**Table S1.** Time-trend analysis for **18O in monthly composites of precipitation for the 50 longest serving GNIP stations. The **18O data were de-seasonalised by subtracting the seasonal variation derived by fitting a generalised additive model with 7 degrees of freedom to the monthly data at a significance level of *p*=0.050. The null hypothesis (no slope) was tested.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Station** | **No. Years** | ****18O per Year ‰** | **Std. Error** | **df** | ***p*-value** | **Trend?** |
| Adak | 45.8 | -0.013 | 0.011 | 295 | 0.246 | No |
| Addis | 48.8 | 0.010 | 0.010 | 298 | 0.266 | No |
| Ankara | 46.4 | -0.014 | 0.008 | 438 | 0.087 | No |
| Antalya | 46.6 | 0.003 | 0.010 | 320 | 0.770 | No |
| Bangkok | 41.4 | -0.022 | 0.009 | 395 | 0.016 | Yes |
| Barbados | 31.6 | -0.015 | 0.010 | 226 | 0.158 | No |
| Berlin | 27.8 | 0.063 | 0.014 | 322 | 0.000 | Yes |
| Bern | 38.8 | 0.019 | 0.009 | 466 | 0.031 | Yes |
| Braunschweig | 27.8 | 0.064 | 0.014 | 327 | 0.000 | Yes |
| Brisbane | 40.8 | 0.011 | 0.009 | 341 | 0.253 | No |
| Cuxhaven | 27.8 | 0.007 | 0.011 | 328 | 0.567 | No |
| Darwin | 40.8 | -0.035 | 0.013 | 239 | 0.009 | Yes |
| Emmerich | 25.8 | -0.020 | 0.013 | 305 | 0.118 | No |
| Garmisch-P. | 27.8 | 0.039 | 0.015 | 333 | 0.007 | Yes |
| Gibraltar | 48.2 | -0.008 | 0.007 | 258 | 0.217 | No |
| Graz | 29.8 | 0.014 | 0.013 | 353 | 0.256 | No |
| Grimsel | 38.3 | 0.030 | 0.009 | 459 | 0.001 | Yes |
| Groningen | 45.8 | 0.022 | 0.005 | 520 | 0.000 | Yes |
| Guttannen | 38.3 | 0.040 | 0.010 | 457 | 0.000 | Yes |
| Halley Bay | 44.4 | -0.097 | 0.011 | 492 | 0.000 | Yes |
| Harare | 43.0 | 0.000 | 0.012 | 255 | 0.972 | No |
| Hohenpeissenbg. | 25.1 | 0.046 | 0.017 | 281 | 0.008 | Yes |
| Hong Kong | 48.8 | -0.010 | 0.007 | 440 | 0.129 | No |
| Howard AFB | 29.3 | 0.053 | 0.017 | 229 | 0.002 | Yes |
| Jayapura | 30.3 | 0.077 | 0.014 | 307 | 0.000 | Yes |
| Kabul | 27.6 | 0.073 | 0.037 | 107 | 0.054 | No |
| Kaitaia | 29.1 | -0.017 | 0.014 | 239 | 0.230 | No |
| Karlsruhe | 24.5 | 0.031 | 0.016 | 288 | 0.054 | No |
| Klagenfurt | 29.8 | 0.029 | 0.014 | 345 | 0.044 | Yes |
| Koblenz | 24.8 | 0.062 | 0.016 | 292 | 0.000 | Yes |
| Konstanz | 27.8 | 0.052 | 0.014 | 330 | 0.000 | Yes |
| Krakow | 35.8 | 0.012 | 0.011 | 416 | 0.262 | No |
| Leipzig | 19.8 | 0.056 | 0.023 | 219 | 0.016 | Yes |
| Meiringen | 38.3 | 0.066 | 0.010 | 458 | 0.000 | Yes |
| Melbourne | 36.4 | 0.006 | 0.010 | 323 | 0.509 | No |
| Midway Is. | 29.4 | -0.032 | 0.011 | 304 | 0.003 | Yes |
| New Delhi | 47.2 | 0.003 | 0.013 | 339 | 0.820 | No |
| Ottawa | 42.3 | 0.011 | 0.009 | 490 | 0.245 | No |
| Regensburg | 27.8 | 0.091 | 0.015 | 330 | 0.000 | Yes |
| Stuttgart | 44.8 | 0.012 | 0.008 | 436 | 0.145 | No |
| Thonon-les-B. | 39.5 | 0.018 | 0.009 | 463 | 0.051 | No |
| Trier | 27.8 | 0.006 | 0.012 | 331 | 0.634 | No |
| Tunis | 38.7 | 0.002 | 0.013 | 222 | 0.865 | No |
| Valentia | 49.8 | -0.004 | 0.005 | 468 | 0.332 | No |
| Vernadsky | 44.9 | 0.042 | 0.009 | 500 | 0.000 | Yes |
| Vienna | 51.8 | 0.009 | 0.007 | 598 | 0.199 | No |
| Villacher Alpe | 29.8 | 0.071 | 0.014 | 358 | 0.000 | Yes |
| Wallingford | 32.0 | 0.004 | 0.011 | 367 | 0.723 | No |
| Wasserkuppe | 27.8 | 0.030 | 0.012 | 333 | 0.016 | Yes |
| Wuerzburg | 27.8 | -0.001 | 0.014 | 332 | 0.951 | No |

Regensburg, Germany

Timetrends picture

Halley Bay, Antarctica

Timetrends picture