



Coordinated studies of the Geospace environment using Cluster, satellite and ground-based data: An interim review

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A little more than four years after its launch, the first magnetospheric multi-satellite mission Cluster has already tremendously contributed to our understanding about the coupled solar wind - magnetosphere - ionosphere system. This is mostly due to its ability, for the first time, to provide instantaneous spatial views of structures in the system, to separate temporal and spatial variations, and to derive velocities and directions of moving structures. Ground-based data have an important complementary impact on Cluster-related research, as they provide a larger-scale context to put the spacecraft data in, allows to virtually enlarge the spacecrafts' field of view, and make it possible to study in detail the coupling between the magnetosphere and the ionosphere in a spatially extended domain. We present an interim review of cooperative research done with Cluster and ground-based instruments, including the support of other space-based data. We first give a short overview of the instrumentation used, and present some specific data analysis and modeling techniques that have been devised for the combined analysis of Cluster and ground-based data. Then we review highlight results of the research using Cluster and ground-based data, ordered into dayside and nightside processes. Such highlights include, e.g., the identification of the spatio-temporal signatures of the different modes of reconnection on the dayside,

and the detailed analysis of the electrodynamic magnetosphere-ionosphere coupling of bursty bulk flows in the tail plasma sheet on the nightside.