

Supplementary File for: Nordli Ø., Przybylak R., Ogilvie A.E.J. & Isaksen K. 2014. Long-term temperature trends and variability on Spitsbergen: the extended Svalbard Airport temperature series, 1898-2012. *Polar Research* 33. Correspondence: Øyvind Nordli, Division for Model and Climate Analysis, Research and Development Department, Norwegian Meteorological Institute, PO Box 43 Blindern, NO-0313 Oslo, Norway. E-mail: peron@met.no.

Parallel measurements at Svalbard Airport

The temperature and humidity sensors at Svalbard Airport were moved to a new position on 5 October 2010, 150 m in a direction 90° from the old site and farther from the runway. The relocation was followed by parallel measurements at the new and old sites from 27 October 2010 to 8 November 2011 in order to detect possible temperature differences between the two sites (see the table below).

Supplementary Table S1. Temperature differences between the new and old sites at the station Svalbard Airport: monthly mean temperature (T), monthly mean of daily maximum temperature (T_x) and monthly mean of daily minimum temperature (T_n).

| Month | T | | T _x | | T _n | |
|-------|-------|------|----------------|------|----------------|------|
| | mean | SD | mean | std | mean | SD |
| Jan | -0.07 | 0.15 | -0.10 | 0.27 | -0.02 | 0.28 |
| Feb | -0.04 | 0.13 | -0.10 | 0.26 | 0.06 | 0.28 |
| Mar | 0.00 | 0.14 | -0.01 | 0.19 | 0.22 | 0.41 |
| Apr | 0.06 | 0.12 | 0.05 | 0.56 | 0.06 | 0.30 |
| May | -0.04 | 0.11 | -0.16 | 0.27 | 0.09 | 0.16 |
| Jun | -0.03 | 0.07 | -0.06 | 0.15 | -0.08 | 0.12 |
| Jul | -0.05 | 0.08 | -0.08 | 0.18 | -0.06 | 0.15 |
| Aug | -0.05 | 0.22 | -0.05 | 0.38 | -0.19 | 0.36 |
| Sep | -0.08 | 0.15 | -0.10 | 0.32 | -0.08 | 0.24 |
| Oct | -0.02 | 0.29 | -0.19 | 0.35 | 0.02 | 0.30 |
| Nov | -0.09 | 0.12 | -0.13 | 0.23 | 0.04 | 0.36 |
| Dec | -0.07 | 0.08 | -0.23 | 0.08 | 0.04 | 0.28 |

The monthly-mean differences all fall in the interval -0.09 °C to $+0.06$ °C, i.e., less than may be expected in routine measurements on ordinary meteorological stations. See the next section for calibration results of the sensor at the old site.

Calibration of data loggers used at Svalbard Airport and at Crozierpynten

At the site Crozierpynten a UTL-3 logger from the firm Geotest A/G (Zollikofen, Switzerland) was used instead of the standard equipment. In order to ensure sufficient data quality from the sensor, it was calibrated at five fixed points ranging from -17 °C to $+21$ °C. The sensor showed good quality so only minor linear corrections were necessary: $+0.16$ and -0.04 at temperatures -17 °C and 21 °C, respectively. A Tinytag temperature data logger (Gemini, Chichester, West Sussex, UK) was used in

the old temperature screen at Svalbard Airport in order to perform parallel measurements with the new site. This logger was also calibrated together with the UTL-3 logger in the same temperature interval. This logger performed so well that no correction was needed.

Ice cover near the observation stations

Ice cover will affect temperature at the observation stations so knowledge of ice cover is crucial. Today detailed maps are available that make it possible to know the local ice cover near the sites. Shown below are stations 99737 Svarttangen, 99752 Sørkappøya, 99765 Akseloya and 99928 Crozierpynten, which are local series incorporated in the composite Svalbard Airport series. Ice cover near the main station 99840 Svalbard Airport is also shown below. The ice-cover observations are taken from the Norwegian Meteorological Institute’s internet site Polar View—European Arctic Node (<http://polarview.met.no/>), where there is an ice archive. Two classes of ice cover are shown below: 9/10 – 10/10 (green) and 7/10 – 9/10 (yellow). Less than 7/10 cover is shown as white.

| Time | 99737 | 99752 | 99765 | 99928 | 99840 |
|------------|--------|--------|-------|--------|-------|
| 01.12.2010 | Yellow | | | | |
| 15.12.2010 | Green | Yellow | | | |
| 30.12.2010 | Green | | | | |
| 15.01.2011 | Green | | | | Green |
| 01.02.2011 | Green | | | | Green |
| 15.02.2011 | Green | | | Yellow | Green |
| 01.03.2011 | Green | | | | Green |
| 15.03.2011 | Green | | | | Green |
| 01.04.2011 | Green | | | | Green |
| 15.04.2011 | Green | | | | Green |
| 01.05.2011 | Green | White | Green | | Green |
| 16.05.2011 | Green | White | Green | | Green |
| | | | | | |
| 01.12.2011 | | | | | |
| 15.12.2011 | | | | | |
| 30.12.2011 | | Yellow | | | |
| 15.01.2012 | | | | | |
| 01.02.2012 | | | | | |
| 15.02.2012 | | | | | |
| 01.03.2012 | | | | | |
| 15.03.2012 | | | | | |
| 01.04.2012 | Green | | | | |
| 15.04.2012 | Green | | | | |
| 01.05.2012 | White | Green | | | |
| 16.05.2012 | White | Green | | | |
| 01.06.2012 | | | | Green | |