

# **NEAR-EARTH MAGNETIC SIGNATURE OF MAGNETOSPHERIC SUBSTORMS AND AN IMPROVED SUBSTORM CURRENT MODEL**

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Based on a comprehensive catalogue with more than 4000 substorm entries from the years 2000--2005, the spatial distribution of the substorm-related magnetic signature at mid and low latitudes around local midnight is investigated. Superposed epoch analysis of a larger number of recent observatory data from mid and low latitudes revealed a field strength increase that is consistent with the results of earlier studies. For the first time, the magnetic signature of the substorm current wedge formation is studied also in near-Earth satellite data from CHAMP. The average maximal deflection measured on board the satellite is smaller by a factor of 2 than that determined from ground observations. The near-Earth and ground-based magnetic field observations cannot be described adequately by a simple current wedge model. A satisfactory agreement between model results and observations at satellite height and on ground can be achieved only if the current reconfiguration scenario combines the following four elements: (1) a gradual decrease of the tail lobe field; (2) a re-routing of a part of the cross-tail current through the ionosphere; (3) eastward ionospheric currents at low and mid latitudes driven by Region-2 field-aligned currents; and (4) a partial ring current connected to these Region-2 FACs.

Keywords: Magnetospheric Substorms, Reconfiguration, R2 Field-aligned currents

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