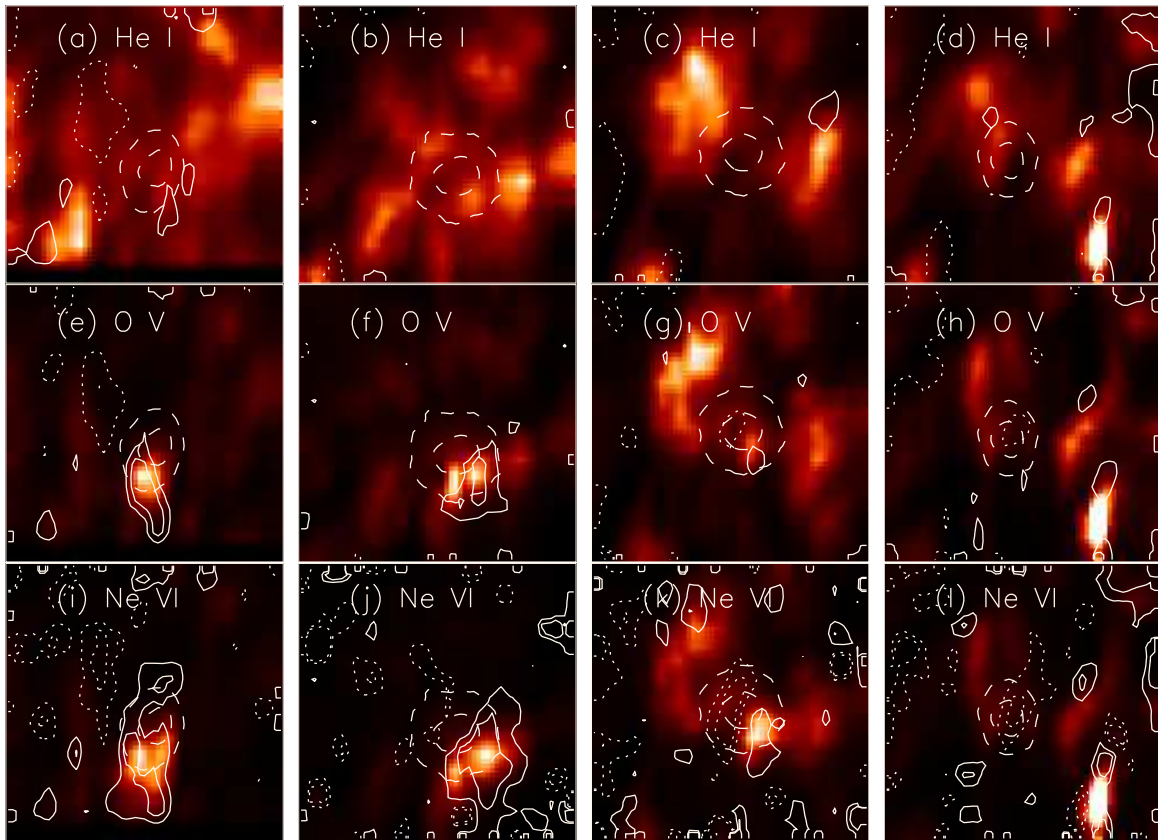


# Disappearance of Sunspot Plume When Mass Flows Cease



These observations were the first to show that the disappearance of a sunspot plume occurred simultaneously with a dramatic change in flow velocity pattern in the plume and sunspot umbra. We observed a large sunspot in Active Region 9535 on 2001 July 12, 15, 17, and 19 with the Coronal Diagnostic Spectrometer aboard *SOHO*. This figure shows  $2' \times 2'$  images of the sunspot on July 12 (frames a,e,i), 15 (b,f,j), 17 (c,g,k), and 19 (d,h,l). Frames (a) - (d) show He I  $584.3 \text{ \AA}$  emission, frames (e) - (h) O V ( $\text{O}^{+4}$ )  $629.7 \text{ \AA}$  emission, and frames (i) - (l) Ne VI ( $\text{Ne}^{+5}$ )  $562.8 \text{ \AA}$  emission. Umbra and penumbra boundaries are displayed as dashed contours. Solid contours show downflow velocities, and dotted contours show upflows. For He I, contour levels are  $10$  &  $20 \text{ km s}^{-1}$ ; for O V and Ne VI, contour levels are  $15$  &  $25 \text{ km s}^{-1}$ . Extreme-ultraviolet emission lines revealed a bright plume in the sunspot penumbra on July 12 and 15 (frames e,f,i,j), a smaller, dimmer plume on July 17 (g,k), and no plume on July 19 (h,l). Downflows of  $25 \text{ km s}^{-1}$  or more were measured in the plume on July 12 and 15. By July 17 the downflow area had shrunk in size, the downflows had diminished in magnitude, and upflows were measured in the umbra and parts of the penumbra outside the plume. By July 19 downflows were no longer observed, but had been replaced entirely with upflows in the umbra and portions of the penumbra. [From J. W. Brosius, *The Astrophysical Journal*, vol. 622, p. 1216 (2005 Apr. 1).]