



Antarctica: Cooling or Warming?

Armin Bunde (1), Josef Ludescher (1), and Christian Franzke (2)

(1) Univ. of Giessen, Giessen, Germany, (Armin.Bunde@theo.physik.uni-giessen.de), (2) British Antarctic Survey, Cambridge, UK, (chan1@bas.ac.uk)

We consider the 14 longest instrumental monthly mean temperature records from the Antarctica and analyse their correlation properties by wavelet and detrended fluctuation analysis. We show that the stations in the western and the eastern part of the Antarctica show significant long-term memory governed by Hurst exponents close to 0.8 and 0.65, respectively. In contrast, the temperature records at the inner part of the continent (South Pole and Vostok), resemble white noise. We use linear regression to estimate the respective temperature differences in the records per decade (i) for the annual data, (ii) for the summer and (iii) for the winter season. Using a recent approach by Lennartz and Bunde [1] we estimate the respective probabilities that these temperature differences can be exceeded naturally without inferring an external (anthropogenic) trend. We find that the warming in the western part of the continent and the cooling at the South Pole is due to a gradually changes in the cold extremes. For the winter months, both cooling and warming are well outside the 95 percent confidence interval, pointing to an anthropogenic origin. In the eastern Antarctica, the temperature increases and decreases are modest and well within the 95 percent confidence interval.

[1] S. Lennartz and A. Bunde, Phys. Rev. E 84, 021129 (2011)