The Contributions of Sir Ian Axford to Our Understanding of the Global Heliosphere

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With the death of Sir Ian Axford, we have lost a great scientist, colleague and friend. His extraordinary contributions to space physics have a remarkable range that is impossible to capture adequately in a single session, much less a single talk. Of his many contributions, one that stands out is his contribution to our understanding of the processes that shape the structure of the global heliosphere. Much of this was summarized in his 1972 review of the solar wind - LISM interaction, which remained the standard in the field for decades. The prescience of his views on the importance of interstellar neutral hydrogen in shaping the physics and structure of the large-scale heliosphere only came to be fully appreciated in the mid-1990's. Today of course, many of his ideas have found observational support from the Voyager Interstellar Mission, originally conceived of as the Mariner-Jupiter-Saturn mission, an undertaking that Ian was instrumental in helping initiate. The Voyager missions were rightly regarded by Ian as one the greatest scientific-cultural achievements of the 20th century and he was a strong advocate and supporter of the program. The breadth of Ian's scientific interests is reflected in virtually every aspect of the Voyager mission, from the various planetary magnetospheres, their moons and interactions, particle acceleration, all the way to the nature of the solar wind interaction with the interstellar medium. Here, we will describe the many accomplishments of Sir Ian Axford in the context of recent modeling and observational achievements in understanding the large-scale structure of the heliosphere and the interstellar and interplanetary processes that are responsible. In particular, we will explore the role of the magnetic field in the heliosheath (the “Axford-Cranfill effect”) using fully 3D MHD simulations, the role of interstellar neutral hydrogen in decelerating the solar wind and shaping the boundary structure, and the temporal response of the termination shock and inner heliosheath to the dynamical solar wind.