LETTERS

Comment on "Unraveling the Causes of Radiation Belt Enhancements"

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The excellent article by M. W. Liemohn and A. A. Chan on the radiation belts (see *Eos, 88*(42), 16 October 2007) is misleading in its implication that the disturbance storm-time (*Dst*) index is an indicator of a magnetospheric ring current. That index is formed from an average of magnetic data from three or four low-latitude stations that have been fallaciously "adjusted" to a magnetic equatorial location under the 1960's assumption [*Sugiura*, 1964] that the fields arrive from the growth and decay of a giant ring of current in the magnetosphere. In truth, the index has a negative lognormal form [*Campbell*, 1996; *Yago and Kamide*, 2003] as a result of its composition from numerous negative ionospheric and magnetospheric disturbance field sources, each having normal field amplitude distributions [*Campbell*, 2004]. Some partial ring currents [*Lui et al*., 1987] and their associated field-aligned currents, as well as major ionospheric currents flowing from the auroral zone to equatorial latitudes, are the main contributors to the *Dst* index. No full magnetospheric ring of currents is involved, despite its false name ("Equatorial *Dst* Ring Current Index") given by the index suppliers, the Geomagnetism Laboratory at Kyoto University, Japan.

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Numerous current systems contribute to the magnetic perturbations used to calculate the *Dst* index. Ionospheric and field-aligned current effects are minimized, although not always well [e.g., *Friedrich et al*., 1999], by averaging measurements from a worldwide chain of low-latitude stations. The index is imperfect, but it has been shown that Biot-Savart magnetic perturbations from magnetospheric currents derived from in situ particle observations can account for most of the *Dst* variation [*Greenspan and Hamilton*, 2000; *Turner et al*., 2001; *Jorgenson et al*., 2004].

Lognormal distributions occur when many independent perturbations are initiated together but with each having a different growth and decay timescale. *Liemohn and Kozyra* [2003] showed that this scenario describes the ring current. The storm-time ring current (at first partial, eventually symmetric) can be thought of as a collection of many small currents created by the trajectories of the individual streams of particles swarming through the inner magnetosphere. These particles take different times to convect through the region and have different collisional decay lifetimes, depending on particle species, pitch angle, energy, and injection location. Therefore, although the *Dst* index is known to be flawed, we maintain that there is a significant link between *Dst* and the ring current.

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MEETINGS

First Coastal Altimetry Workshop

Cooperative Institute for Oceanographic Satellite Studies/National Oceanic and Atmospheric Administration Coastal Altimeter Workshop; 5–7 February 2008, Silver Spring, Maryland

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Satellite radar altimeter measurements of sea surface height (SSH), significant wave height, and wind speed have many potential applications in coastal zones, despite the common perception that altimetry does not "work" near the coast. The altimeter's primary measurement, the radar travel time from the spacecraft to the sea surface, is reliable seaward of 10 kilometers from the coast, and sometimes closer. The Ocean Surface Topography Mission altimeter on Jason 2, launched on 20 June 2008, has a new tracking mode that may recover more data in the coastal zone, and the launch of CryoSat 2 next year will demonstrate the coastal capabilities of a delay-Doppler altimeter. Turning radar travel time into accurate SSH requires ancillary water vapor radiometer measurements that may become unreliable within 50 kilometers of the coast. Interpretation of SSH data in the coastal zone is complicated where tides and other SSH corrections may change abruptly over shallow coastal shelves or near land.

A workshop on coastal altimetry was convened to explore the challenges and opportunities of altimetry in the coastal zone. Fifty-five participants, primarily from U.S. and European institutions, attended. The workshop was sponsored by the U.S. National Oceanic and Atmospheric Administration (NOAA), NASA, and the Cooperative Institute for Oceanographic Satellite Studies at Oregon State University.

Experts in altimeter and ancillary data retrieval, high-resolution regional-scale modelers, and users of data and model out-