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A statistical and event study of magnetotail dipolarizations

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A statistical study of dipolarizations of the Earth's magnetotail has been performed using 7 years (2001 through 2007) of Cluster data. In the data set events earthward flows of broadly varying velocities are included. To obtain the temporal profile of the dipolarization, a superposed epoch analysis is performed. It is found that the temporal scale of the dipolarization tends to be decreasing with increasing velocity of the plasma flows. The spatial scale of the dipolarization, obtained by calculating the thickness of the dipolarization front of the magnetic structure using the four spacecraft timing velocity, is on average on the order of the plasma inertial length and is independent of the plasma velocity. Using the curlometer technique, the dipolarization associated currents for two events are examined and compared to the expected diamagnetic currents.