

6.2 MONITORING OF THE NEXRAD NETWORK USING SOLAR SIGNALS

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During the past decade we have developed and characterized a method for using solar signals for monitoring operational weather radars and networks thereof. The method relies on signals resulting from occasional solar interferences in the radar antenna during operational scanning. There is no need for dedicated radar scans or interruption of the operational scanning. In a series of publications we have shown that the solar method can reliably be used to determine the antenna pointing, identify signal processor issues, keep track of receiver chain stability and calibration, and monitor the balance between horizontal and vertical polarization receiver chains. The solar method has already been taken into use by numerous national weather services in Europe, Canada, Australia and South Africa, and its operational use has proven to be highly effective in reducing radar downtimes, in focussing maintenance activities, and in keeping radars calibrated.

NEXRAD is the homogenous network of 160 high-resolution S-band weather radars operated by the National Weather Service in the USA. Volumetric data (level II) from this network are available online and this makes NEXRAD ideal for demonstrating the application of our solar method on a continental-scale radar network. The level-II data contain for each radial a noise power estimate and when a scanning radar antenna hits the sun the observed noise power will be higher. Our decoding software extracts the radial-based noise power estimates for the horizontal and vertical receiver channels (converted to solar flux units) and relevant metadata, such as the azimuth, elevation, observation time and radar location. Furthermore, we have optimized our solar modelling method for analysing the NEXRAD noise power data.

Here we present the first results from the application of our solar method on a continental-scale radar network. The results demonstrate that the solar method can provide great benefits for monitoring and harmonizing national and transnational operational radar networks.
