



## **A statistical analysis of Pi2-band waves in the plasma sheet and their relation to magnetospheric drivers**

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We use the Cluster observations from 2001 to 2009 to investigate the occurrence of Pi2-band waves in the plasma sheet. To study the generation mechanisms of these waves, we examine the association between Pi2-band waves and dynamic processes in the plasma sheet, including tail fast flows and substorm activity. For a total of 80 large-amplitude Pi2-band wave events in the plasma sheet, we find that Cluster records fast flows during 62 events, 11 wave events without fast flows occur during substorm times, 3 events occur when the solar wind significantly changes its direction, and 4 events are not associated with any of the above activities. Most of observed Pi2-band waves are predominantly compressional, whilst only one event is transverse. From this statistical study, we suggest that the plasma sheet fast flows can be the main driver of Pi2-band waves/oscillations in the magnetotail, especially considering that most of these waves are compressional. The relatively small number of other events indicates that other mechanisms also play a role in creating Pi2-band waves/oscillations in the plasma sheet but are relatively rare. In all wave events of this study, the plasma pressure and magnetic pressure varies in anti-phase, suggesting the slow-mode feature of these waves.