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| **Table S2. Soil temperatures for the various locations used for calculating atmospheric *p*CO2.** Soil temperatures for the calcisols formed at various paleolatitudes were estimated using low-latitude sea surface water temperatures(SST; Joachimski et al., 2012, Sun et al., 2012), assuming a low latitudinal temperature gradient for warm climatic conditions (0.2° C per 1° latitude) as e.g. the Paleocene-Eocene (Zhang et al., 2019; Upchurch et al. 2015), air temperatures 3°C lower than SST (Zhang et al., 2019), and 2 to 4°C warmer soil temperatures compared to atmospheric temperatures (Hu and Feng, 2013). Note: we used a ± 5° C temperature range around calculated average soil temperature for *p*CO2 calculations. |
|  |
|  | Paleolatitude | Late Permian | Early Triassic | Middle Triassic |
|  soil temp (°C) | soil temp (°C) | soil temp (°C) |
|  |   |   |   |   |
| **Xinjiang** | 45° N  |   | 25 - 35  |   |
| **Russia** | 30-35° N  | 15 - 25 | 25 - 35 |   |
| **North China**  | 20° N | 20 - 30 | 30 - 40 | 25 – 35 |
| **UK** | 20° N  |   |   | 25 – 35 |
| **Karoo** | 55-60° S  | 15 - 25 |   |   |
|  |   |   |   |   |
| **Low latitude SST** |   | 26 | 35 | 32 |