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New Chorus Diffusion Matrix

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Whistler mode chorus waves play a major role in the loss and acceleration of electrons in the Earth's radiation belts. While high time resolution satellite data show that these waves are highly structured in frequency and time, at present their effects on the electron distribution can only be assessed on a global scale by using quasi-linear diffusion theory. Here we present new quasi-linear diffusion coefficients for upper and lower band chorus waves for use in global radiation belt models. Using data from DE 1 CRRES, Cluster 1, Double Star TC1 and THEMIS, we have constructed a database of wave properties and used this to construct new diffusion coefficients for L* = 1.5 to 10 in steps of 0.5, 10 latitude bins between 0o and 60o ,8 bins in MLT and 5 levels of geomagnetic activity as measured by Kp. We find that the peak frequency of lower band chorus is close to 0.2 fce, which is lower than that used in previous models. The combined upper and lower band chorus diffusion shows structure that should result in an energy dependent pitch angle anisotropy, particularly between 1 keV and 100 keV. The diffusion rates suggest that wave-particle interactions should still be very important outside geostationary orbit, out to at least L* = 8. We find significant energy diffusion near 1 keV near the loss cone, consistent with wave growth. By including the new chorus diffusion matrix into the BAS radiation belt (BRB) model we compare the effects on the evolution of the radiation belts against previous models.