



Solar radiation measurements from coordinated radiosonde flights during the 20th March 2015 solar eclipse

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Solar radiation sensors can be carried on standard weather balloon packages and provide additional information about the atmosphere's vertical structure beyond the traditional thermodynamic measurements [1]. An interesting set of circumstances for such sensors occurs during a solar eclipse, which provides a rapidly changing solar radiation environment within the duration of a typical free balloon flight. Coordinating several launches of solar radiation measuring radiosondes brings a good likelihood of at least one being above any cloud during the maximum eclipse, allowing solar eclipse radiation measurements for comparison with theory. For the 20th March 2015 solar eclipse, a coordinated campaign of balloon-carried solar radiation measurements was undertaken from Reading (51.44N, 0.94W), Lerwick (60.15N, 1.13W) and Reykjavik (64.13N, 21.90W), straddling the path of the eclipse. All three balloons reached sufficient altitude at the eclipse time for eclipse-induced variations in solar radiation and solar limb darkening to be measured above cloud. Because the sensor platforms were free to swing, techniques have been evaluated to correct the measurements for their changing orientation. These approaches, which are essentially independent, give values that agree with theoretical expectations for the eclipse-induced radiation changes.

[1] K.A. Nicoll and R.G. Harrison, Balloon-borne disposable radiometer *Rev Sci Instrum* 83, 025111 (2012) doi: 10.1063/1.3685252