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Atmospheric Measurement Techniques Discussions

Interactive comment on "The Austrian radiation monitoring network ARAD – best practice and added value" *by* M. Olefs et al.

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Response to Referee 1

This is the response to the comments of Joseph Michalsky (R1). We thank Dr. Michalsky for his positive judgement of the ARAD network and the helpful comments and suggestions on the manuscript. We updated the manuscript following the referee's comments as detailed below: 1. We agree that 'accuracy' is a better term than 'precision' and rephrased accordingly throughout the manuscript. 2. We detail that expanded uncertainties refer to the 95% level when this term is used for the first time in the manuscript. Furthermore the section discussing uncertainties in ARAD measurements was extended in the revised manuscript following the editorial comments of Dr.

Ammann. 3. The referee points out that the low resolution of voltage measurements is a shortcoming of the current ARAD setup. We are aware of this shortcoming (as noted in the manuscript and acknowledged by the referee) and are planning to upgrade the data acquisition system, to allow for higher resolutions and accuracies of the voltage measurements at all ARAD sites, over the next year(s). This information is now provided in the revised manuscript. 4. The referee points out that some sections of the manuscript contain non-standard English constructions. We carefully revised the manuscript and updated language and grammar.

Response to Referee 2

This is the response to the comments of Rolf Philipona (R2). We thank Dr. Philipona for his positive judgement of the ARAD network and the helpful comments and suggestions on the manuscript. We updated the manuscript following the referee's comments as detailed below: 1. We agree with the referee that the term 'downwelling', although ill-suited for the reasons detailed by the referee, has been used within the community for many years. We replaced 'downwelling' with 'downward' throughout the manuscript.

Response to the Editor

This is the response to the editorial comments of Christof Ammann (Editor). We thank Dr. Ammann for his positive judgement of the ARAD network and the helpful comments and suggestions on the manuscript. We updated the manuscript following the editor's comments as detailed below: 1 We included the uncertainty calculation for ARAD measurements following BSRN guidelines in the updated version of the manuscript. We updated Sect. 4 as well as the conclusions and the abstract of the manuscript, referring now to the combination of both the absolute and relative value of the combined expanded uncertainties as given in table 7 and corresponding to common practice, the BSRN standards and the suggestion of the editor. Following Vuilleumier (2014), we wish to keep the uncertainty estimates for high/low radiation levels (ss, ls) as these cover the typical range of measured radiation values at the given sites and thus char-

acterize the typical uncertainty and highlight that ARAD measurements are in majority (70% of observations) within BSRN requirements for large signals while BSRN targets for small signals are (and cannot) be achieved with the current instrument setup. As mentioned in the discussion (section 6 (2)), a further step in the future will be to operationally provide those uncertainties as meta information for every timestep to all users of the ARAD data.

2. We provide “expanded uncertainties” in the manuscript following suggestions in JCGM (2008) and Gupta (2012) and as defined in the BSRN guidelines on p. 159 (Mc Arthur, 2005). The way “expanded uncertainties” are treated in our manuscript they correspond to 95% confidence levels. This is detailed in the revised version of the manuscript at the end of section 1 when the term “expanded uncertainties” is introduced for the first time. For convenient reference we provide also the reference to JCGM (2008) in the revised version of the manuscript. Finally, the calculation of both the standard and the expanded uncertainties seems necessary for two reasons: (1) it corresponds to a standard metrological procedure for the assessment of uncertainty of a measurement as recommended in section 8 of JCGM (2008) as well as in Gupta (2012) and e.g. demonstrated by Reda (2011) or Vuilleumier (2014)), (2) standard uncertainties of our measurements need to be converted into expanded uncertainties (95% level) in order to get comparable values to the BSRN target accuracies defined in Mc Arthur (2005).

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