

# CLUSTER AND DOUBLE STAR OBSERVATIONS OF GEOMAGNETIC STORMS DURING THE LAST DECADE

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The launch of the Cluster spacecraft almost coincided with one of the largest geomagnetic storm of the last decade, well known as the "Bastille Day" storm, on 14-15 July 2000. Planned on 15 July, the launch was aborted a few minutes before due to a thunderstorm that had hit the Baikonour cosmodrome and made a disruption in the communication lines with the rocket. The launch took place the day after, on 16 July 2000. Our US colleagues had warned us about the storm and recommended not to launch on 15 July. Given the facts that (1) Cluster was built to study the effects of space weather and geomagnetic storms and (2) that the Russian launch authorities were not concerned for the Soyuz rocket, it was decided to go ahead with the launch. The launch was fine and, after a second launch less than a month later, the four Cluster spacecraft were put successfully in their 4x19 RE polar orbit. Since then, Cluster has observed many geomagnetic storms and could observe, for the first time with a constellation of four spacecraft, the dynamics induced in the magnetosphere by coronal mass ejections or interplanetary shocks coming from the Sun. In this talk we will use storms observed by Cluster and Double Star in the last decade to illustrate how the magnetosphere was affected, including: impact of the arrival of ICMEs to Earth, large compressions of the magnetosphere, distortions of the polar cusp, acceleration of particles associated with chorus and ULF waves, intensification of the ring current imaged by energetic neutral atom imagers, and oxygen outflow from polar regions. The Cluster Science Archive which gives public access to all Cluster data (including highest resolution) will be briefly described.