**Supplementary material**

Table S1. Geographical and hydrological characteristics of gauging stations. The mean annual rainfall was extracted from TRMM (1998-2009 period; Bookhagen, B., in review) <http://www.geog.ucsb.edu/~bodo/TRMM/#tif>. References for runoff values: a, HYBAM database (2001–2011); b, Lavado et al., 2012 (1969-2004 period); c, ANA (2012). The HYBAM monitored stations are highlighted in gray.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref.** | **Country** | **River** | **Gauging station** | **Lat.** | **Long.** | **station elevation** | **mean basin elevation** | **Total basin area** | **area > 500m** | **Q avg** |  | **rainfall avg (TRMM 1998-2009)** | **Sampling period (number of samples)** |
|  |  |  |  | **Decimal degree** | **m.a.s.l.** | **103 km²** |  | **m3.s-1** |  | **mm·yr-1** | **TDS** |
| 1 | **Ecuador** | Esmeraldas | D.J. Sade | 0.5349 | -79.4219 | 110 | 1629 | 19.6 | 12.6 | 857 | a | 1570 | 2001-2011 (148) |
| 2 | **Peru** | Tumbes | El Tigre | -3.7200 | -80.4700 | 11 | 1007 | 4.8 | 3.7 | 99 | a | 1062 | 2006-2011 (56) |
| 3 | **Peru** | Chira | Puente Sullana | -4.8961 | -80.7060 | 56 | 1305 | 14.7 | 10.4 | 216 | b | 864 | (3) |
| 4 | **Peru** | Piura | Puente Morropon | -5.1128 | -80.1735 | 133 | 873 | 4.7 | 2.4 | 27 | b | 516 | (5) |
| 5 | **Peru** | Reque | Puente Panamericana | -6.8536 | -79.8258 | 20 | 1744 | 3.7 | 2.9 | 32 | c | 776 | (2) |
| 6 | **Peru** | Jequetepeque | Yonan Pampalarga | -7.2500 | -79.1000 | 621 | 2571 | 3.3 | 3.3 | 27 | b | 787 | (4) |
| 7 | **Peru** | Moche | Puente Panamericana | -8.1440 | -79.0142 | 14 | 2362 | 2.0 | 1.8 | 10 | b | 584 | (2) |
| 8 | **Peru** | Viru | Puente Panamericana | -8.4227 | -78.7835 | 53 | 2240 | 1.7 | 1.5 | 7 | b | 309 | (2) |
| 9 | **Peru** | Santa | Condorcerro | -8.6500 | -78.2200 | 480 | 3652 | 10.4 | 10.4 | 139 | a | 608 | 2007-2011 (41) |
| 10 | **Peru** | Lacramarca | Puente Panamericana | -9.1117 | -78.5493 | 7 | 1162 | 0.8 | 0.5 | 0 | c | 213 | (2) |
| 11 | **Peru** | Casma | Puente Carretera | -9.4800 | -78.3000 | 61 | 2566 | 1.8 | 1.6 | 6 | c | 319 | (1) |
| 12 | **Peru** | Huarmey | Puente Carretera | -10.0700 | -78.1700 | 11 | 2328 | 2.1 | 1.7 | 6 | c | 222 | (1) |
| 13 | **Peru** | Fortaleza | Puente Panamericana | -10.6550 | -77.8398 | 23 | 2394 | 2.3 | 2.2 | 5 | c | 232 | (2) |
| 14 | **Peru** | Pativilca | Puente Panamericana | -10.7201 | -77.7735 | 65 | 3442 | 4.4 | 4.2 | 44 | b | 432 | (3) |
| 15 | **Peru** | Huaura | Puente Panamericana | -11.0719 | -77.5957 | 68 | 3144 | 4.3 | 4.1 | 43 | b | 309 | (2) |
| 16 | **Peru** | Chancay | Puente Panamericana | -11.6071 | -77.2397 | 82 | 2781 | 2.9 | 2.7 | 28 | b | 256 | (2) |
| 17 | **Peru** | Cañete | Socsi | -13.0283 | -76.1946 | 388 | 3776 | 5.8 | 5.8 | 48 | a | 348 | 2005-2011 (42) |
| 18 | **Peru** | Chincha/San Juan | Puente Panamericana | -13.4600 | -76.1300 | 63 | 3199 | 3.1 | 3.0 | 18 | c | 189 | (1) |
| 19 | **Peru** | Pisco | Puente Panamericana | -13.6900 | -76.1500 | 77 | 3168 | 4.0 | 3.8 | 27 | b | 241 | (1) |
| 20 | **Peru** | Grande | Puente Panamericana | -14.5191 | -75.2112 | 378 | 3072 | 1.9 | 1.8 | 13 | c | 266 | (1) |
| 21 | **Peru** | Acari | Puente Panamericana | -15.6283 | -74.6363 | 42 | 2899 | 4.5 | 4.3 | 14 | b | 300 | (1) |
| 22 | **Peru** | Yauca | Puente Panamericana | -15.6733 | -74.5226 | 60 | 2818 | 4.3 | 4.2 | 9 | b | 228 | (1) |
| 23 | **Peru** | Ocoña | Puente Ocoña | -16.4247 | -73.1171 | 32 | 3763 | 16.0 | 15.8 | 95 | a | 346 | 2004-2011 (41) |
| 24 | **Peru** | Camana-Majes | Puente Panamericana | -16.5855 | -72.7330 | 72 | 3611 | 17.1 | 16.9 | 70 | c | 250 | (11) |
| 25 | **Peru** | Tambo | Puente Panamericana | -17.0288 | -71.6908 | 316 | 3198 | 9.4 | 9.3 | 21 | b | 186 | (1) |
| 26 | **Peru** | Osmore | Puente Panamericana | -17.3337 | -70.9978 | 993 | 3326 | 1.8 | 1.8 | 3 | c | 111 | (1) |
| 27 | **Peru** | Locumba | Puente Panamericana | -17.6853 | -70.8428 | 479 | 3307 | 3.9 | 3.9 | 3 | b | 121 | (1) |
| 28 | **Peru** | Sama | Puente Panamericana | -17.8424 | -70.5204 | 446 | 3107 | 2.1 | 2.1 | 3 | b | 107 | (1) |
| Total sampled basins |   |   |   |   |   |   | 157.3 | 139.0 | 1871.3 |   | 565 |   |
| % total Ecuadorian and Peruvian Pacific basins |   |   |   |   | 40% | 54% | 49% |   | 38% |   |
| Total Pacific coast Ecuador and Peru (from Mira R. to Caplina R.) |   |   |   |   | 398 | 256 | 3825 |   | 585 |   |

Table S2. Net and rainfall weighted relative proportions of each lithological class for the studied basins.

|  |  |  |
| --- | --- | --- |
| **Ref.** | **River** | **Lithologies** |
| **net total basin proportion** | **rainfall weighted proportion** |
| **carbonates** | **Plutonic and metamorphi** | **Sedimentary rocks** | **Volcanic** | **carbonates** | **Plutonic and metamorphi** | **Sedimentary rocks** | **Volcanic** |
| 1 | Esmeraldas | 0.1% | 5.2% | 43% | 52% | 0.2% | 5.4% | 40% | 55% |
| 2 | Tumbes | 1.3% | 27% | 49% | 23% | 1.2% | 25% | 57% | 17% |
| 3 | Chira | 0.2% | 19% | 42% | 38% | 0.2% | 19% | 47% | 34% |
| 4 | Piura |   | 21% | 69% | 11% | 0.0% | 18% | 74% | 8% |
| 5 | Reque |   | 1% | 25% | 75% | 0.2% | 3% | 32% | 64% |
| 6 | Jequetepeque |   | 2% | 40% | 57% |   | 3% | 37% | 60% |
| 7 | Moche |   | 20% | 8% | 72% |   | 27% | 22% | 51% |
| 8 | Viru |   | 6% | 7% | 87% |   | 18% | 26% | 56% |
| 9 | Santa |   | 17% | 59% | 24% |   | 17% | 56% | 27% |
| 10 | Lacramarca |   | 42% | 10% | 48% |   | 63% | 26% | 11% |
| 11 | Casma |   | 25% | 21% | 54% |   | 34% | 22% | 44% |
| 12 | Huarmey |   | 10% | 38% | 52% |   | 27% | 39% | 33% |
| 13 | Fortaleza |   | 33% | 26% | 40% |   | 52% | 21% | 28% |
| 14 | Pativilca |   | 14% | 63% | 23% |   | 16% | 58% | 26% |
| 15 | Huaura |   | 16% | 54% | 30% |   | 27% | 45% | 28% |
| 16 | Chancay |   | 17% | 31% | 51% |   | 31% | 32% | 38% |
| 17 | Cañete | 1.2% | 18% | 31% | 50% | 4.1% | 23% | 22% | 51% |
| 18 | Chincha/San Juan | 3.3% | 20% | 6% | 71% | 7.2% | 29% | 11% | 53% |
| 19 | Pisco |   | 6.4% | 15% | 78% | 0.4% | 23% | 26% | 50% |
| 20 | Grande |   | 10% | 20% | 70% |   | 14% | 25% | 62% |
| 21 | Acari |   | 7.9% | 10% | 82% |   | 28% | 17% | 55% |
| 22 | Yauca |   | 6.0% | 25% | 69% |   | 32% | 28% | 40% |
| 23 | Ocoña | 0.4% | 5.0% | 12% | 81% | 0.2% | 13% | 16% | 70% |
| 24 | Camana-Majes | 0.1% | 2.5% | 26% | 71% | 0.4% | 8.2% | 37% | 55% |
| 25 | Tambo | 0.2% | 4.1% | 52% | 44% | 0.2% | 10% | 49% | 41% |
| 26 | Osmore |   | 3.6% | 22% | 74% |   | 4.3% | 31% | 65% |
| 27 | Locumba |   | 2.0% | 55% | 43% |   | 4.9% | 54% | 40% |
| 28 | Sama |   | 2.7% | 25% | 73% | 0.1% | 2.9% | 33% | 64% |

Table S3. Summary of the hydrochemical data of the monitored HYBAM and discrete sampled stations from the HYBAM website (raw data for the 5 monitored stations is available on the website: [www.ore-hybam.org](http://www.ore-hybam.org)).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. number** | **Gauging station** | **River** | **Sampling period or date** | **Temp** | **cond.** | **pH** | **Cl-** | **SO42-** | **Na+** | **Ca2+** | **Mg2+** | **K+** | **HCO3-** | **SiO2** | **TDS** | **TZ-** | **TZ+** | **NICB** |
|  |  |  |   | µS.cm-1 |   | mmoles.l-1 | mg.l-1 | meq.l-1 | meq.l-1 |   |
| **HYBAM monitored stations** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| 1 | DJ Sade | Esmeraldas | 2001-2011 | 24.5 | 121 | 6.3 | 0.11 | 0.08 | 0.37 | 0.22 | 0.17 | 0.07 | 0.91 | 0.26 | 109 | 1.19 | 1.22 | 0.01 |
|   |  |  | (148) |  ± 1 |  ± 50 |  ± 8.8 |  ± 0.07 |  ± 0.04 |  ± 0.21 |  ± 0.08 |  ± 0.08 |  ± 0.05 |  ± 0.37 |  ± 0.15 |  ± 40 |  ± 0.5 |  ± 0.52 |  ± 8.1 |
| 2 | El Tigre | Tumbes | 2006-2011 | 24.9 | 127 | 6.2 | 0.15 | 0.16 | 0.39 | 0.41 | 0.14 | 0.03 | 0.90 | 0.29 | 127 | 1.3 | 1.51 | 0.01 |
|   |  |  | (56) |  |  ± 32 |  ± 7.6 |  ± 0.29 |  ± 0.06 |  ± 0.47 |  ± 0.30 |  ± 0.11 |  ± 0.03 |  ± 0.31 |  ± 0.05 |  ± 57 |  ± 0.28 |  ± 1.3 |  ± 4.6 |
| 9 | Condorcero | Santa | 2007-2011 | 24.3 | 311 | 7.0 | 0.27 | 0.91 | 0.55 | 0.83 | 0.34 | 0.05 | 0.86 | 0.16 | 216 | 2.93 | 2.96 | 0.00 |
|   |  |  | (41) |  ± 3.2 |  ± 114 |  ± 7.7 |  ± 0.15 |  ± 0.38 |  ± 0.31 |  ± 0.24 |  ± 0.14 |  ± 0.02 |  ± 0.31 |  ± 0.046 |  ± 68 |  ± 0.98 |  ± 1.01 |  ± 4.8 |
| 17 | Socsi | Cañete | 2005-2011 | 23.4 | 301 | 7.3 | 0.37 | 0.67 | 0.46 | 1.13 | 0.30 | 0.05 | 1.74 | 0.17 | 270 | 3.45 | 3.36 | -0.02 |
|   |  |  | (42) |  ± 1.6 |  ± 113 |  ± 8 |  ± 0.17 |  ± 0.31 |  ± 0.18 |  ± 0.30 |  ± 0.13 |  ± 0.01 |  ± 0.37 |  ± 0.047 |  ± 65 |  ± 1.03 |  ± 1 |  ± 5.4 |
| 23 | Pte Ocoña | Ocoña | 2004-2011 | 23.7 | 350 | 7.2 | 0.71 | 0.61 | 1.31 | 0.73 | 0.16 | 0.09 | 1.33 | 0.37 | 240 | 3.25 | 3.17 | -0.02 |
|   |   |   | (41) |   |  ± 140 |  ± 7.8 |  ± 0.38 |  ± 0.24 |  ± 0.83 |  ± 0.18 |  ± 0.06 |  ± 0.02 |  ± 0.25 |  ± 0.124 |  ± 67 |  ± 1.05 |  ± 1.26 |  ± 7.9 |
| **Discrete sampled stations** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| 3 | Pte Sullana | Chira | 13/02/2004 | 29.2 | 860 |  | 1.83 | 1.12 | 3.68 | 1.53 | 0.61 | 0.08 | 3.70 | 0.27 | 579 | 7.78 | 8.03 | 1.59  |
|   |  |  | 23/02/2006 | 27.4 | 404 | 7.8 | 0.45 | 0.39 | 1.11 | 0.84 | 0.30 | 0.05 | 2.05 | 0.30 | 265 | 3.28 | 3.45 | 0.02  |
|   |  |  | 25/04/2007 |  |  |  | 0.81 | 0.54 | 1.96 | 0.94 | 0.44 | 0.06 | 2.38 | 0.12 | 329 | 4.27 | 4.78 | 0.06  |
| 4 | Pte Morropon | Piura | 13/02/2004 | 32.4 | 444 |  | 1.03 | 0.47 | 1.49 | 0.90 | 0.46 | 0.06 | 2.44 | 0.47 | 343 | 4.40 | 4.26 | -0.02  |
|   |  |  | 27/06/2004 | 31.0 | 1 138 | 8.3 | 3.92 | 1.36 | 2.93 | 1.64 | 1.00 | 0.06 | 4.75 | 0.45 | 747 | 11.39 | 8.27 | -0.16  |
|   |  |  | 27/02/2006 | 24.7 | 191 | 6.6 | 0.31 | 0.15 | 0.61 | 0.44 | 0.19 | 0.06 | 1.18 | 0.39 | 159 | 1.79 | 1.93 | 0.04  |
|   |  |  | 10/03/2006 |  | 164 | 6.1 | 0.24 | 0.12 | 0.48 | 0.38 | 0.16 | 0.05 | 1.09 |  |  | 1.57 | 1.62 | 0.01  |
|   |  |  | 20/05/2006 |  | 632 | 6.9 | 1.71 | 0.65 | 1.94 | 1.22 | 0.67 | 0.04 | 3.61 | 0.40 | 479 | 6.61 | 5.77 | -0.07  |
| 5 | Pte Panamericana | Reque | 10/02/2004 | 32.0 | 969 |  | 1.73 | 1.15 | 5.34 | 1.30 | 0.72 | 0.07 | 4.55 | 0.44 | 672 | 8.58 | 9.46 | 0.05  |
|   |  |  | 22/02/2006 | 30.9 | 1088 | 7.7 | 1.56 | 1.23 | 4.02 | 1.81 | 0.60 | 0.10 | 5.06 | 0.35 | 687 | 9.07 | 8.95 | -0.01  |
| 6 | Yonan Pampalarga | Jequetepeque | 02/03/2006 | 20.6 | 271 | 7.6 | 0.05 | 0.33 | 0.15 | 1.23 | 0.21 | 0.03 | 2.37 | 0.15 | 245 | 3.07 | 3.05 | -0.00  |
|   |  |  | 27/04/2006 | 21.2 | 303 | 7.8 | 0.07 | 0.41 | 0.24 | 1.16 | 0.28 | 0.02 | 2.21 | 0.16 | 246 | 3.10 | 3.14 | 0.01  |
|   |  |  | 25/04/2007 |  |  |  | 0.12 | 0.26 | 0.34 | 0.61 | 0.20 | 0.04 | 1.18 | 0.14 | 148 | 1.81 | 2.00 | 0.05  |
|   |  |  | 18/02/2004 | 22.0 | 262 |  | 0.12 | 0.33 | 0.29 | 0.87 | 0.17 | 0.03 | 1.85 | 0.21 | 208 | 2.62 | 2.39 | -0.04  |
| 7 | Pte Panamericana | Moche | 19/02/2004 | 23.0 | 545 |  | 0.69 | 2.11 | 0.93 | 1.48 | 0.47 | 0.06 | 0.55 | 0.35 | 376 | 5.46 | 4.88 | -0.06  |
|   |  |  | 22/02/2006 | 26.9 | 910 | 7.4 | 1.62 | 2.41 | 2.08 | 2.50 | 0.87 | 0.09 | 2.14 | 0.40 | 615 | 8.57 | 8.90 | 0.02  |
| 8 | Pte Panamericana | Viru | 19/02/2004 | 24.5 | 315 |  | 0.35 | 0.78 | 0.49 | 0.91 | 0.30 | 0.04 | 1.17 | 0.20 | 227 | 3.08 | 2.95 | -0.02  |
|   |  |  | 21/02/2006 | 23.7 | 265 | 6.6 | 0.18 | 0.69 | 0.40 | 0.78 | 0.29 | 0.04 | 0.82 | 0.16 | 181 | 2.38 | 2.57 | 0.04  |
| 10 | Pte Panamericana | Lacramarca | 09/02/2004 | 28.5 | 1 302 |  | 4.65 | 2.63 | 7.66 | 2.04 | 0.67 | 0.16 | 3.82 | 0.38 | 954 | 13.73 | 13.24 | -0.02  |
|   |  |  | 21/02/2006 | 26.5 |  | 7.4 | 5.93 | 2.35 | 7.82 | 2.29 | 0.78 | 0.19 | 3.86 | 0.37 | 991 | 14.48 | 14.15 | -0.01  |
| 11 | Pte Carretera | Casma | 10/02/2006 | 28.4 | 404 | 7.3 | 1.08 | 1.08 | 1.65 | 2.05 | 0.54 | 0.07 | 3.45 | 0.46 | 515 | 6.68 | 6.87 | 0.01  |
| 12 | Pte Carretera | Huarmey | 21/02/2006 | 35.2 | 597 | 7.4 | 0.65 | 1.35 | 1.03 | 1.92 | 0.54 | 0.06 | 3.07 | 0.29 | 474 | 6.41 | 6.02 | -0.03  |
| 13 | Pte Panamericana | Fortaleza | 19/02/2004 | 27.0 | 386 |  | 0.69 | 0.57 | 0.97 | 1.08 | 0.29 | 0.05 | 2.02 | 0.35 | 298 | 3.86 | 3.74 | -0.01  |
|   |  |  | 21/02/2006 | 26.4 | 745 | 7.1 | 1.88 | 1.08 | 2.07 | 1.99 | 0.52 | 0.08 | 3.58 | 0.40 | 557 | 7.63 | 7.18 | -0.03  |
| 14 | Pte Panamericana | Pativilca | 09/02/2004 | 26.7 | 312 |  | 0.28 | 0.73 | 0.46 | 1.09 | 0.20 | 0.06 | 1.24 | 0.13 | 225 | 2.98 | 3.08 | 0.02  |
|   |  |  | 21/02/2006 | 25.7 | 410 | 7.6 | 0.59 | 0.73 | 0.88 | 1.33 | 0.26 | 0.05 | 1.87 | 0.18 | 298 | 3.92 | 4.10 | 0.02  |
|   |  |  | 11/02/2007 |  | 352 | 7.7 | 0.61 | 0.51 | 0.57 | 0.88 | 0.16 | 0.04 | 1.75 | 0.12 | 238 | 3.37 | 2.69 | -0.11  |
| 15 | Pte Panamericana | Huaura | 09/02/2004 | 26.1 | 479 |  | 0.43 | 0.95 | 0.99 | 1.55 | 0.28 | 0.07 | 2.68 | 0.21 | 377 | 5.00 | 4.73 | -0.03  |
|   |  |  | 21/02/2006 | 24.7 | 626 | 7.2 | 0.55 | 1.08 | 1.26 | 1.78 | 0.46 | 0.09 | 2.99 | 0.25 | 435 | 5.70 | 5.82 | 0.01  |
| 16 | Pte Panamericana | Chancay | 09/02/2004 | 25.0 | 428 |  | 0.39 | 0.71 | 1.05 | 1.38 | 0.26 | 0.05 | 2.54 | 0.22 | 338 | 4.35 | 4.38 | 0.00  |
|   |  |  | 21/02/2006 | 24.2 | 636 | 7.7 | 0.78 | 0.93 | 1.31 | 2.09 | 0.48 | 0.07 | 3.68 | 0.32 | 489 | 6.32 | 6.51 | 0.01  |
| 18 | Pte Panamericana | Chincha | 16/04/2004 | 29.1 | 237 |  | 0.33 | 0.31 | 0.36 | 0.56 | 0.13 | 0.04 | 1.25 | 0.24 | 167 | 2.19 | 1.77 | -0.11  |
| 19 | Pte Panamericana | Pisco | 16/04/2004 | 27.8 | 454 |  | 1.09 | 0.91 | 0.30 | 0.71 | 0.16 | 0.05 | 1.35 | 0.24 | 263 | 4.26 | 2.07 | -0.34  |
| 20 | Pte Panamericana | Grande | 06/04/2004 | 27.6 | 422 |  | 1.11 | 0.66 | 1.08 | 0.65 | 0.16 | 0.11 | 1.44 | 0.26 | 265 | 3.87 | 2.79 | -0.16  |
| 21 | Pte Panamericana | Acari | 07/04/2004 | 21.7 | 373 |  | 0.91 | 0.65 | 0.92 | 0.62 | 0.14 | 0.08 | 1.25 | 0.24 | 238 | 3.45 | 2.52 | -0.16  |
| 22 | Pte Panamericana | Yauca | 07/04/2004 | 24.0 | 1 003 |  | 2.83 | 3.01 | 2.15 | 1.79 | 0.37 | 0.16 | 1.47 | 0.37 | 638 | 10.32 | 6.63 | -0.22  |
| 24 | Pte Panamericana | Camana | 07/04/2004 | 22.4 | 350 |  | 0.74 | 0.61 | 0.77 | 0.33 | 0.16 | 0.10 | 1.38 | 0.20 | 219 | 3.33 | 1.85 | -0.29  |
|   |  |  | 11/07/2005 |  | 779 | 6.9 | 1.71 | 1.76 | 3.04 | 1.73 | 0.46 | 0.16 | 2.42 | 0.55 | 567 | 7.64 | 7.58 | -0.00  |
|   |  |  | 11/08/2005 |  | 796 | 7.0 | 1.77 | 1.79 | 3.08 | 1.78 | 0.47 | 0.16 | 2.38 | 0.55 | 573 | 7.73 | 7.73 | 0.00  |
|   |  |  | 11/09/2005 |  | 881 | 8.0 | 1.86 | 1.95 | 3.03 | 1.90 | 0.62 | 0.21 | 2.29 | 0.46 | 590 | 8.06 | 8.26 | 0.01  |
|   |  |  | 11/10/2005 |  | 938 | 7.3 | 2.78 | 2.62 | 3.20 | 1.94 | 0.66 | 0.21 | 2.87 | 0.23 | 715 | 10.89 | 8.62 | -0.12  |
|   |  |  | 11/11/2005 |  | 859 | 7.2 | 2.89 | 2.79 | 3.14 | 1.82 | 0.68 | 0.21 | 2.62 | 0.50 | 730 | 11.09 | 8.34 | -0.14  |
|   |  |  | 11/12/2005 |  | 843 | 7.5 | 1.58 | 1.66 | 2.63 | 2.12 | 0.58 | 0.18 | 3.09 | 0.53 | 602 | 7.99 | 8.20 | 0.01  |
|   |  |  | 11/07/2007 |  |  |  | 1.22 | 1.02 | 2.01 | 0.95 | 0.45 | 0.14 | 1.13 | 0.46 | 338 | 4.38 | 4.95 | 0.06  |
|   |  |  | 11/08/2007 |  |  |  | 1.22 | 1.03 | 2.06 | 1.10 | 0.47 | 0.15 | 1.54 | 0.47 | 373 | 4.82 | 5.33 | 0.05  |
|   |  |  | 11/09/2007 |  |  |  | 1.35 | 1.07 | 2.32 | 1.31 | 0.49 | 0.16 | 1.96 | 0.59 | 429 | 5.44 | 6.09 | 0.06  |
|   |  |  | 11/10/2007 |  |  |  | 1.42 | 1.11 | 2.34 | 1.34 | 0.51 | 0.16 | 2.00 | 0.55 | 438 | 5.63 | 6.20 | 0.05  |
| 25 | Pte Panamericana | Tambo | 08/04/2004 | 19.7 | 968 |  | 4.61 | 1.30 | 2.85 | 1.10 | 0.38 | 0.20 | 1.76 | 0.81 | 571 | 8.97 | 6.02 | -0.20  |
| 26 | Pte Panamericana | Osmore | 08/04/2004 | 23.0 | 1 008 |  | 2.63 | 2.10 | 2.30 | 2.00 | 0.52 | 0.16 | 2.78 | 0.88 | 669 | 9.61 | 7.50 | -0.12  |
| 27 | Pte Panamericana | Locumba | 08/04/2004 | 23.2 | 2 290 |  | 10.20 | 4.54 | 6.28 | 3.86 | 1.13 | 0.60 | 3.95 | 0.96 | 1446 | 23.22 | 16.85 | -0.16  |
| 28 | Pte Panamericana | Sama | 08/04/2004 | 28.1 | 2 940 |   | 10.86 | 9.33 | 6.51 | 5.81 | 1.51 | 0.58 | 2.45 | 0.71 | 1915 | 31.96 | 21.72 | -0.19  |

Table S4. Values of *b* for HYBAM monitored stations (*C* = *a Qb*).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. number** | **Gauging station** | **River** | **cond.** | **Cl-** | **SO42-** | **Na+** | **Ca2+** | **Mg2+** | **K+** | **HCO3-** | **SiO2** | **TDS** |
| 1 | DJ Sade | Esmeraldas | -0.45 | -0.71 | -0.48 | -0.55 | -0.36 | -0.50 | -0.26 | -0.16 | -0.41 | -0.32 |
|   |   |   | ± 0.02 | ± 0.02 | ± 0.02 | ± 0.03 | ± 0.02 | ± 0.02 | ± 0.02 | ± 0.02 | ± 0.02 | ± 0.02 |
| 2 | El Tigre | Tumbes | -0.11 | -0.04 | -0.20 | -0.14 | -0.12 | -0.10 | 0.05 | -0.08 | -0.10 | -0.12 |
|   |   |   | ± 0.05 | ± 0.06 | ± 0.04 | ± 0.04 | ± 0.02 | ± 0.03 | ± 0.04 | ± 0.02 | ± 0.02 | ± 0.02 |
| 9 | Condorcero | Santa | -0.49 | -0.72 | -0.46 | -0.62 | -0.23 | -0.46 | -0.31 | -0.17 | -0.10 | -0.31 |
|   |   |   | ± 0.03 | ± 0.05 | ± 0.04 | ± 0.05 | ± 0.04 | ± 0.04 | ± 0.04 | ± 0.05 | ± 0.03 | ± 0.04 |
| 17 | Socsi | Cañete | -0.35 | -0.50 | -0.46 | -0.35 | -0.23 | -0.35 | -0.22 | -0.17 | -0.09 | -0.22 |
|   |   |   | ± 0.07 | ± 0.04 | ± 0.05 | ± 0.04 | ± 0.03 | ± 0.05 | ± 0.03 | ± 0.05 | ± 0.03 | ± 0.04 |
| 23 | Pte Ocoña | Ocoña | -0.34 | -0.60 | -0.40 | -0.53 | -0.21 | -0.35 | -0.20 | 0.01 | -0.18 | -0.33 |
|   |   |   | ± 0.08 | ± 0.07 | ± 0.06 | ± 0.09 | ± 0.04 | ± 0.06 | ± 0.04 | ± 0.03 | ± 0.02 | ± 0.04 |

Table S5. Relative contribution of atmospheric inputs to riverine solutes exports.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref.** | **River** | **Cl-** | **SO42-** | **Na+** | **Ca2+** | **Mg2+** | **K+** | **HCO3-** | **SiO2** | **TDS** |
| 1 | Esmeraldas | 18% | 37% | 7% | 23% | 4% | 12% | 0% | 0% | 6% |
| 2 | Tumbes | 13% | 19% | 6% | 12% | 5% | 27% | 0% | 0% | 6% |
| 3 | Chira | 2% | 5% | 1% | 5% | 2% | 13% | 0% | 0% | 2% |
| 4 | Piura | 2% | 7% | 2% | 6% | 2% | 13% | 0% | 0% | 2% |
| 5 | Reque/Chancay-Lambayeque | 1% | 3% | 1% | 3% | 1% | 9% | 0% | 0% | 1% |
| 6 | Jequetepeque | 17% | 10% | 8% | 6% | 4% | 26% | 0% | 0% | 3% |
| 7 | Moche | 2% | 1% | 2% | 3% | 1% | 11% | 0% | 0% | 1% |
| 8 | Viru | 8% | 4% | 5% | 6% | 2% | 20% | 0% | 0% | 3% |
| 9 | Santa | 7% | 3% | 4% | 6% | 2% | 15% | 0% | 0% | 3% |
| 10 | Lacramarca | 0% | 1% | 0% | 2% | 1% | 5% | 0% | 0% | 1% |
| 11 | Casma | 2% | 3% | 1% | 2% | 1% | 12% | 0% | 0% | 1% |
| 12 | Huarmey | 3% | 2% | 2% | 3% | 1% | 13% | 0% | 0% | 1% |
| 13 | Fortaleza | 2% | 4% | 2% | 3% | 2% | 13% | 0% | 0% | 2% |
| 14 | Pativilca | 4% | 5% | 4% | 5% | 3% | 16% | 0% | 0% | 3% |
| 15 | Huaura | 4% | 3% | 2% | 3% | 2% | 10% | 0% | 0% | 2% |
| 16 | Chancay | 3% | 4% | 2% | 3% | 2% | 13% | 0% | 0% | 2% |
| 17 | Cañete | 5% | 5% | 5% | 5% | 2% | 15% | 0% | 0% | 3% |
| 18 | Chincha / san Juan | 6% | 10% | 7% | 9% | 6% | 18% | 0% | 0% | 4% |
| 19 | Pisco | 2% | 3% | 8% | 7% | 4% | 18% | 0% | 0% | 3% |
| 20 | Grande | 2% | 5% | 2% | 8% | 4% | 7% | 0% | 0% | 3% |
| 21 | Acari | 2% | 5% | 3% | 8% | 5% | 9% | 0% | 0% | 3% |
| 22 | Yauca | 1% | 1% | 1% | 3% | 2% | 5% | 0% | 0% | 1% |
| 23 | Ocoña | 3% | 5% | 2% | 7% | 4% | 8% | 0% | 0% | 3% |
| 24 | Camana-Majes | 1% | 2% | 1% | 3% | 1% | 5% | 0% | 0% | 1% |
| 25 | Tambo | 0% | 2% | 1% | 5% | 2% | 4% | 0% | 0% | 1% |
| 26 | Osmore | 1% | 1% | 1% | 3% | 1% | 5% | 0% | 0% | 1% |
| 27 | Locumba | 0% | 1% | 0% | 1% | 1% | 1% | 0% | 0% | 0% |
| 28 | Sama | 0% | 0% | 0% | 1% | 0% | 1% | 0% | 0% | 0% |

Table S6. TDS flux (error), M2%, e90, e10, bias and imprecision estimates for annual TDS flux based on Moatar et al. (2013) error monograph for a sampling interval of 30 days and a 3-year monitoring period.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TDS** | Flux (103t.year-1) | M2% | e90 | e10 | Bias (e50) | Imprecision (e90-e10) |
| = a M2%²+b M2% |   |   |   |   |   |   |
| a |   |   | 0 | -0.003 | 0 | -0.007 |
| b |   |   | 1.1 | -0.821 | 0.165 | 0.039 |
| Esmeraldas | 2799 | 0.05 | 4% | -4% | 0.60% | 8% |
|   | (2687-2911) |   |   |   |   |   |
| Tumbes | 333 | 0.15 | 12% | -13% | 1.80% | 25% |
|   | (290-373) |   |   |   |   |   |
| Condorcero | 758 | 0.11 | 9% | -9% | 1.30% | 18% |
|   | (690-826) |   |   |   |   |   |
| Socsi | 329 | 0.07 | 5% | -6% | 0.90% | 11% |
|   | (309-345) |   |   |   |   |   |
| Ocona | 649 | 0.16 | 12% | -14% | 1.90% | 26% |
|   | (558-727) |   |   |   |   |   |

Table S7. Correction coefficient of TDS concentrations applied to the discrete sampling database according to the sampled month.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| month | Esmeraldas | El Tigre | Santa | Cañete | Ocona | Mean (correction coefficient) |
| mean monthly TDS (mg.l-1) | % of the annual mean concentration | mean monthly TDS (mg.l-1) | % of the annual mean concentration | mean monthly TDS (mg.l-1) | % of the annual mean concentration | mean monthly TDS (mg.l-1) | % of the annual mean concentration | mean monthly TDS (mg.l-1) | % of the annual mean concentration | % of the annual mean concentration |
| J | 92 | 79% | 95 | 79% | 150 | 67% | 185 | 70% | 266 | 97% | 79% |
| F | 71 | 61% | 90 | 75% | 172 | 78% | 176 | 67% | 162 | 59% | 68% |
| M | 69 | 59% | 104 | 87% | 142 | 64% | 163 | 62% | 143 | 52% | 65% |
| A | 67 | 58% | 113 | 94% | 175 | 79% | 251 | 96% | 148 | 54% | 76% |
| M | 69 | 59% | 111 | 92% | 189 | 85% | 291 | 111% | 197 | 72% | 84% |
| J | 100 | 86% | 111 | 92% | 293 | 132% | 319 | 121% | 247 | 90% | 105% |
| J | 131 | 113% | 125 | 104% | 286 | 129% | 353 | 134% | 308 | 113% | 119% |
| A | 143 | 123% | 136 | 114% | 313 | 141% | 326 | 124% | 327 | 120% | 124% |
| S | 159 | 137% | 139 | 116% | 308 | 139% | 318 | 121% | 345 | 126% | 128% |
| O | 169 | 146% | 148 | 123% | 250 | 113% | 324 | 123% | 361 | 132% | 127% |
| N | 183 | 158% | 131 | 109% | 230 | 104% | 318 | 121% | 351 | 128% | 124% |
| D | 138 | 120% | 139 | 116% | 152 | 69% | 206 | 78% | 426 | 156% | 108% |