

A comparison of turbulence measurements made by balloon-borne accelerometers and MST radar

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Atmospheric turbulence costs the airline industry in the region of \$100 million each year. Furthermore, some types of turbulence are expected to become more common in the coming decades as a result of climate change. One of the main issues with turbulence is that it is hard to predict, due partly to a lack of consistent observations. Here a balloon-borne method that attaches an accelerometer to a standard radiosonde using the Programmable ANalogue and Digital Operational Radiosonde Accessory (PANDORA) system is used. As the balloon ascends and encounters turbulence it will cause the radiosonde beneath to swing. The amplitude of the swings is measured by the accelerometer and can be used to infer information about the turbulence intensity, as more intense turbulence will yield larger swings. A special observational campaign was undertaken in early 2015, during which 18 accelerometer radiosondes were launched from the Aberystwyth MST Radar site. The standard deviation of radiosonde accelerations was compared with beam-broadening corrected values of radar return spectral widths. There was good overall agreement at tropospheric altitudes. However, owing to a lack of suitable conditions during the campaign period, it is not yet possible to be sure how good the technique is for stratospheric layers of turbulence.