

Revisiting the INCA Belt with IMAP Energetic Neutral Atom (ENA) observations

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The IMAP mission is imaging the outer heliosphere by creating all-sky maps of Energetic Neutral Atom (ENA) intensities, as measured by the three ENA imagers onboard, namely IMAP-Lo, IMAP-Hi and IMAP-Ultra. These second-generation imagers collectively cover energies from ~ 100 eV to ~ 100 keV with significant energy overlap between the Lo and Hi, and the Hi and Ultra sensors. One of the main thrusts of the IMAP mission is to address unresolved questions remaining from the previously flown IBEX and Cassini missions, about heliospheric structures, in particular the transition from the “ribbon” structure at lower energies, as observed by IBEX, to a different “belt” structure at higher energies, as observed by INCA on Cassini. The “belt” was interpreted as an ENA emission region dominated by a broad, high intensity, latitude-dependent structure in the INCA 5–13 keV energy channel, that makes a rough circle in the sky passing approximately through the upwind and downwind directions, but not aligned with the IBEX “ribbon” structure. The belt was suggested to be a Globally Distributed Flux (GDF) feature, originating in the heliosheath, which is of great interest because it has been interpreted as the manifestation of particle acceleration in the heliosheath within a short tail heliosphere. The fact that there was limited energy overlap between the IBEX and INCA measurements, resulted in ambiguity with respect to the existence and interpretations of the belt observations, ambiguity that can be resolved now, with the significant overlap in the 3–15 keV energy range between the Hi and Ultra imagers on IMAP. Therefore, in this presentation we use ENA intensities from the Hi (500 eV–15 keV) and Ultra (3–100 keV) sensors in order to revisit the belt and compare the improved IMAP observations to the IBEX and INCA observations across the relevant energy channels.