



EMIC wave activity associated with solar wind dynamic pressure variations : Modeling and Observations

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Electromagnetic Ion Cyclotron (EMIC) waves are known to occur naturally from the temperature anisotropy of protons. The two main driving mechanisms for the EMIC wave excitation are (1) injection of energetic protons into the night side inner magnetosphere from the tail plasma sheet and (2) the magnetospheric compressions associated with the solar wind dynamic pressure enhancements at the dayside. Previous investigations have provided a good understanding of the origin and distribution of EMIC waves associated with storm time hot ion enhancements in the ring current region. However, the mechanisms leading to the excitation of EMIC waves in the dayside inner magnetosphere owing to enhancement in the solar wind dynamic pressure is not clear. In this study, we combined the satellite/ground based observations along with global modeling to understand the EMIC wave generation in the inner magnetosphere in response to solar wind dynamic pressure enhancements. The EMIC wave events triggered by solar wind pressure enhancements are identified using the RBSP and ground magnetic field measurements. To understand if the magnetic field enhancements in the dayside inner magnetosphere lead to increase in temperature anisotropy thereby generating EMIC waves, we simulated the EMIC wave-particle interaction using the RAM-SCB model. The results show that during periods of enhanced solar wind dynamic pressure, the temperature anisotropy of protons increases at the dayside inner magnetosphere through the compression of the magnetosphere. The simulated EMIC wave growth rates are enhanced in regions of higher temperature anisotropy in the dayside inner magnetosphere. The ground magnetometers also recorded the presence of Pc1/EMIC waves at these regions. We analyze in detail the physical mechanisms that lead to the excitation of EMIC waves in the dayside inner magnetosphere during periods of enhanced solar wind dynamic pressure.