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Global model of whistler mode chorus from multiple satellite observations

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Gyroresonant wave particle interactions with whistler mode chorus play a fundamental role in the dynamics of the Earth's radiation belts and inner magnetosphere, affecting both the acceleration and loss of radiation belt electrons. Knowledge of the variability of chorus wave power as a function of both spatial location and geomagnetic activity, required for the computation of pitch angle and energy diffusion rates, is thus a critical input for global radiation belt models. Here we present a global model of lower band ($0.1f_{ce} < f < 0.5f_{ce}$) and upper band ($0.5f_{ce} < f < f_{ce}$) chorus, where f_{ce} is the local electron gyrofrequency, using plasma wave data from DE1, CRRES, Cluster 1, Double Star TC1 and THEMIS, extending the coverage and improving the statistics of existing models. The chorus emissions extend from the plasmapause out to $L^* = 10$ and are found to be largely substorm dependent with the largest intensities being seen during active conditions. Equatorial lower band chorus is strongest during active conditions with peak intensities of the order 2000 pT^2 in the region $4 < L^* < 9$ between 2300 and 1200 MLT. Equatorial upper band chorus is both weaker and less extensive with peak intensities of the order a few hundred pT^2 during active conditions between 2300 and 1100 MLT from L^* = 3 to L^* = 7. Moving away from the equator mid-latitude chorus is strongest in the lower band during active conditions with peak intensities of the order 2000 pT^2 in the region $4 < L^* < 9$ but is restricted to the dayside between 0700 and 1400 MLT. The results suggest that including wave particle interactions beyond geostationary orbit could be very important for global radiation belt models.