

Extensive Antarctic campaign finds cold bias in satellite records

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Advances in satellite sensing have now made it possible to track changes in the world's most remote locations. Over the Antarctic continental interior, the vast majority of profiles of atmospheric temperature are provided by satellite remote sensing, making proper calibration of the satellite observational equipment and analysis algorithms particularly important. However, the hostile environmental conditions in regions such as the Antarctic make it difficult or even dangerous to conduct the in-the-field observations needed to calibrate and validate the satellite observations.

From September through December 2010, Wang et al. carried out an extensive program to directly measure atmospheric temperature profiles over coastal and interior Antarctica and over the surrounding ocean. The researchers launched 13 Driftsondes, gondola-laden stratospheric balloons that carry up to 56 individual dropsondes-sensors designed to measure the pressure, temperature, humidity, and wind speed and direction as they fall from the stratosphere to the surface. Using the dropsondes, the authors collected 639 profiles of the Antarctic atmosphere. The campaign produced a collection of observations that spanned the southern continent and provided an opportunity to assess the skill of various remote-sensing satellites.

Comparing their observations against coincident measurements made with 10 different satellite sensors, the authors find that 9 of the 10 sensors consistently underestimated Antarctic atmospheric temperatures and that errors are generally larger over the continental interior than

along the coast. The findings reveal that the cold biases can be from 0 to 4 degrees Celsius (0 to 7 degrees Fahrenheit), depending on the satellite sensor and the altitude of the atmosphere being observed. Despite the cold bias, however, the satellites do tend to properly represent the [atmospheric temperature](#) profile's shape.

More information: Unprecedented upper air dropsonde observations over Antarctica from the 2010 Concordiasi Experiment: Validation of satellite-retrieved temperature profiles, *Geophysical Research Letters*, [doi:10.1002/grl.50246](https://doi.org/10.1002/grl.50246), 2013 onlinelibrary.wiley.com/doi/10.1002/grl.50246/abstract

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