



Observations and analysis of the far-infrared downwelling radiance from the Dome C site, Antarctica: a 7-year time series

Giovanni Bianchini, Luca Palchetti, and Gianluca Di Natale
INO-CNR, Sesto Fiorentino, Italy (giovanni.bianchini@ino.it)

Since December, 2011 an integrated observation system based on the REFIR-PAD Fourier transform spectroradiometer has been established at the station Concordia, on the East Antarctic plateau (75°06'S, 123°23'E, 3233 m a. s. l.).

The REFIR-PAD instrument provides spectrally-resolved measurements of the downwelling atmospheric emitted radiance in the 100-1500 cm⁻¹ range, thus including the far-infrared region; together with a set of auxiliary sensors connected to a single data acquisition and storage system these measurements provide a valuable tool for the characterization of the Antarctic troposphere.

The observation system is operating in continuous acquisition mode since its installation, thus providing an unique, more than 7-year long, time series of atmospheric radiances and ancillary data.

Polar regions are the main radiative sink of the Earth system, thus the monitoring of their atmosphere has a high relevance for climate studies. Broad band, spectrally resolved radiance measurements as those performed by REFIR-PAD fulfill a twofold task, providing a characterization of the atmospheric radiation including the identification of its main contributing components, but also allowing for the retrieval of the atmospheres structure and composition through the analysis of the measured spectra.

This kind of analysis is particularly interesting in the polar context, since it includes the far-infrared region of the spectrum in which, due to the low temperatures involved, a great part of the radiative exchange takes place.

A description of the currently operating observation system will be presented, together with some preliminary results from the analysis of the measurements performed in the 2012-2018 period.