The standard model of the formation of the ring current during a geomagnetic storm is that enhanced, time dependent convection due to an extended time period of strongly southward interplanetary magnetic field (IMF) brings the plasma sheet plasma into the inner magnetosphere, where it becomes trapped on closed drift paths. Thus, the ring current composition should reflect the plasma sheet composition. The composition of the ring current plasma indicates that a large fraction must come from the ionosphere. Thus, there must also be a large ionospheric component in the plasma sheet during storms. One significant source is the “cleft ion fountain”. These ions are heated and accelerated in the cusp/cleft region, and then are convected across the polar cap as they move up the field line. The resulting velocity filter effect separates these ions in both energy and mass, such that higher energy and lighter ions travel further down the tail than lower energy and heavier ions. In this paper we will review the observational evidence for the transport of the cusp source through the lobes and into the plasma sheet. We will examine the evidence for further acceleration of the ionospheric O+ along the path to form the hot plasma sheet population. Finally, we will discuss how the enhanced O+ population affects the plasma sheet dynamics.