Observation-based Ionization Rates during the Decade of IBEX Observations

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Solar wind and EUV flux are dominant ionization factors for the interstellar gas inside the heliosphere. They vary in time with the solar cycle and with heliographic latitude. The modulation of the solar ionizing factors affects the fluxes of interstellar neutral (ISN) gas and energetic neutral atoms (ENAs) on their way from heliospheric boundaries to IBEX in the Earth’s vicinity. IBEX has been measuring ISN gas of hydrogen, helium, neon, and oxygen, as well as hydrogen ENAs since the beginning of the solar cycle 24. Most of the ISN gas species observed by IBEX-Lo are prone to variations in time of the in-ecliptic ionization rates. In case of H ENAs, variations of the out-of-ecliptic solar wind are significant for data interpretation.

We present a model of ionization rates based on available observations of the solar wind and the solar EUV flux. We follow methodology discussed by Sokół et al. 2019 (ApJ 872:57), however with data selection revised according to recent data releases. We focus on ionization rates for various species in and out of the ecliptic during the decade of IBEX observations. We discuss similarities and differences in the dominant ionization processes, the latitudinal modulation, and the evolution in time.