ENA detection vs heliosphere numerical models

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Charge exchange on interstellar He dominates properties of the neutral solar wind in the downwind (interstellar wind) hemisphere[1]. During charge-exchange collisions there are produced ENAs (energetic neutral atoms) which are detected to image the interaction of the heliosphere with interstellar medium [2]. Measurements are performed by two ENA imagers, IBEX-Hi in energy band ~0.5 to 5 keV [3] end IBEX-Lo in energy band ~0.1 to 2 keV. Every 6 months data are gathered into sky maps (Figure 1). First attempt to numerically model the interaction between solar wind and interstellar medium was by solving hydrodynamic equations of counter-flowing fluids, via solving inviscid Euler equation. Since then many numerical models were developed to determine the basic structure of the heliosphere. The local interstellar medium velocity vector and temperature originally determined through the velocity and temperature of the interstellar He flowing in the inner heliosphere and measured by the GAS instrument on Ulysses [4,5,6] recently have been challenged by new measurements by the Interstellar Boundary Explorer (IBEX). In this work we discuss results of global modeling of the heliosphere regarding the interstellar bow shock and measurements of the He flow.

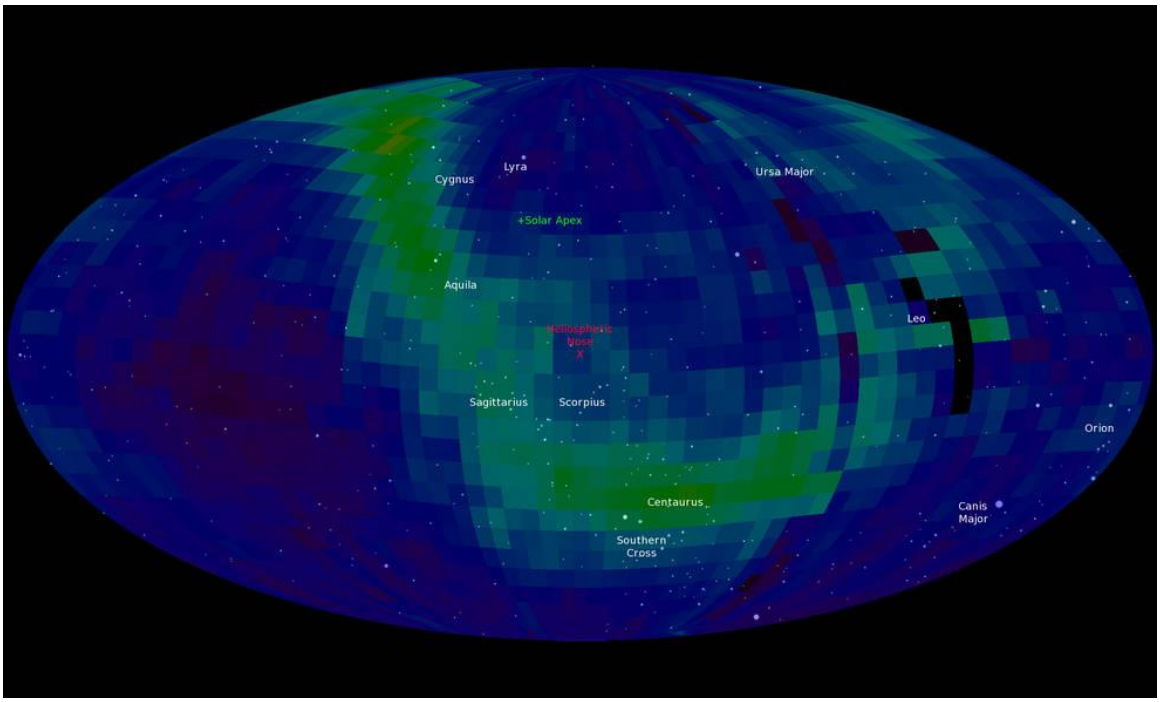

Figure 1: In 2009, NASA's Interstellar Boundary Explorer (IBEX) mission science team constructed the first-ever all-sky map of the interactions occurring at the edge of the solar system, where the sun's influence diminishes and interacts with the interstellar medium.A giant ribbon of energetic neutral atoms – shown here in light green and blue - streaming in from that boundary. Source: NASA/Goddard/Scientific Visualization Studio

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