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Reexamination on Pi 1/2 pulsation onsets as a substorm onset indicator

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Various kinds of arguments concerning about identification of a substorm onset have been recently reported in literatures. It is important for substorm researchers ascertaining what a kind of methods is most accurate for identification of a substorm onset initiation. Some researchers use all-sky images of auroras, from which they identify an auroral brightening onset, and/or an auroral expansion onset, while some other researchers employ Pi 1/2 pulsation onsets. In this paper we examine the more detail relationships between onsets of auroral phenomena, i.e., an auroral brightening onset and an auroral expansion onset, and Pi 1/2 pulsation onsets, and their relationships to in-situ observations of the near-earth magnetotail dynamics, from which we might construct a more accurate substorm scenario proceeding in the coupling system between the night-side ionosphere and the tail magnetosphere.

Keywords: magnetosphere, substorm, ULF waves, Aurora, plasma, high-speed flow