Dayside energetic electron precipitation and VLF emissions observed at Syowa station associated with sudden commencements

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The relationship between dayside chorus emissions and energetic electron precipitation with several tens of keV at the sudden commencements are statistically examined. We examine the spatiotemporal evolution of VLF emissions observed at Syowa Station (-69.00 S, 39.58 E, and L = 6.1) in Antarctica and electron temperature anisotropy obtained from LANL satellites at geosynchronous orbit associated with the sudden commencements from 1999 to 2007. The selected 244 sudden commencements result in enhancements of electron temperature anisotropy and VLF emissions at the 12 MLT. Detailed analyses show that 44% of events (7 of 16) show clear enhancements of CNA and the remaining 56% of events (9 of 16) do not show enhancements. The CNA enhancement events suggest that the compression of the dayside magnetosphere due to the enhancement of the solar wind dynamic pressure causes the enhancement of temperature anisotropy of hot electrons in the dayside and the enhanced whistler mode waves due to the enhancement of temperature anisotropy cause pitch angle scattering of energetic electrons into the atmosphere. On the other hand, it is suggested that the cause of no enhancement events of CNA is due to the absence of energetic electrons in the magnetosphere to generate whistler mode waves and CNA. The properties of the solar wind and AE index before the sudden commencements are significantly different between the events with and without CNA enhancements, suggesting the importance of preconditioning of the magenetosphere before the sudden commencements.