



## **The Austrian radiation monitoring network ARAD – best practice and added value**

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The Austrian RADiation monitoring network (ARAD) has been established to advance the national climate monitoring and to support satellite retrieval, atmospheric modelling and solar energy techniques development. Measurements cover the downwelling solar and thermal infrared radiation using instruments according to Baseline Surface Radiation Network (BSRN) standards. A unique feature of ARAD is its vertical dimension of five stations, covering an air column between about 200 m a.s.l. (Vienna) and 3100 m a.s.l. (BSRN site Sonnblick). The contribution outlines the aims and scopes of ARAD, its measurement and calibration standards, methods, strategies and station locations. ARAD network operation uses innovative data processing for quality assurance and quality control, applying manual and automated control algorithms. A combined uncertainty estimate for the broadband shortwave radiation fluxes at all five ARAD stations indicates that accuracies range from 1.5 to 23 %. If a directional response error of the pyranometers and the temperature response of the instruments and the data acquisition system (DAQ) is corrected, this expanded uncertainty reduces to 1.4 to 5.2 %. Thus, for large signals (global: 1000 W m<sup>-2</sup>, diffuse: 500 W m<sup>-2</sup>) BSRN target accuracies are met or closely met for 70 % of valid measurements at the ARAD stations after this correction. For small signals (50 W m<sup>-2</sup>), the targets are not achieved as a result of uncertainties associated with the DAQ or the instrument sensitivities. Additional accuracy gains can be achieved in future by additional measurements and corrections. However, for the measurement of direct solar radiation improved instrument accuracy is needed. ARAD could serve as a powerful example for establishing state-of-the-art radiation monitoring at the national level with a multiple-purpose approach. Instrumentation, guidelines and tools (such as the data quality control) developed within ARAD are best practices which could be adopted in other regions, thus saving high development costs.