POPULATING THE INNER HELIOSPHERE (<5 AU) WITH HEAVY IONS

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Heavy ion ($Z > 2$) measurements were made on the ACE (1 AU) and Ulysses (3.2 AU) spacecraft in the inner heliosphere during the July 14, 2000 solar events. Following the last interplanetary shock event at ∼1437 UT on July 15, the heavy ion fluxes at 1 AU began to decay with an e-folding decay time for both O and Fe ions (0.5–1 MeV/nucl) of ∼1 day. This e-folding decay continued for ∼5 days, to July 21. In contrast, the heavy ion fluxes at Ulysses (heliolatitude ∼62^{o}S; ∼90^o in longitude from the ACE-Sun line) abruptly increased in intensity on July 14, and continued to increase slowly thereafter. The e-folding time of ∼6 days for the Ulysses increase persisted for ∼7 days. The ion fluxes at both locations were essentially equal on July 21, indicating that the inner heliosphere (to ∼3.2 AU) then contained an approximately uniform reservoir of heavy ions in a volume of ∼10^2AU^3 (∼$3.4{\cdot}10^{24}$km^3). The equality of the decaying fluxes at the two locations persisted for more than two weeks, at times modulated more noticeably at 1 AU by solar activity. The observations will be described and discussed in the context of the filling of a reservoir of ions in the inner heliosphere by solar activity and the subsequent slow decrease in particles as the solar-initiated shock wave disturbances propagate outward to the distant heliosphere. The several time constants measured contain information on the acceleration of particles by the propagating shocks and the leakage of particles through the outward-propagating shock barriers.