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Plasmaspheric Hiss Properties: Observations from Polar

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In the region between L = 2 to 7 at all MLTs, plasmaspheric hiss was detected 32% of the time. In the limited region of L = 3 to 6 and 15 to 21 MLT (dusk sector), the wave percentage detection was the highest (51%). The latter plasmaspheric hiss is most likely due to energetic ∼10-100 keV electrons drifting into the dusk plasmaspheric bulge region. On average plasmaspheric hiss intensities are an order of magnitude larger on the dayside than on the nightside. Plasmaspheric hiss intensities are considerably more intense and coherent during high solar wind ram pressure intervals. A hypothesis for this is generation of dayside chorus by adiabatic compression of preexisting 10-100 keV outer magnetospheric electrons in minimum B pockets plus chorus propagation into the plasmasphere. In large solar wind pressure events, it is hypothesized that plasmaspheric hiss can also be generated inside the plasmasphere as well. These new generation mechanism possibilities are in addition to the well-established mechanism of plasmaspheric hiss generation during substorms and storms. Plasmaspheric hiss under ordinary conditions is of low coherency, with small pockets of several cycles of coherent waves. During high solar wind ram pressure intervals (positive SYM-H intervals, plasmaspheric hiss and large L hiss can have higher intensities and be coherent. Plasmaspheric hiss in these cases is typically found to be propagating obliquely to the ambient magnetic field with θkB0 ∼30° to 40°. Hiss detected at large L has large amplitudes (∼0.2 nT) and propagates obliquely to the ambient magnetic field (θkB0 ∼70°) with 2:1 ellipticity ratios. A series of schematics for plasmaspheric hiss generation is presented.