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One-year analysis of dust detection using dipole electric field antennas at Mars by MAVEN

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Detection of dust grains in space is limited by a small number of dedicated dust detectors, however, we aim to study dust detection using electric field instruments usually placed on the majority of scientific spacecraft. This technique has been previously applied to detect dust impacts in space for several decades. The major advantage of this method is that entire spacecraft surface acts as a detector. We present a preliminary statistical analysis of 1-year (2015) observations of dust impacts by the Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft. The pulses generated by dust impacts were identified in data of the Langmuir Probe and Wave instrument operating in a dipole configuration (probe to probe potential measurement). Out of all the modes we use the medium frequency burst mode, the data covers 62.5 milliseconds using 4096 measured points which gives us a sampling frequency of 66.67 kHz. First, our algorithm selected events for which the derivative exceeded a threshold value. Second, these preselected events were further categorized into groups. Several groups contained suspicious events which are most likely not related to dust impacts. In total, we find 9848 events at altitudes ranging from less than 200 to 6000 kilometers that we can interpret as dust impacts. The distribution of these dust events around the Mars orbit is discussed.