41] Edwards, C., Menzies, M., Thirlwall, M.F., Morris, J.D., Leeman, W., Harmon, R.S. 1994. The transition to potassic alkaline volcanism island arcs: the Ringgit-Besser Complex, East Java, Indonesia: *Journal of Petrology*, 35, 1557-1595.
- [42] Bryan, W.B., Stice, G.S., Ewart, A. 1972. Geology, petrography, and geochemistry of the volcanic islands of Tonga: *Journal of Geophysical Research*, 77, 1566-1585.
- [43] Ewart, A., Brothers, R N., Mateen, A. 1977. An outline of the geology and geochemistry, and the possible petro-

- genetic evolution of the volcanic rocks of the Tonga-Kermadec-New Zealand island arc: *Journal of Volcanology and Geothermal Research*, 2, 205-270.
- [44] Barsdell, M. 1988. Petrology and petrogenesis of clinopyroxene-rich tholeiitic lavas, Merelava volcano, Vanuatu: *Journal of Petrology*, 29, 927-964.
- [45] Barsdell, M., y Berry, R. F. 1990. Origin and evolution of primitive island arc ankaramites from western Epi, Vanuatu: *Journal of Petrology*, 31, 747-777.
- [46] Hegner, E., Smith, I.E.M. 1992. Isotopic compositions of late Cenozoic volcanics from Southeast Papua New Guinea; evidence for multi-component sources in arc and rift environment: *Chemical Geology*, 97, 233-249.
- [47] Woodhead, J.D., Johnson, R.W. 1993. Isotopic and trace-element profiles across the New Britain island arc, Papua New Guinea: *Contributions of Mineralogy and Petrology*, 113, 479-491.
- [48] Bau, M., Knittel, U. 1993. Significance of slab-derived partial melts and aqueous fluids for the genesis of tholeiitic and calc-alkaline island-arc basalts: evidence from Mt. Arayat, Philippines: *Chemical Geology*, 105, 233-251.
- [49] Defant, M.J., Jacques, D., Maury, R.C., De Boer, J., Joron, J.L. 1989. Geochemistry and tectonic setting of the Luzon arc, Philippines: *Geological Society of America Bulletin*, 101, 663-672.
- [50] Woodhead, J.D. 1988. The origin of geochemical variations in Mariana lavas: a general model for petrogenesis in intra-oceanic island arcs: *Journal of Petrology*, 29, 805-830.
- [51] Hole, M.J., Saunders, A.D., Marriner, G.F., Tarney, J. 1984. Subduction of pelagic sediments: implications for the origin of Ce-anomalous basalts from the Marianas Islands: *Journal of Geological Society of London*, 141, 453-472.
- [52] Tatsumi, Y., Muraski, M., Nohda, S. 1992. Across-arc variation of lava chemistry in the Izu-Bonin arc: identification of subduction components: *Journal of Volcanology and Geothermal Research*, 49, 179-190.
- [53] Sakuyama, M., Nesbitt, R.W. 1986. Geochemistry of the Quaternary volcanic rocks of the Northeast Japan arc: *Journal of Volcanology and Geothermal Research*, 29, 413-450.
- [54] Nakada, S., Kamata, H. 1991. Temporal change in chemistry of magma source under central Kyushu, southwest Japan: progressive contamination of mantle wedge: *Bulletin of Volcanology*, 53, 182-194.
- [55] Togashi, S., Tanaka, T., Yoshida, T., Ishikawa, K.I., Fujinawa, A., Kurasawa, H. 1992. Trace elements and Nd-Sr isotopes of island arc tholeiites from frontal arc of Northeast Japan: *Geochemical Journal*, 26, 261-277.
- [56] Tamura, Y. 1994. Genesis of island arc magmas by mantle-derived bimodal magmatism: evidence from the Shirahama group, Japan: *Journal of Petrology*, 35, 619-645.
- [57] Singer, B.S., Kudo, A.M. 1986. Assimilation-fractional crystallization of Polvadera Group rocks in the northwestern Jemez volcanic field, New Mexico: *Contributions of Mineralogy and Petrology*, 94, 374-386.
- [58] Johnson, C.M., Lipman, W. 1988. Origin of metaluminous and alkaline volcanic rocks of the Latir volcanic field, northern Rio Grande rift, New Mexico: *Contributions of Mineralogy and Petrology*, 100, 107-128.
- [59] Moyer, T.C., Esperança, S., 1989. Geochemical and isotopic variations in a bimodal magma system: the Kaiser Spring volcanic field, Arizona: *Journal of Geophysical Research*, 94, 7841-7859.
- [60] Lum, C.C.L., Leeman, W., Foland, K.A., Kargel, J.A., Fitton, J.G. 1989. Isotopic variations in continental basaltic lavas as indicators of mantle heterogeneity: examples from the western U.S. Cordillera: *Journal of Geophysical Research*, 94, 7871-7884.
- [61] Perry, F., Baldrige, W.S., De Paolo, D.J., Shafiqullah, M. 1990. Evolution of a magmatic system during continental extension: the Mount Taylor volcanic field, New Mexico: *Journal of Geophysical Research*, 95, 19,327-19,348.
- [62] Price, R.C., Johnson, R.W., Gray, C.M., Frey, F.A. 1985. Geochemistry of phonolites and trachytes from the summit region of Mt. Kenya: *Contributions of Mineralogy and Petrology*, 89, 394-409.
- [63] Duncker, K.E., Wolff, J.A., Harmon, R.S., Leat, T., Dickin, A., Thompson, R.N. 1991. Diverse mantle and crustal components in lavas of the NW Cerros del Rio volcanic field, Rio Grande Rift, New Mexico: *Contributions of Mineralogy and Petrology*, 108, 331-345.
- [64] Wittke, J.H., Mack, L.E. 1993. OIB-like mantle source for continental alkaline rocks of the Balcones Province: trace-element and isotopic evidence: *Journal of Geology*, 101, 333-344.
- [65] Luhr, J.F., Aranda-Gómez, J.J., Housh, T.B. 1995. San Quintín Volcanic Field, Baja California Norte, México: geology, petrology and geochemistry: *Journal of Geophysical Research*, 100, 10353-10380.
- [66] Chauvel, C., Jahn, B.M. 1984. Nd-Sr isotope and REE geochemistry of alkali basalts from the Massif Central, France: *Geochimica et Cosmochimica Acta*, 48, 93-110.
- [67] Déruelle, B., Moreau, C., Nkoubou, C., Kambou, R., Lissom, J., Njonfang, E., Ghogomu, R.T., Nono, A. 1991. The Cameroon Line; a review, *in*, Kampunzu, A.B., and Lubala, R. T., eds., *Magmatism in extensional structural settings*: Berlin, Springer-Verlag, p. 275-327
- [68] Lee, D.C., Halliday, A.N., Fitton, J.G., Poli, G. 1994. Isotopic variations with distance and time in the volcanic islands of the Cameroon line: evidence for a mantle plume origin: *Earth and Planetary Science Letters*, 123,

- 119-138.
- [69] Barberi, F., Ferrara, G., Santacroce, R., Treuil, M., Varet, J. 1975. A transitional basalt -pantellerite sequence of fractional crystallization, the Boina Centre (Afar rift, Ethiopia): *Journal of Petrology*, 16, 22-56.
- [70] Hart, W.K., Wolde, G., Walter, R.C., Mertzman, S.A. 1989. Basaltic volcanism in Ethiopia: constraints on continental rifting and mantle interactions: *Journal of Geophysical Research*, 94, 7731-7748.
- [71] Aoki, K.I., Yoshida, T., Yusa, K., Nakamura, Y. 1985. Petrology and geochemistry of the Nyamuragira volcano, Zaire: *Journal of Volcanology and Geothermal Research*, 25, 1-28.
- [72] Auchapt, A., Dupuy, C., Dostal, J., Kanika, M. 1987. Geochemistry and petrogenesis of rift-related volcanic rocks from South Kivu (Zaire): *Journal of Volcanology and Geothermal Research*, 31, 33-46.
- [73] Davidson, J., Wilson, I.R. 1989. Evolution of an alkali basalt-trachyte suite from Jebel Marra volcano, Sudan, through assimilation and fractional crystallization: *Earth and Planetary Science Letters*, 95, 141-160.
- [74] De Mulder, M., Hertogen, J., Deutsch, S., André, L. 1986. The role of crustal contamination in the potassic suite of the Karisimbi volcano (Virunga, African, Rift Valley): *Chemical Geology*, 57, 117-136.
- [75] Class, C., Altherr, R., Volker, F., Eberz, G., Mcculloch, M.T. 1994. Geochemistry of Pliocene to Quaternary alkali basalts from the Huri Hills, northern Kenya: *Chemical Geology*, 113, 1-22.
- [76] Deniel, C., Vidal, C., Coulon, C., Vellutini, P., Piguet, J. 1994. Temporal evolution of mantle sources during continental rifting: the volcanism of Djibouti (Afar): *Journal of Geophysical Research*, 99, 2853-2869.
- [77] Camp, E., Roobol, M.J., Hooper, R. 1991. The Arabian continental alkali basalt province; Part II. Evolution of Harrats Khaybar, Ithnayn, and Kura, Kingdom of Saudi Arabia: *Geological Society of America Bulletin*, 103, 363-391.
- [78] Peng, Z.C., Zartman, R.E., Futa, K., Chen, D.G. 1986. Pb-, Sr-, Nd-isotopic systematics, chemical characteristics of Cenozoic basalts, eastern China: *Chemical Geology*, 59, 3-33.
- [79] Fan, Q., Hooper, R. 1991. The Cenozoic basaltic rocks of Eastern China. Petrology and chemical composition: *Journal of Petrology*, 32, 765-810.
- [80] Liu, C.Q., Masuda, A., Xie, G.H. 1992. Isotope and trace-element geochemistry of alkali basalts and associated megacrysts from the Huangyishan volcano, Kuandian, Liaoning, NE China: *Chemical Geology*, 97, 219-231.
- [81] Liu, C.Q., Masuda, A., y Xie, G.H. 1994. Major- and trace-element compositions of Cenozoic basalts in eastern China: petrogenesis and mantle source: *Chemical Geology*, 114, 19-42.
- [82] Chung, S.L., Sun, S.S., Tu, K., Chen, C.H., Lee, C.Y. 1994. Late Cenozoic basaltic volcanism around the Taiwan Strait, SE China: product of lithosphere-asthenosphere interaction during continental extension: *Chemical Geology*, 112, 1-20.
- [83] Zhang, M., Suddaby, Thompson, R., Thirwall, M. F., Menzies, M. A. 1995. Potassic volcanic rocks in NE China. Geochemical constraints on mantle source and magma genesis: *Journal of Petrology*, 36, 1275-1303.
- [84] Feigenson, M.D. 1984. Geochemistry of Kauai volcanics and a mixing model for the origin of Hawaiian alkali basalts: *Contributions of Mineralogy and Petrology*, 87, 109-119.
- [85] Chen, C.Y., Frey, F.A., García, M.O. 1990. Evolution of alkalic lavas at Haleakala volcano, east Maui, Hawaii: *Contributions of Mineralogy and Petrology*, 105, 197-218.
- [86] Lipman, W., Rhodes, R.M., Dalrymple, G.B. 1990. The Ninole basalt - implications for the structural evolution of Mauna Loa volcano, Hawaii: *Bulletin of Volcanology*, 53, 1-19.
- [87] Chen, C.Y., Frey, F.A., García, M.O., Dalrymple, G.B., Hart, S.R. 1991. The tholeiitic to alkalic basalt transition at Haleakala Volcano, Maui, Hawaii: *Contributions of Mineralogy and Petrology*, 106, 183-200.
- [88] García, M.O., Rhodes, J.M., Wolfe, E.W., Ulrich, G.E., 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*, 55, 1-16.
- [89] MaalØe, S., James, D., Smedley, , Petersen, S., Germann, L.B. 1992. The Koloa volcanic suite of Kauai, Hawaii: *Journal of Petrology*, 33, 761-784.
- [90] West, H.B., García, M.O., Gerlach, D.C., Romero, J. 1992. Geochemistry of tholeiites from Lanai, Hawaii: *Contributions of Mineralogy and Petrology*, 112, 520-542.
- [91] Frey, F.A., García, M.O., Roden, M.F. 1994. Geochemical characteristics of Koolau volcano: implications of innershield geochemical differences among Hawaiian volcanoes: *Geochimica et Cosmochimica Acta*, 58, 1441-1462.
- [92] West, H.B., Leeman, W. 1994. The open system geochemical evolution of alkalic cap lavas from Haleakala crater, Hawaii, USA: *Geochimica et Cosmochimica Acta*, 58, 773-796.
- [93] Liotard, J.M., Barszczus, H.G., Dupuy, C., Dostal, J. 1986. Geochemistry and origin of basaltic lavas from Marquesas Archipelago, French Polynesia: *Contributions of Mineralogy and Petrology*, 92, 260-268.
- [94] Geist, D.J., McBirney, A.R., Duncan, R.A. 1986. Geology and petrogenesis of lavas from San Cristobal Islands, Galapagos Archipelago: *Geological Society of America Bulletin*, 97, 555-566.

- [95] Dupuy, C., Barszczus, H.G., Liotard, J.M., Dostal, J. 1988. Trace element evidence for the origin of ocean island basalts: an example from the Austral Islands (French Polynesia): *Contributions of Mineralogy and Petrology*, 98, 293-302.
- [96] Dupuy, C., Barszczus, H.G., Dostal, J., Vidal, Liotard, J.M. 1989. Subducted and recycled lithosphere as the mantle source of ocean island basalts from southern Polynesia, central Pacific: *Chemical Geology*, 77, 1-18.
- [97] Cheng, Q.C., Macdougall, J.D., Lugmair, G.W. 1993. Geochemical studies of Tahiti, Teahitia and Mahetia, Society island chain: *Journal of Volcanology and Geothermal Research*, 55, 155-184.
- [98] Hémond, C., Devey, C.W., 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*, 115, 7-45.
- [99] Weaver, B.L., Wood, D.A., Tarney, J., Joron, J.L. 1987. Geochemistry of ocean island basalts from the South Atlantic: Ascension, Bouvet, St. Helena, Gough and Tristan da Cunha, in Fitton, J.G., and Upton, B. G. J., eds., *Alkaline igneous rocks*: Oxford, Geological Society; Blackwell Science, p. 253-267.
- [100] Storey, M., Saunders, A.D., Tarney, J., Leat, , Thirwall, M.F., Thompson, R.N., Menzies, M.A., Marriner, G.F. 1988. Geochemical evidence for plume-mantle interactions beneath Kerguelen and Heard islands, Indian Ocean: *Nature*, 336, 371-374.
- [101] Weis, D., Frey, F.A., Leyrit, H., Gautier, I. 1993. Kerguelen Archipelago revisited: geochemical and isotopic study of the Southeast Province lavas: *Earth and Planetary Science Letters*, 118, 101-119.
- [102] Barling, J., Goldstein, S.L., 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*, 35, 1017-1053.
- [103] Palacz, Z.A., Saunders, A.D. 1986. Coupled trace element and isotope enrichment in the Cook-Austral-Samoa islands, Southwest Pacific: *Earth and Planetary Science Letters*, 79, 270-280.
- [104] Michael, J., Chase, R.L., Allan, J.F. 1989. Petrologic and geologic variations along the southern explorer ridge, northeast Pacific Ocean. *Journal of Geophysical Research*, 94, 895-918.
- [105] Kay, R., Hubbard, N.J., Gast, W. 1970. Chemical characteristics and origin of oceanic ridge volcanic rocks: *Journal of Geophysical Research*, 75, 1585-1613.
- [106] Lonsdale, Blum, N., Puchelt, H. 1992. The RRR triple junction at the southern end of the Pacific-Cocos East Pacific Rise: *Earth and Planetary Science Letters*, 109, 73-85.
- [107] Bach, W., Hegner, E., Erzinger, J., Satir, M. 1994. Chemical and isotopic variations along the superfast spreading East Pacific Rise from 6 to 30°S: *Contributions of Mineralogy and Petrology*, 16: 365-380.
- [108] Hekinian, R., Francheteau, J., Armijo, R., Cogné, J., Constantine, M., Girardeau, J., Hey, R., Naar, D.F., Searle, R. 1996. Petrology of the Easter microplate region in the South Pacific: *Journal of Volcanology and Geothermal Research*, 72, 259-289.
- [109] Bach, W., Erzinger, J., Dosso, L., Bollinger, C., Bougault, H., Etoubleau, J., Sauerwein, J. 1996. Unusually large Nb-Tb depletions in North Chile ridge basalts at 36°50' to 38°56'S; major element, trace element, and isotopic data: *Earth and Planetary Science Letters*, 142, 223-240.
- [110] Hasse, J.M., Devey, C.W., Mertz, D.F., Stoffers, P., Garbe-Schönberg, D. 1996. Geochemistry of lavas from Mohns ridge, Norwegian-Greenland sea: implications for melting conditions and magma sources near Jan Mayen: *Contributions of Mineralogy and Petrology*, 123, 223-237.
- [111] Schilling, J.G., Zajac, M., Evans, R., Johnston, T., White, W., Devine, J.D., Kingsley, R. 1983. Petrologic and geochemical variations along the Mid-Atlantic Ridge from 29°N to 73°N: *American Journal of Science*, 283, 510-586.
- [112] Bryan, W.B., Thompson, G., Ludden, J.N. 1981. Compositional variation in normal MORB from 22°-25°N: Mid-Atlantic Ridge and Kane fracture zone: *Journal of Geophysical Research*, 86, 815-836.
- [113] Dosso, L., Bougault, H., Joron, J.L. 1993. Geochemical morphology of the North Mid-Atlantic Ridge, 10°-24°N: Trace element-isotope complementary. *Earth and Planetary Science Letters*, 120, 443-462.
- [114] Dosso, L., Hanan, B.B., Bougault, H., Schilling, J.G., Joron, J.-L. 1991. Sr-Nd-Pb geochemical morphology between 10° and 17°N on the Mid-Atlantic Ridge: a new MORB isotope signature: *Earth and Planetary Science Letters*, 106: 29-43.
- [115] Bougault, H., Dmitriev, L., Schilling, J.G., Sobolev, A., Joron, J.L., Needham, H. D. 1988. Mantle heterogeneity from trace elements: MAR triple junction near 14°N: *Earth and Planetary Science Letters*, 88, 27-36.
- [116] Le Roex, A., Dick, H. J.B., Gulen, L., Reid, A.M., Erlank, A.J. 1987. Local and regional heterogeneity in MORB from the Mid-Atlantic Ridge between 54.5°S and 51°S: evidence for geochemical enrichment: *Geochimica et Cosmochimica Acta*, 51, 541-555.
- [117] Le Roex, A.P., Dick, H.J.B. 1981. Petrography and geochemistry of basaltic rocks from the Conrad Fracture zone on the America-Antarctica Ridge: *Earth and Planetary Science Letters*, 54, 117-138.

- [118] Humler, E., Whitechurch, H. 1988. Petrology of basalts from the Central Indian Ridge (lat. 25°23'S, long. 70° 04'E); estimates of frequencies and fractional volumes of magma injections in a two-layered reservoir: *Earth and Planetary Science Letters*, 88, 169-181.
- [119] Price, R.C., Kennedy, A.K., Riggs-Sneeringer, M., Frey, F.A. 1986. Geochemistry of basalts from the Indian Ocean triple junction; implications for the generation and evolution of Indian Ocean ridge basalts: *Earth and Planetary Science Letters*, 78, 379-396.
- [120] Mahoney, J., Le Roex, A., Peng, Z., Fisher, R.L., Natland, J.H. 1992. Southwestern limits of Indian Ocean Ridge mantle and the origin of low <sup>206</sup>Pb/<sup>204</sup>Pb Mid-Ocean Ridge basalt: isotope systematics of the central southwest Indian Ridge (17°-50°E): *Journal of Geophysical Research*, 97, 771-790.
- [121] Dosso, L., Bougault, H., Beuzart, , Calvez, J.Y., Joron, J.L. 1988. The geochemical structure of the South-East Indian Ridge: *Earth and Planetary Science Letters*, 88, 47-59.

### Base de datos para la Aplicación y Validación (Tabla 2)

- [122] Marsh, N.G., Saunders, A.D., Tarney, J., Dick, H.J.B. 1980. Geochemistry of basalts from the Shikoku and Daito basins, Deep Sea Drilling Project Leg 58: Initial Reports of the Deep Sea Drilling. Project, 58, 805-842.
- [123] Saunders, A.D., Fornari, D.J., Joron, J.L., Tarney, J., Treuil, M. 1982. Geochemistry of basic igneous rocks, Gulf of California, Deep Sea Drilling Project Leg 64: Initial Reports of the Deep Sea Drilling. Project, 64, 595-642.
- [124] Flower, M.F.J., Pritchard, R.G., Shmincke, H.U., Robinson, T. 1983. Geochemistry of basalts; Deep Sea Drilling Project Sites 482, 483, and 485 near the Tamayo fracture zone, Gulf of California: Initial Reports of the Deep Sea Drilling. Project, 65, 559-578.
- [125] Shibata, T., Delong, S E., Lyman, P., 1981, Petrographic and chemical characteristics of abyssal tholeiites from Deep Sea Drilling Project Leg 63 off Baja California: Initial Reports of the Deep Sea Drilling. Project, 63, 687-694.
- [126] Pearce, J.A., Rogers, N., Tindle., A.J., Watson, J.S. 1985. Geochemistry and petrogenesis of basalts from Deep Sea Drilling Project Leg 92, Eastern Pacific: Initial Reports of the Deep Sea Drilling. Project, 92, 435-457.
- [127] Rhodes, J.M., Blanchard, D., Rodgers, K., Jacobs, J.W., Brannon, J.C. 1976. Petrology and chemistry of basalts from the Nazca Plate, Part 2. Major and trace element chemistry: Initial Reports of the Deep Sea Drilling. Project, 34, 447-459.
- [128] Weaver, B.I., Tarney, J., Saunders, A. D. 1983. Geochemistry and mineralogy of basalts recovered from the central North-Atlantic. Initial Reports of the Deep Sea Drilling Project, 82, 395-419.
- [129] Dietrich, S., Carman, J.M.F., y Mckee, E.H. 1984. Geochemistry of basalts from Holes 519A, 520, 522B, and 524, Deep Sea Drilling Project Leg 73 (South Atlantic): Initial Reports of the Deep Sea Drilling. Project, 73, 579-601.
- [130] Shinjo, R. 1998. Petrochemistry and tectonic significance of the emerged late Cenozoic basalts behind the Okinawa Trough - Ryukyu arc system: *Journal of Volcanology and Geothermal Research*, 61, 171-192.
- [131] Dupuy, C., Dostal, J., Marcelot, G., Bougault, H., Joron, J.-L., Treuil, M. 1982. Geochemistry of basalts from central and southern New Hebrides arc; implication for their source rock composition: *Earth and Planetary Science Letters*, 60, 207-225.
- [132] Dautria, J.M., Girod, M.M. 1991. Relationships between Cainozoic magmatism and upper mantle heterogeneties and exemplified by the Hoggar volcanic area (Central Sahara, Southern Algeria), *in*, Kampunzu, A. B., and Lubala, R. T., eds., *Magmatism in extensional structural settings*: Berlin, Springer-Verlag, p. 250-268.
- [133] Weinstein, Y., Navon, O., Lang, B. 1994. Fractionation of Pleistocene alkali-basalts from the northern Golan Heights, Israel: *Israel Journal of Earth Sciences*, 43, 63-79.
- [134] Price, R.C., Gray, C.M., Frey, F.A., 1997, Strontium isotopic and trace element heterogeneity in the plains basalts of the Newer Volcanic Province, Victoria, Australia: *Geochimica et Cosmochimica Acta*, 61, 171-192.
- [135] Buket, E., Temel, A. 1998. Major-element, and Sr-Nd isotopic geochemistry and genesis of Varto (Mu°) volcanic rocks, eastern Turkey: *Journal of Volcanology and Geothermal Research*, 85, 405-422.
- [136] Verma, S. 2000. Geochemistry of subducting Cocos plate and the origin of subduction-unrelated mafic volcanism at the volcanic front of the central Mexican Volcanic Belt, *in*, Delgado Granados, Hugo; Aguirre-Diaz, Gerardo J., and Stock, Joann M. , eds. *Cenozoic tectonics and volcanism of Mexico*: Boulder, Co., Geological Society of America, Special Paper, 334, 195-222.
- [137] Nelson, S.A., Carmichael, I.S.E. 1984. Pleistocene to recent alkalic volcanism in the region of Sanganguey volcano, Nayarit, Mexico: *Contributions of Mineralogy and Petrology*, 85, 321-335.
- [138] Luhr, J.F., Carmichael, I.S.E. 1982. The Colima volcanic complex, Mexico: III ash- and scoria-fall deposits from the upper slopes of Volcan Colima: *Contributions of Mineralogy and Petrology*, 80, 262-275.