

CONSTRAINING SUBSTORM ONSET FROM COMBINED SPACE- AND GROUND-BASED OBSERVATIONS

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Any solution to the substorm onset problem will involve the combination of observations from multiple space- and ground-based sources. Here we present observations at and around a substorm onset on 1st October 2005 from Cluster, Double Star, IMAGE & Geosynchronous Satellites and ground-based magnetometers & riometers from the CARISMA and NORSTAR arrays. The observations reveal a complex substorm preceded by several auroral activations at different latitudes and local times, the locations of which are constrained through the analysis of both ground- and space-based data. The near-Earth onset instability and the formation of the substorm current wedge were potentially observed in-situ by Double Star TC-2. As the substorm developed, higher latitude geomagnetic bays, larger than the auroral zone bays detected around onset, were observed. These bays are linked to the onset of reconnection of open magnetic flux through magnetotail data taken by the Cluster spacecraft.

This event provides a good example of the need for synoptic measurements taken throughout the entire magnetosphere-ionosphere system when studying the complexities of the substorm process.

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