

RECENT GROUND-BASED AND IN-SITU OBSERVATIONS OF SUBSTORM EXPANSION PHASE ONSET

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In this talk, we present the results obtained from an objective wavelet-based technique to determine the first onset of ULF wave activity during expansion phase onset on the ground and in space. We validate ground-based ULF timing against the large- and smaller-scale auroral observations of onset and find clear, coherent and repeatable characteristics that define onset on the ground; namely, that auroral and magnetic fluctuations start in a co-located epicentre prior to auroral break-up. Furthermore, we extend this technique into space and characterise the magnetic fluctuations in the magnetotail during major and minor THEMIS conjunctions. We show that at times the onset of in-situ ULF wave activity occurs within ~20s of the onset of ULF wave activity on the ground, suggesting that magnetosphere-ionosphere coupling may occur faster than expected during the onset process, perhaps via wave-driven auroral electron precipitation. Finally, we discuss the implications of these results for the initiation of expansion phase onset.

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