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From interplanetary space to the ground: The development of magnetic structures and their signatures

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We use a special conjuntion of several satellites (ACE, Wind, Cluster, THEMIS, Geotail and DoubleStar) and ground based magnetometers and cameras, on 14 June 2007, to follow rotational magnetic structures from the solar wind, via amplification through the bow shock, motion of the magnetopause and signatures on the ground.

The structures crossing the quasi-perpendicular bow shock are amplified as expected ($\sim$ factor 2) and further compressed when moving towards the magnetopause. Timing analysis on the structures in the magnetosheath shows that they are moving along with the magnetosheath plasma flow. The structures have slightly different characters with respect to the location of the spacecraft, either pre- or post-noon, both in the solar wind and in the magnetosheath. At the same time that these two structures are observed near Earth, there are strong poleward motions of the aurora and the THEMIS ground magnetometer stations show strong magnetic activity.

We will follow these structures from the solar wind to the ground and discuss the various processes that are taking place in a first time “three dimensional” view of near Earth space.