



## **Substorm Related ULF waves Observed in the Magnetosphere by BD-IES and Van Allan Probes**

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By using the data return from the BD-IES instrument onboard an inclined (55 [U+25E6]) geosynchronous orbit (IGSO) satellite together with geo-transfer orbit (GTO) Van Allen Probe AB satellite, we analysis a substorm related ULF waves occurred on Feb 5, 2016 in the dawnside of the magnetosphere. Immediately after the substorm injection followed by energetic electron drift echoes, the electron flux was clearly and strongly varying on the ULF wave time scale. It is found that both toroidal and poloidal mode ULF waves with a period of 320 s. During the substorm injection, the IES onboard IGSO is outbound while both Van Allen Probe AB satellites are inbound. This configuration of multiple satellite trajectories provides an unique opportunity to investigate substorm related ULF waves. When substorm injections are observed simultaneously with multiple spacecraft, they help elucidate potential mechanisms for particle transport and energization, a topic of great importance for understanding and modeling the magnetosphere. Two possible scenaria on ULF wave triggering are discussed: fast-mode compressional waves -driven field line resonance and ULF wave growth through drift resonance.