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High frequency waves at the front of the terrestrial bow shock

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Cluster WEC measurements are used to separate temporal and spatial variations for waves observed in the frequency range 100-2000 Khz. It became possible for the first time to identify the dispersion relation for these waves directly from experimental data. It is shown that waves observed in that frequency range have wave lengths in the range 10-100 Debye lengths. These high frequency waves in their lower range (up to ~ 200 Hz) were previously interpreted as whistlers, and in the upper part as doppler shifted ion-sound waves. Our results indicate that such interpretation is not valid, at least for the studied Cluster crossings, since the waves have positive dispersion in the whole frequency range, while ion-sound waves have negative dispersion. In addition the wavelengths are small in comparison with the electron gyroradius. Various theoretical models are compared with results obtained.