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Foreshock cavities and ULF waves

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Solar wind coupling with Earth's magnetosphere has been found to be more complex than originally thought. This complexity occurs because the interaction region is dominated by kinetic effects that affect the large-scale dynamics of the sub-regions that form, namely the foreshock, bow shock and magnetosheath. In this work we use global hybrid simulations to study solar wind coupling with the magnetosphere for a variety of IMF geometries. Global hybrid simulations give a collective picture of processes taking place in the foreshock, bow shock and magnetosheath. Because ions are treated as particles, these codes also give information on ion-scale microphysics allowing us to understand how kinetic phenomena modulate global characteristics. We concentrate on the origin and characteristics of low frequency waves and density cavities in the foreshock, and follow their evolution as they propagate downstream. We also study the possible influence that cavities may have on magnetosphere dynamics. Our results are compared with in situ observations.