Chorus and microbursts: quantifying the connection with a substantial dataset of simultaneous low- and high-altitude high time resolution observations.

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Microbursts are impulsive injections of energetic (few keV to MeV) electrons into the atmosphere that may represent a major loss source from the outer radiation belt during storm recovery. Low energy microbursts (10s keV) have been observed for decades by balloons and low altitude satellites, while relativistic microbursts (hundreds of 100 keV) are a more recent discovery. The evidence to date strongly suggests that the dominant cause of microbursts is resonant loss-cone scattering by whistler mode chorus. Surveys have shown similarities in occurrence, including distributions in L, MLT, and variation with activity level. Additionally, both share similar sub second duration as well as cadence.

Despite the statistical similarities and plausibility of the scattering mechanism, it has been difficult to directly establish that chorus causes microbursts. This means that details of the scattering process, including scattering latitude (equatorial or off- equatorial), and the exact nature of resonance remain unverified or unknown. These questions can only be addressed with high altitude chorus packet observations made simultaneously with low altitude microburst observations during magnetic conjunctions. This dataset has only been realized in recent years with measurements from the equatorial Van Allen Probes, the low-altitude FIREBIRD and AC6 CubeSats, and the BARREL balloons. Teams representing these four missions have made a concerted effort in recent years to build up a conjunction database of chorus and microbursts. This unprecedented dataset includes hundreds of magnetic conjunctions, with hours of high- quality, high time- and energy-resolution data that resolves details of both the causative waves and the resulting microbursts from 10s keV (AC6, BARREL) to hundreds keV (FIREBIRD, BARREL). We provide initial results from the analysis of this dataset, which provides detailed insight into the connection between chorus and microbursts.