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Volcanic plume-top altitudes during the Eyjafjallajökull 2010 eruption

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We present a unique, high resolution time-series of the variations in plume height during the eruption of the Eyjafjallajökull volcano, Iceland, 14 April - 23 May 2010. Scans were made every 5 minutes by the weather radar of the Icelandic Meteorological Office, located 154 km from the volcano. Because of the discrete elevation angles of the radar and the long distance to the volcano, the plume-top altitude estimates are grouped in discrete steps at about 2.8, 3.9, 5.0 and 7.9 km. The telecommunications company Mila installed webcams to monitor the eruption; the webcam-photos were saved every 5 sec. From several known landmarks on the photographs we defined a vertical height-scale above the volcano. During periods when the plume was visible, we have analysed the photos every 5 minutes to create a time-series of the plume-top altitude. Comparison of the radar and webcam time-series shows that the radar was far superior to the webcam in monitoring the eruption plume; the radar gave useful information over 80% of the time, compared to 20% for the webcam. However, on a clear day, the height resolution of the photos is an order of magnitude better than that of the radar. In the altitude range where both instruments provided useful estimates, there is good consistency between the two, with mean difference on the order of 100 m.