Reviewer 2 Comments and Response

Please address the capabilities of the methods in terms of the signal's lifetime and amplitudes. In case the machine learning method is replaced instead of the current onboard dust detection algorithm, does this method works for the different lifetime of the dust signals, for instance?

We have now addressed the constraints of the method in section 5.2. Note that we refer to the "lifetime of the dust signals" more generally as the "dust impact shape" and that the amplitude is constrained by the detection threshold (~5 mV) of the RPW-TDS instrument (discussed in section 2.1 of the revised manuscript).

Section 3.4.1 Feature Extraction: Please compare the two features selected in this study and the dust detection algorithm employed onboard TDS.

The TDS feature extraction routine is not publicly available. We can therefore not directly compare the feature extraction techniques themselves. However, the performance of the TDS algorithm is thoroughly compared to the 2-feature SVM technique in section 4. Furthermore, a more detailed description of the TDS classifier is now included in Section 2.2.

Figure 4: How is the 'decision line' defined?

The decision line is defined by a polynomial of degree 2. Where the polynomial parameters are found by minimizing the non-separable SVM cost function. This is now stated explicitly in Figure 4. The mathematical formulation of the optimization problem is however not trivial and beyond the scope of this article to discuss. The curious reader is directed to Theodoridis and Konstantinos (2009) in the article.

Figures 4 and 5: Is the similar classification confirmed for the CNN results as well?

Yes, the same data set (the testing data) is used to obtain the CNN results. This is now stated in Figure 8.

Figure 9: What are the highlighted area in a-i)?

The following text is added to Figure 9 to describe the highlighted area:
"The highlighted green color indicates the CAM values associated with the *dust* class, the green regions therefore emphasize the regions that are considered important by the CNN for the *dust* class. Similarly, the red color indicates the regions that are influential for the *no dust* class."

Figure 11: Both SVM and CNN dust detection seem to have a local minimum around the perihelion, while TDS results are largely scattered and have a maximum around the perihelion. Is there any explanation for this?

This is an important observation that we have not noticed. The local minima may be due many reasons, now discussed in the article text. The main reason (as we propose) is that there is an asymmetry in the interstellar dust flux when going towards perihelion (upstream of the interstellar dust flux) and away from the perihelion (downstream) which might lead to a sharp

dip in the dust impact rates around perihelion. We can however not confidently state that this is the cause of the local minima around the perihelia, since the Poisson dust impact rate variation is quite large in this region, as can be seen in the updated Figure 11 (with included errorbars).