



Cluster/FAST conjunctions as a tool to investigate auroral acceleration

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Cluster/FAST conjunctions provide a powerful tool to investigate auroral phenomena, in particular the auroral acceleration region (AAR). We present results of a systematic search through almost 6 years of data, acquired by the two spacecraft since January 2001, when Cluster became operational. We started by looking for time intervals when Cluster is close to perigee (at $\sim 20,000$ km) and FAST close to apogee (at $\sim 4,000$ km), with both satellites above the winter, nightside auroral oval. Such a configuration offers two measuring platforms that encompass the AAR — with Cluster closely above it and FAST occasionally skimming its bottom side. After the selection stage based just on orbit information, which resulted in slightly over 100 conjunctions (out of more than 1500), and the manual examination of these data, we were finally left with just a few events, including three cases when FAST crosses the AAR. For the final events we derive the field-aligned potential drop by using FAST electron data, when the satellite is below the AAR, to which we add ion data within the AAR, and compare it with the value inferred from Cluster ion data. Sometimes the agreement is remarkably good, consistent with a quasi-static character of the potential drop on the ~ 1 min ion transit time scale between the ionosphere and Cluster. The results are discussed with respect to the geophysical conditions, the proximity of the conjunctions, and the oxygen content of the upflowing ions. Given their scarcity and the quality of the data, the events to be presented are rather unique, and offer good prospects for further comparison with simulations.