**Appendix Table DR1:** $^{40}Ar/^{39}Ar$ analysis data from fresh basaltic glasses and pillow interiors from the Nicoya Peninsula, Costa Rica.

| Sample No | Mass (mg) | $^{39}Ar/^{40}Ar_m$ | ± | 1σ | $^{36}Ar/^{40}Ar_m$ | ± | 1σ |
|---|---|---|---|---|---|---|---|
| **AN3 basalt glass (SPA)** | | | | | | | |
| AN3-60 | 0.090 | 7.421E-03 | ± | 2.3E-04 | 1.352E-03 | ± | 1.1E-04 |
| AN3-62 | 0.176 | 6.268E-03 | ± | 8.2E-05 | 1.719E-03 | ± | 4.4E-05 |
| AN3-63 | 0.239 | 4.184E-03 | ± | 4.2E-05 | 2.274E-03 | ± | 3.4E-05 |
| AN3-64 | 0.227 | 4.241E-03 | ± | 4.2E-05 | 2.269E-03 | ± | 2.9E-05 |
| AN3-65 | 0.330 | 2.847E-03 | ± | 1.7E-05 | 2.594E-03 | ± | 1.7E-05 |
| AN3-66 | 0.366 | 5.852E-03 | ± | 4.3E-05 | 1.840E-03 | ± | 2.0E-05 |
| AN3-67 | 0.392 | 8.642E-03 | ± | 7.2E-05 | 1.117E-03 | ± | 3.5E-05 |
| AN3-68 | 0.685 | 7.448E-03 | ± | 3.7E-05 | 1.430E-03 | ± | 2.0E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.305E-02 | ± | 1.5E-04 | | | |
| Isochron age (Ma) | | 132.9 | ± | 1.5 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 300.4 | ± | 2.4 | MSWD | = | 0.3 |
| **AN8 basalt glass (SPA)** | | | | | | | |
| AN8-39 | 0.044 | 7.201E-03 | ± | 2.4E-04 | 1.376E-03 | ± | 1.8E-04 |
| AN8-40 | 0.136 | 8.276E-03 | ± | 1.2E-04 | 1.180E-03 | ± | 5.2E-05 |
| AN8-41 | 0.143 | 1.652E-03 | ± | 1.2E-05 | 2.919E-03 | ± | 2.2E-05 |
| AN8-42 | 0.201 | 3.408E-03 | ± | 2.5E-05 | 2.447E-03 | ± | 2.3E-05 |
| AN8-43 | 0.230 | 8.575E-03 | ± | 9.5E-05 | 9.755E-04 | ± | 5.5E-05 |
| AN8-44 | 0.288 | 6.364E-03 | ± | 6.4E-05 | 1.634E-03 | ± | 3.0E-05 |
| AN8-45 | 0.369 | 9.344E-03 | ± | 8.7E-05 | 7.983E-04 | ± | 2.9E-05 |
| AN8-46 | 0.552 | 8.589E-03 | ± | 3.7E-05 | 1.065E-03 | ± | 1.9E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.245E-02 | ± | 9.1E-05 | | | |
| Isochron age (Ma) | | 139.1 | ± | 1.1 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 296.9 | ± | 2.1 | MSWD | = | 1.05 |
| **AN10 basalt glass (SPA)** | | | | | | | |
| AN10-75 | 0.060 | 1.070E-03 | ± | 2.9E-05 | 3.067E-03 | ± | 2.6E-05 |
| AN10-76 | 0.107 | 7.043E-03 | ± | 1.4E-04 | 1.472E-03 | ± | 7.8E-05 |
| AN10-77 | 0.228 | 8.689E-03 | ± | 1.3E-04 | 1.101E-03 | ± | 5.1E-05 |
| AN10-78 | 0.220 | 6.823E-03 | ± | 1.9E-04 | 1.565E-03 | ± | 7.7E-05 |
| AN10-79 | 0.361 | 9.240E-03 | ± | 8.0E-05 | 8.476E-04 | ± | 3.3E-05 |
| AN10-80 | 0.415 | 1.686E-03 | ± | 9.7E-06 | 2.901E-03 | ± | 1.0E-05 |
| AN10-81 | 0.881 | 3.838E-03 | ± | 1.5E-05 | 2.336E-03 | ± | 1.2E-05 |
| AN10-82 | 0.253 | 2.112E-03 | ± | 8.2E-06 | 2.737E-03 | ± | 1.7E-05 |
| AN10-84 | 0.287 | 3.315E-03 | ± | 2.8E-05 | 2.458E-03 | ± | 1.2E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.258E-02 | ± | 1.3E-04 | | | |
| Isochron age (Ma) | | 137.6 | ± | 1.8 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 299.3 | ± | 1.4 | MSWD | = | 1.68 |

**Appendix Table DR1:** $^{40}Ar/^{39}Ar$ analysis data from fresh basaltic glasses and pillow interiors from the Nicoya Peninsula, Costa Rica.

| Sample No | Mass (mg) | $^{39}Ar/^{40}Ar_m$ | ± | 1σ | $^{36}Ar/^{40}Ar_m$ | ± | 1σ |
|---|---|---|---|---|---|---|---|
| **AN34 basalt glass (SPA)** | | | | | | | |
| AN34-1 | 0.508 | 4.506E-03 | ± | 2.9E-05 | 2.274E-03 | ± | 2.0E-05 |
| AN34-2 | 0.077 | 1.262E-02 | ± | 9.9E-04 | 2.189E-04 | ± | 4.5E-04 |
| AN34-3 | 0.214 | 1.102E-03 | ± | 1.3E-05 | 3.072E-03 | ± | 1.5E-05 |
| AN34-4 | 0.122 | 1.195E-02 | ± | 4.2E-04 | 7.175E-04 | ± | 1.8E-04 |
| AN34-5 | 0.172 | 3.875E-03 | ± | 6.7E-05 | 2.432E-03 | ± | 6.0E-05 |
| AN34-6 | 0.503 | 5.086E-03 | ± | 2.8E-05 | 2.202E-03 | ± | 1.9E-05 |
| AN34-7 | 0.355 | 1.031E-02 | ± | 1.2E-04 | 9.717E-04 | ± | 4.9E-05 |
| AN34-8 | 0.664 | 8.855E-03 | ± | 5.6E-05 | 1.290E-03 | ± | 2.4E-05 |
| AN34-9 | 0.297 | 9.713E-03 | ± | 1.1E-04 | 1.088E-03 | ± | 4.1E-05 |
| AN34-10 | 0.349 | 3.285E-03 | ± | 3.0E-05 | 2.560E-03 | ± | 2.9E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.454E-02 | ± | 1.3E-04 | | | |
| Isochron age (Ma) | | 119.4 | ± | 1.1 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 300.6 | ± | 1.4 | MSWD | = | 0.85 |
| **AN40 basalt glass (SPA)** | | | | | | | |
| AN40-22 | 0.105 | 6.220E-03 | ± | 2.0E-04 | 1.903E-03 | ± | 8.4E-05 |
| AN40-24 | 0.255 | 3.043E-03 | ± | 3.1E-05 | 2.735E-03 | ± | 2.4E-05 |
| AN40-25 | 0.227 | 5.287E-03 | ± | 5.4E-05 | 2.208E-03 | ± | 3.5E-05 |
| AN40-26$^{(-)}$ | 0.314 | 5.828E-03 | ± | 4.2E-05 | 2.220E-03 | ± | 3.1E-05 |
| AN40-27 | 0.418 | 9.313E-03 | ± | 1.2E-04 | 1.298E-03 | ± | 3.6E-05 |
| AN40-28 | 0.605 | 1.802E-03 | ± | 9.6E-06 | 2.999E-03 | ± | 7.0E-06 |
| AN40-29 | 0.589 | 2.416E-03 | ± | 1.0E-05 | 2.863E-03 | ± | 1.2E-05 |
| AN40-30 | 0.367 | 6.923E-03 | ± | 7.0E-05 | 1.747E-03 | ± | 2.7E-05 |
| AN40-31 | 0.265 | 5.972E-03 | ± | 7.7E-05 | 2.060E-03 | ± | 3.2E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.511E-02 | ± | 1.7E-04 | | | |
| Isochron age (Ma) | | 118.2 | ± | 1.8 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 292.3 | ± | 1.1 | MSWD | = | 1.55 |
| **BN22 basalt matrix (SPA)** | | | | | | | |
| BN22-116 | 0.191 | 3.827E-03 | ± | 5.2E-05 | 2.719E-03 | ± | 3.7E-05 |
| BN22-142 | 0.176 | 3.228E-03 | ± | 6.1E-05 | 2.737E-03 | ± | 7.9E-05 |
| BN22-143 | 0.213 | 8.853E-03 | ± | 9.0E-05 | 1.543E-03 | ± | 4.2E-05 |
| BN22-144 | 0.128 | 8.499E-03 | ± | 1.4E-04 | 1.471E-03 | ± | 6.3E-05 |
| BN22-145 | 0.215 | 4.759E-03 | ± | 5.9E-05 | 2.485E-03 | ± | 5.6E-05 |
| BN22-150 | 0.676 | 1.026E-02 | ± | 2.9E-05 | 1.196E-03 | ± | 6.1E-06 |
| BN22-151 | 0.909 | 8.135E-03 | ± | 2.3E-05 | 1.663E-03 | ± | 1.6E-05 |
| BN22-11 | 0.073 | 3.999E-03 | ± | 5.8E-05 | 2.629E-03 | ± | 4.6E-05 |
| BN22-12 | 0.179 | 1.590E-03 | ± | 1.1E-04 | 3.132E-03 | ± | 1.3E-04 |
| BN22-13 | 0.389 | 1.676E-03 | ± | 1.1E-05 | 3.032E-03 | ± | 1.5E-05 |
| BN22-14 | 0.145 | 1.459E-03 | ± | 2.4E-05 | 3.137E-03 | ± | 3.5E-05 |
| BN22-15 | 0.463 | 1.462E-03 | ± | 6.9E-06 | 3.091E-03 | ± | 1.4E-05 |
| $^{39}Ar_K/^{40}Ar^*$ | | 1.581E-02 | ± | 6.2E-05 | | | |
| Isochron age (Ma) | | 110.6 | ± | 0.9 | | | |
| Initial $^{40}Ar/^{36}Ar$ | | 292.7 | ± | 1.6 | MSWD | = | 2.67 |

**Appendix Table DR1:** $^{40}Ar/^{39}Ar$ analysis data from fresh basaltic glasses and pillow interiors from the Nicoya Peninsula, Costa Rica.

| Sample No<br>Laser power (W) | 39Ar<br>fraction | $^{39}Ar/^{40}Ar_m$ | ± | 1σ | $^{36}Ar/^{40}Ar_m$ | ± | 1σ |
|---|---|---|---|---|---|---|---|
| **AN34 basalt glass (IHA)** | | | | | | | |
| 0.15 | 0.004 | 2.49E-05 | ± | 3.09E-06 | 3.38E-03 | ± | 1.24E-05 |
| 0.25 | 0.015 | 5.65E-05 | ± | 2.35E-06 | 3.34E-03 | ± | 1.10E-05 |
| 0.4 | 0.039 | 5.48E-05 | ± | 1.36E-06 | 3.33E-03 | ± | 1.30E-05 |
| 0.5 | 0.042 | 7.51E-05 | ± | 1.08E-05 | 3.24E-03 | ± | 2.52E-05 |
| 0.6 | 0.078 | 9.33E-05 | ± | 1.03E-06 | 3.32E-03 | ± | 1.39E-05 |
| 0.7 | 0.124 | 1.61E-04 | ± | 2.68E-06 | 3.30E-03 | ± | 1.39E-05 |
| 0.8 | 0.176 | 2.09E-04 | ± | 3.10E-06 | 3.28E-03 | ± | 9.59E-06 |
| 0.9 | 0.224 | 3.27E-04 | ± | 4.55E-06 | 3.30E-03 | ± | 1.71E-05 |
| 1.0 | 0.285 | 5.03E-04 | ± | 4.71E-06 | 3.23E-03 | ± | 2.11E-05 |
| 1.1 | 0.340 | 6.09E-04 | ± | 7.46E-06 | 3.24E-03 | ± | 1.53E-05 |
| 1.2 | 0.423 | 7.58E-04 | ± | 7.83E-06 | 3.21E-03 | ± | 1.56E-05 |
| 1.35 | 0.512 | 7.79E-04 | ± | 8.26E-06 | 3.26E-03 | ± | 2.87E-05 |
| 1.5 | 0.591 | 7.16E-04 | ± | 5.87E-06 | 3.26E-03 | ± | 1.82E-05 |
| 2 | 0.711 | 1.01E-03 | ± | 5.67E-06 | 3.15E-03 | ± | 2.11E-05 |
| 3 | 0.811 | 6.65E-04 | ± | 5.22E-06 | 3.22E-03 | ± | 1.45E-05 |
| 5 | 0.912 | 6.97E-04 | ± | 4.22E-06 | 3.19E-03 | ± | 1.44E-05 |
| 10 | 0.996 | 1.57E-03 | ± | 1.17E-05 | 3.05E-03 | ± | 2.77E-05 |
| 20 | 0.998 | 7.94E-04 | ± | 1.06E-04 | 2.76E-03 | ± | 2.41E-04 |
| 25 | 0.999 | 5.06E-04 | ± | 9.03E-05 | 2.53E-03 | ± | 3.72E-04 |
| 25(f) | 1.000 | 1.24E-03 | ± | 4.66E-04 | 1.26E-03 | ± | 8.76E-04 |
| Plateau steps | | 0.9-3 W | | | | | |
| Plateau 39Ar fraction | | 64% | | | | | |
| Plateau age | | 118 | ± | 5 Ma | MSWD | = | 1.6 |
| **AN10 basalt glass (IHA)** | | | | | | | |
| 0.15 | 0.008 | 6.63E-05 | ± | 3.02E-06 | 3.36E-03 | ± | 1.85E-05 |
| 0.25 | 0.027 | 1.93E-04 | ± | 3.06E-06 | 3.37E-03 | ± | 2.29E-05 |
| 0.4 | 0.081 | 3.01E-04 | ± | 1.33E-06 | 3.32E-03 | ± | 9.12E-06 |
| 0.5 | 0.158 | 5.81E-04 | ± | 2.71E-06 | 3.22E-03 | ± | 9.22E-06 |
| 0.6 | 0.246 | 9.39E-04 | ± | 5.84E-06 | 3.11E-03 | ± | 2.41E-05 |
| 0.7 | 0.327 | 1.13E-03 | ± | 5.42E-06 | 3.08E-03 | ± | 1.83E-05 |
| 0.8 | 0.402 | 1.36E-03 | ± | 7.83E-06 | 3.03E-03 | ± | 2.43E-05 |
| 0.9(-) | 0.474 | 1.33E-03 | ± | 9.95E-06 | 2.95E-03 | ± | 2.02E-05 |
| 1.0 | 0.545 | 1.43E-03 | ± | 7.89E-06 | 2.99E-03 | ± | 2.11E-05 |
| 1.1 | 0.608 | 1.73E-03 | ± | 1.47E-05 | 2.95E-03 | ± | 1.71E-05 |
| 1.2 | 0.664 | 1.89E-03 | ± | 1.76E-05 | 2.83E-03 | ± | 2.50E-05 |
| 1.35(-) | 0.722 | 2.05E-03 | ± | 1.82E-05 | 2.92E-03 | ± | 3.33E-05 |
| 1.5 | 0.780 | 2.17E-03 | ± | 1.86E-05 | 2.80E-03 | ± | 2.13E-05 |
| 2 | 0.852 | 1.75E-03 | ± | 1.47E-05 | 2.97E-03 | ± | 1.85E-05 |
| 3 | 0.914 | 1.61E-03 | ± | 1.23E-05 | 2.95E-03 | ± | 2.40E-05 |
| 5 | 0.953 | 2.38E-03 | ± | 3.18E-05 | 2.78E-03 | ± | 6.27E-05 |
| 10 | 0.996 | 2.19E-03 | ± | 2.47E-05 | 2.74E-03 | ± | 4.62E-05 |
| 20 | 1.000 | 2.21E-03 | ± | 2.16E-04 | 2.91E-03 | ± | 3.76E-04 |
| 25 | 1.000 | -2.89E-03 | ± | 6.26E-03 | -1.09E-02 | ± | 3.03E-02 |
| 25(f) | 1.000 | -5.93E-03 | ± | 1.76E-02 | 9.26E-03 | ± | 2.23E-02 |
| Plateau steps | | 0.4-25 W | | | | | |
| Plateau 39Ar fraction | | 79% | | | | | |
| Plateau age | | 137 | ± | 2 Ma | MSWD | = | 1.7 |

**Table Captions Appendix DR1:** Single-particle total fusion (SPA) and incremental heating (IHA) $^{39}Ar/^{40}Ar$ analysis data. Irradiations at the GKSS Research Center (Geesthacht, FRG). $^{39}Ar/^{40}Ar$ analyses at IFM-GEOMAR (MAP-216 mass spectrometer / 25W Spectra Physics Ar-ion laser). Irradiation monitor = Taylor Creek Rhyolite Sanidine (TCs = 27.92 Ma from Duffield and Dalrymple, 1990). Fully automated analysis series. Ar isotope ratios are corrected for mass discrimination, contributions from system blanks, and interfering neutron reactions on Ca and K. $^{39}Ar/^{40}Ar_m$ ratios scaled to J = 1.0E-03 (measured J = 1.04E-3 ± 3E-6). Isochrons are least-squares-fitted with correlated errors (York, 1969). MSWD = Mean Square Weighted Deviates (Sum of Squares / N-2). Missing numbers reflect failed total fusion experiments (partial fusions, jumped mineral grains, mass 40 signal beyond linear amplifier range) not considered. $^{(-)}$ Analysis excluded from isochron or plateau calculation because of excess scatter. $^{(f)}$ Final fusion with focused laser beam.

Additional CLIP age data sources used in Fig. 2C are Alvarado et al. (1997); Christie et al., 1992; Hauff et al. (2000a); Hoernle et al. (2002); Kerr et al. (1997, 2002); Lapierre et al. (1999); Révillon et al. (2000); and Sinton et al. (1996, 1997, 1998); White et al. (1993).

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**Appendix Table DR2.** Major element data of pillow lavas from the Nicoya Peninsula, Costa Rica.

| Sample<br>material | AN3[1]<br>glass | AN6<br>glass | AN7[1]<br>glass | AN7b<br>glass | AN8<br>glass | AN10<br>glass | AN10b<br>glass | AN20<br>glass | AN34<br>glass | AN40[1]<br>glass | BN22[2]<br>whole rock |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Major elements (wt %)* | | | | | | | | | | | |
| $SiO_2$ | 50.67 | 50.11 | 49.86 | 49.84 | 50.41 | 50.22 | 50.42 | 50.01 | 52.31 | 51.92 | 49.02 |
| $TiO_2$ | 1.63 | 2.78 | 2.69 | 2.86 | 1.67 | 1.66 | 1.73 | 2.77 | 1.15 | 1.30 | 1.26 |
| $Al_2O_3$ | 13.40 | 12.59 | 12.54 | 12.57 | 13.45 | 13.42 | 13.56 | 12.53 | 13.94 | 13.68 | 14.51 |
| $FeO_t$ | 13.78 | 16.40 | 16.43 | 16.27 | 13.78 | 13.80 | 13.78 | 16.43 | 11.90 | 12.41 | 11.65 |
| MnO | 0.24 | 0.26 | 0.25 | 0.26 | 0.24 | 0.22 | 0.25 | 0.25 | 0.21 | 0.20 | 0.17 |
| MgO | 6.31 | 4.91 | 4.83 | 4.94 | 6.27 | 6.10 | 6.27 | 4.91 | 6.91 | 6.87 | 7.9 |
| CaO | 10.89 | 9.41 | 9.50 | 9.37 | 10.90 | 10.88 | 10.80 | 9.38 | 11.22 | 11.24 | 12.33 |
| $Na_2O$ | 2.12 | 2.40 | 2.57 | 2.54 | 2.06 | 2.16 | 2.15 | 2.42 | 1.90 | 1.92 | 2.31 |
| $K_2O$ | 0.13 | 0.23 | 0.23 | 0.24 | 0.13 | 0.14 | 0.14 | 0.23 | 0.09 | 0.09 | 0.11 |
| $P_2O_5$ | 0.07 | 0.15 | 0.20 | 0.15 | 0.07 | 0.07 | 0.06 | 0.17 | 0.03 | 0.03 | 0.096 |
| $SO_2$ | 0.30 | 0.39 | 0.40 | 0.41 | 0.32 | 0.31 | 0.31 | 0.39 | 0.21 | 0.22 | n.d. |
| Total | 99.54 | 99.62 | 99.48 | 99.44 | 99.30 | 98.99 | 99.47 | 99.49 | 99.87 | 99.89 | 99.36 |

[1] and [2] refer to major element data from (Hauff et al., 1997) and (Hauff et al., 2000a) respectively. Major element data of the glasses were obtained using a Cameca SX 50 electron microprobe at IfM-GEOMAR (details in Hauff et al., 1997)

**Appendix Table DR2.** Trace element data of pillow lavas from the Nicoya Peninsula, Costa Rica.

| Sample<br>material | AN3<br>glass | AN7<br>glass | AN10<br>glass | AN34<br>glass | AN40<br>glass | BN22<br>whole rock | BHVO-1<br>Standard | BIR-1<br>Standard |
|---|---|---|---|---|---|---|---|---|
| *Trace elements (ppm)* | | | | | | | | |
| Cs | 0.035 | 0.081 | 0.042 | 0.034 | 0.034 | 0.024 | 0.126 | 0.006 |
| Rb | 2.54 | 5.04 | 3.24 | 2.36 | 3.26 | 1.97 | 9.36 | 0.196 |
| Ba | 26.7 | 47.5 | 28.6 | 23.1 | 35.5 | 16.6 | 135 | 6.55 |
| Sr | 120 | 134 | 122 | 90 | 126 | 113 | 392 | 108 |
| Zr | 99.2 | 173.6 | 98.1 | 64.6 | 72.4 | 61.5 | 177 | 14.96 |
| Hf | 2.20 | 3.83 | 2.20 | 1.49 | 1.65 | 1.86 | 4.27 | 0.588 |
| Nb | 5.23 | 9.74 | 5.21 | 3.84 | 4.23 | 4.18 | 17.20 | 0.521 |
| Pb | 0.420 | 0.711 | 0.393 | 0.307 | 0.311 | 0.271 | 2.10 | 3.03 |
| Th | 0.360 | 0.647 | 0.348 | 0.264 | 0.299 | 0.252 | 1.19 | 0.029 |
| U | 0.125 | 0.209 | 0.120 | 0.086 | 0.094 | 0.088 | 0.422 | 0.012 |
| La | 4.72 | 8.41 | 4.64 | 3.24 | 3.36 | 3.82 | 15.57 | 0.579 |
| Ce | 12.98 | 22.67 | 12.80 | 8.82 | 9.36 | 10.2 | 38.50 | 2.09 |
| Pr | 2.07 | 3.62 | 2.07 | 1.38 | 1.51 | 1.65 | 5.59 | 0.393 |
| Nd | 10.45 | 17.96 | 10.31 | 6.98 | 7.57 | 8.40 | 24.9 | 2.46 |
| Sm | 3.42 | 5.61 | 3.35 | 2.36 | 2.56 | 2.79 | 6.20 | 1.13 |
| Eu | 1.28 | 1.92 | 1.26 | 0.90 | 0.93 | 1.10 | 2.09 | 0.559 |
| Gd | 4.27 | 6.85 | 4.21 | 3.07 | 3.29 | 3.77 | 6.39 | 1.80 |
| Tb | 0.776 | 1.23 | 0.767 | 0.581 | 0.617 | 0.665 | 0.944 | 0.362 |
| Dy | 5.15 | 8.01 | 5.08 | 3.93 | 4.14 | 4.42 | 5.283 | 2.60 |
| Ho | 1.06 | 1.67 | 1.05 | 0.834 | 0.883 | 0.923 | 0.957 | 0.570 |
| Er | 3.00 | 4.71 | 2.95 | 2.39 | 2.50 | 2.60 | 2.38 | 1.63 |
| Tm | 0.449 | 0.705 | 0.439 | 0.359 | 0.380 | 0.386 | 0.320 | 0.251 |
| Yb | 2.96 | 4.70 | 2.93 | 2.45 | 2.56 | 2.57 | 1.96 | 1.65 |
| Lu | 0.439 | 0.696 | 0.432 | 0.368 | 0.387 | 0.379 | 0.282 | 0.261 |

Trace element concentrations were determined on an Agilent 7500 ICP-MS after the methods of Garbe-Schönberg (1993) at the Institute for Geosciences (Kiel University). Analytical precision of this intrument ranges between 0.2 and 1%. When compared to literature data the accuracy of BHVO-1 is generally better than 4%, except Th (10%). For BIR-1, Sr, Hf, Pb, Th and all REE except La and Ce (<7%) compare within 4% of the literature data, whereas higher deviations are observed for Rb (8%), Ba (12%) and U (21%).

Additional notes for Figure 3: Primitive mantle normalizing values for multielement diagram are from Hofmann (1988). Reference pattern for island-arc basalts (IAB) is from Elliot et al. (1997, sample GUG9); patterns for oceanic-island basalts (OIB) and normal mid-oceanic-ridge basalts (N-MORB) are from Sun and McDonough (1989).

**Appendix Table DR2.** Sr-Nd-Pb isotope data of pillow lavas from the Nicoya Peninsula, Costa Rica.

| Sample<br>material | AN3<br>glass | AN7<br>glass | AN8<br>glass | AN10<br>glass | AN34<br>glass | AN40<br>glass | BN22<br>whole rock |
|---|---|---|---|---|---|---|---|
| *Sr-Nd-Pb isotope data* | | | | | | | |
| $^{87}Rb/^{86}Sr$ | 0.061 | 0.108 | 0.041* | 0.077 | 0.076 | 0.075 | 0.051 |
| $^{87}Sr/^{86}Sr$ | 0.703107 (8) | 0.703057 (9) | 0.703120 (8) | 0.703123 (7) | 0.703075 (8) | 0.703141 (8) | 0.703190 (6) |
| $^{147}Sm/^{144}Nd$ | 0.197 | 0.188 | 0.208* | 0.196 | 0.204 | .204 | 0.200 |
| $^{143}Nd/^{144}Nd$ | 0.513016 (8) | 0.513020 (11) | 0.513017 (11) | 0.513022 (29) | 0.513005 (22) | 0.513006 (8) | 0.513019 (5) |
| $^{238}U/^{204}Pb$ | 19.23 | 19.28 | 20.46 | 20.15 | 18.35 | 20.00 | 20.79 |
| $^{232}Th/^{204}Pb$ | 56.47 | 59.26 | 57.63 | 57.58 | 56.84 | 62.55 | 61.67 |
| $^{206}Pb/^{204}Pb$ | 19.168 (5) | 19.062 (5) | 19.202 (6) | 19.215 (9) | 19.237 (13) | 19.212 (7) | 19.114 (3) |
| $^{207}Pb/^{204}Pb$ | 15.563 (4) | 15.560 (5) | 15.571 (5) | 15.575 (7) | 15.579 (10) | 15.572 (5) | 15.554 (2) |
| $^{208}Pb/^{204}Pb$ | 38.751 (11) | 38.669 (11) | 38.785 (12) | 38.806 (18) | 38.889 (27) | 38.867 (14) | 38.690 (6) |

Sr-Nd-Pb isotopic ratios were determined on a Finnigan MAT262 $RPQ^{2+}$ Thermal Ionization Mass Spectrometer (TIMS) at IFM-GEOMAR, operating in static mode for Sr and Pb and in multidynamic mode for Nd. Sr and Nd isotopic ratios are normalized within run to $^{86}Sr/^{88}Sr$= 0.1194 and $^{146}Nd/^{144}Nd$= 0.7219 respectively. Over the course of this study NBS 987 gave $^{87}Sr/^{86}Sr$= 0.710249± 0.000022 (N=160), $^{143}Nd/^{144}Nd$= 0.511844± 0.000011 (N=68) for La Jolla. NBS 981 (N=46) gave $^{206}Pb/^{204}Pb$= 16.897± 0.006, $^{207}Pb/^{204}Pb$= 15.435± 0.008, $^{208}Pb/^{204}Pb$= 36.522± 0.024 and are corrected to the NBS 981 values given in Todt et al., (1996). Total chemistry blanks were <100 pg for Sr, Nd and Pb and thus considered negligible.

Numbers in brackets denote two sigma within run errors of isotope ratio analyses. * based on averages of other Nicoya igneous rocks from (Hauff et al., 2000a; Hauff et al., 2000b). $^{238}U/^{204}Pb$ and $^{232}Th/^{204}Pb$ of the fresh glasses were determined using a mixed $^{205}Pb$-$^{235}U$-$^{230}Th$ spike.

Additional notes for Figure 4: Data for Galapagos Island and hotspot track field from White et al. (1993), Hoernle et al. (2000) and Werner et al. (2003). Caribbean large igneous province field (CLIP) is from Hauff et al. (1997, 2000a, 2000b) and Hoernle et al. (2002). Parent/daughter ratios for Pacific N-MORB source are from Table 6 of Janney and Castillo et al. (1997), and those for Galápagos Island lavas are from Hauff et al. (2000b).

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