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Ion acoustic solitons in the upward current region[1] CLARK SCHOLZ, DANIEL MAIN, John Brown University, DAVID NEWMAN, ROBERT ERGUN, University of Colorado — The formation of ion acoustic solitons in the upward current region is demonstrated through one and two-dimensional Particle-in-Cell simulations. The simulations include cold ionospheric electrons, hot auroral cavity electrons and H^+ ions, and H^+ and O^+ beams. The interaction of the H^+ and O^+ beams in the auroral cavity leads to the formation of an earthward traveling H^+ population. In order to understand the mechanism which leads to the formation of the soliton, we then simplify the simulation so that it includes only a H^+ beam, hot electrons and an earthward traveling H^+ population (which mimics the population that forms in the more complicated simulation). Both the above plasmas are unstable to ion acoustic soliton formation. However, in order for the soliton to form, we show that it is necessary to trigger the formation of the soliton, which occurs at the interface of the earthward and the anti-earthward traveling H^+ population.After the initial soliton forms, "baby" solitons form from the initial soliton, consistent with previous studies (Kono, 1986). FAST data are presented which show the presence of earthward traveling ions and bipolar electric field structures in support of the above numerical results.

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