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Observations of parallel propagating EMIC and whistler waves in the solar wind with wavenumbers $kc/\omega_{pi} \sim 1$ JOHN J. PODESTA, Los Alamos National Laboratory — Parallel propagating electromagnetic ion cyclotron (EMIC) waves and electron cyclotron (whistler) waves can be generated through proton pressure anisotropy instabilities in the solar wind which are believed to play an important role in the regulation of proton distribution functions. However, observations that provide a positive identification of these waves are rare in the relevant wavenumber range $kc/\omega_{pi} \sim 1$. Here I report observations obtained using wavelet analysis techniques which indicate that these waves are ubiquitous in high speed streams. The observations show the persistent presence of parallel propagating EMIC waves propagating predominantly *away* from the sun along the magnetic field and/or whistler waves propagating predominantly *toward* the sun along the magnetic field. The average power of these parallel propagating waves is comparable to the trace magnetic power at the same wavenumber. When the observed differential streaming of alpha particles is taken into account in calculations of the growth rates, it is found that proton pressure anisotropy instabilities preferentially generate EMIC waves propagating away from the sun when $T_{\perp p} > T_{\|p}$ and whistler waves propagating toward the sun when $T_{\perp p} < T_{\|p}$. Both of these temperature inequalities may occur in high speed streams. These instabilities appear to provide a natural explanation for the observed waves.

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