

Reply to comments by H. Bjornsson et al. on “Iceland as a heat island”

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[1] *Bjornsson et al.* [2005] (hereinafter referred to as BJJ) make two critical points about our paper on Iceland [Douglass et al., 2005]. The first is that BJJ’s own analysis of temperature trends in Iceland “does not support [our] conclusions” that “recent temperature increases in Iceland are due to variations in thermal heating.” The second is that one of BJJ’s maps is not the same as our corresponding map, despite having originated in the same data set. The authors’ first point is moot, because they only reinforce our actual findings. Below we briefly discuss, but do not immediately resolve, the map problem.

[2] In the paper we note that Iceland’s considerable geothermal activity suggests a connection to the observed data, but after pointing out the quantitative inadequacy of the geothermal hypothesis we state “...the temperature trends we observe must be due to complex persistent microclimate effects that do not conform to simple forcing theory and which involve quite large positive feedbacks.” Even in our introduction, we point out the quantitative results and refer to them as “an unresolved puzzle.” BJJ also refer to our observation of the extended nature of the warming trend as a “*contention* that the geothermally enhanced warming extends over an area far larger than Iceland...” (emphasis ours). This was neither said nor implied in our paper. The large extent of the warming trend was presented as observed fact, not “*contention*,” and with no specific claim that the warming was “geothermally enhanced.” The mapping discrepancy may be related to different methods of data conversions from the original Gaussian grid to a $2.5^\circ \times 2.5^\circ$ grid. Our published map was produced by a bilinear interpolation program GG2LL, which is found at the web site containing the NCEP data [Kistler et al., 2001] (data available at <http://dss.ucar.edu/datasets/ds090.2/data/monthly/>). We are looking into the discrepancy further, and at this time can remark only that

either version of the 2-m map under discussion is generally consistent with both our higher-altitude maps and our conclusions.

[3] We welcome BJJ’s alternative hypothesis that changes in sea ice cover may have caused the large observed warming trend. Indeed one of the purposes of our paper was to call attention to this interesting anomaly. One hopes that the extensive literature quoted by the authors can produce a quantitative explanation. We are not ready to accept the authors’ hypothesis that the local anomaly is simply part of a global warming trend, especially as it applies to the time period we studied. As shown by Douglass et al.’s [2005] Figures 1a and 1b, the anomaly in question is unique to latitudes at and above that of Iceland.

[4] We take this opportunity to remind readers that the observed anomalies are not simply at the surface. A finding that tends to be obscured by this discussion was that the 1979–1996 anomaly has an altitude effect whose existence implies a strong long-term correlation in warming and cooling processes at different altitudes. The sea-ice hypothesis may be consistent with this, but a quantitative explanation remains to be found.

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References

- Bjornsson, H., T. Jonsson, and T. Johannesson (2005), Comment on “Iceland as a heat island” by D. H. Douglass et al., *Geophys. Res. Lett.*, *32*, L24714, doi:10.1029/2005GL023793.
- Douglass, D. H., V. Patel, and R. S. Knox (2005), Iceland as a heat island, *Geophys. Res. Lett.*, *32*, L03709, doi:10.1029/2004GL021816.
- Kistler, R., et al. (2001), The NCEP-NCAR 50-year reanalysis: Monthly means: CD-ROM and documentation, *Bull. Am. Meteorol. Soc.*, *82*, 247–267.

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