Smithsonian Astrophysical Observatory

XRT Science Highlights
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SAO

The Thermal Structure of Coronal Cavities

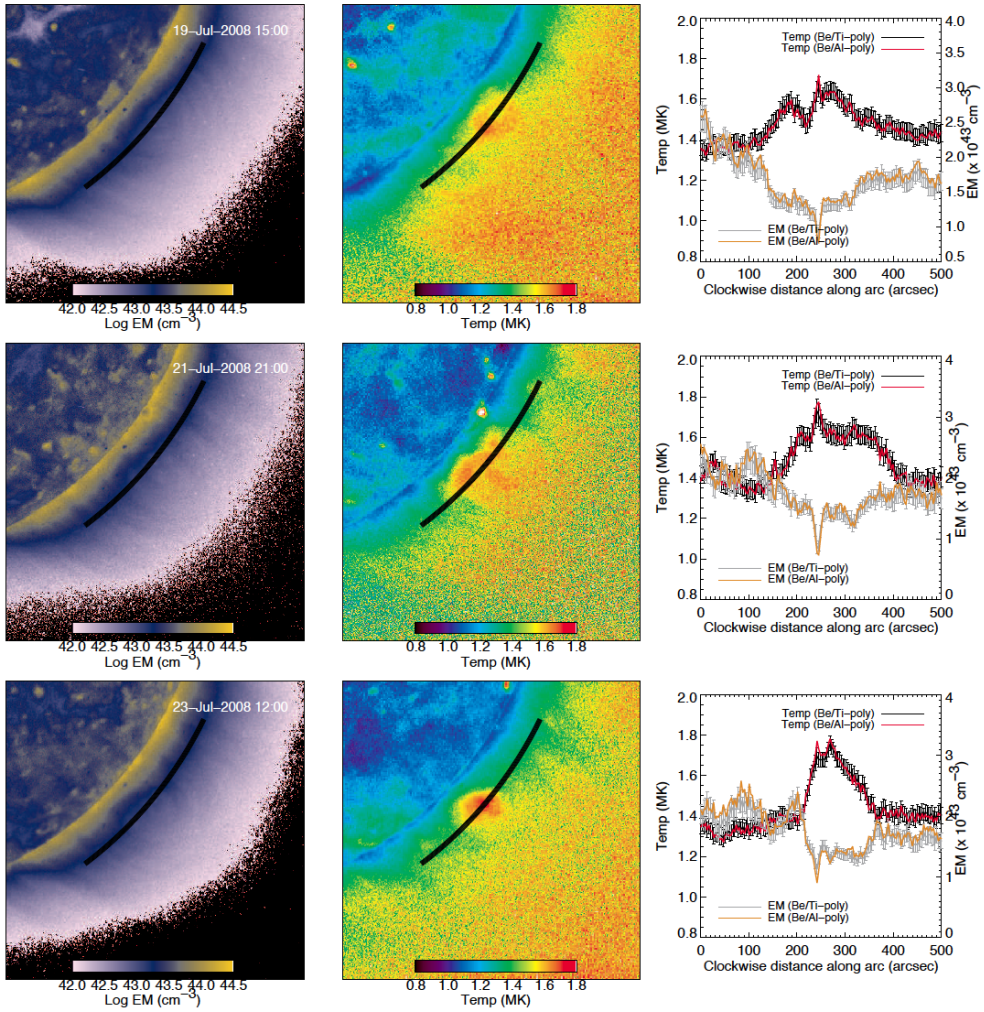


FIG. 4.— The left column shows maps of the emission measure calculated for the three dates shown in Figure 2, derived using the XRT Thin-Be/Ti-poly filter pair. The middle column shows maps of the temperature calculated for the same cavity and filter pair. The right column shows the emission measure and temperature along the arc plotted in the images using the Thin-Be/Ti-poly filter pair (gray/black) and the Thin-Be/Al-poly filter pair (orange/red). For simplicity, only the error bars calculated from the Thin-Be/Ti-poly are shown.

The magnetic structure overlying a filament plays an important role in the stability and dynamics of the filament. The structure has low density and appears as a void or cavity in coronal images. Heating of the tenuous plasma provides important information about the structure of the cavity. Forward modeling is used to constrain the morphological and thermal structure of the cavity.

THERMAL PROPERTIES OF A SOLAR CORONAL CAVITY OBSERVED WITH THE X-RAY TELESCOPE ON HINODE Katharine K. Reeves, Sarah E. Gibson, Therese A. Kucera, Hugh S. Hudson, Ryouhei Kano 2012, ApJ in press.

Chromospheric Evaporation

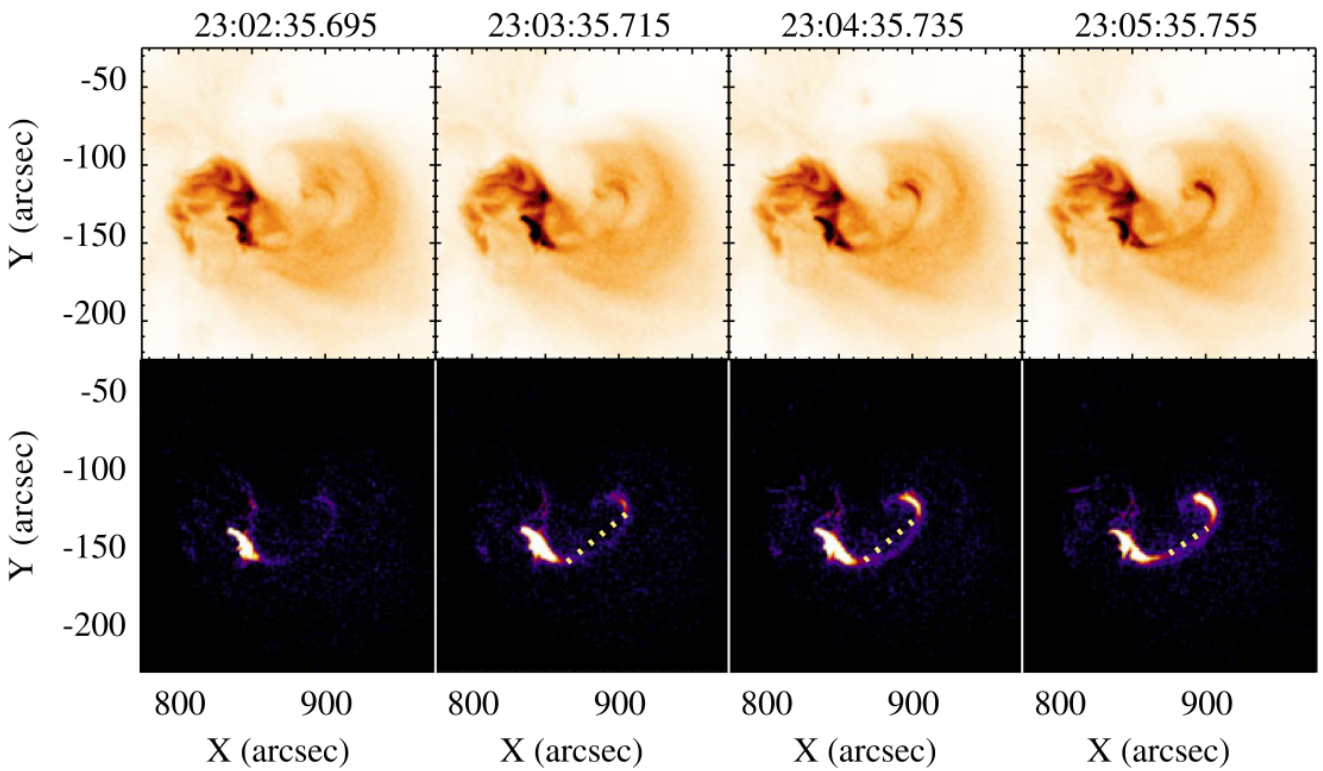


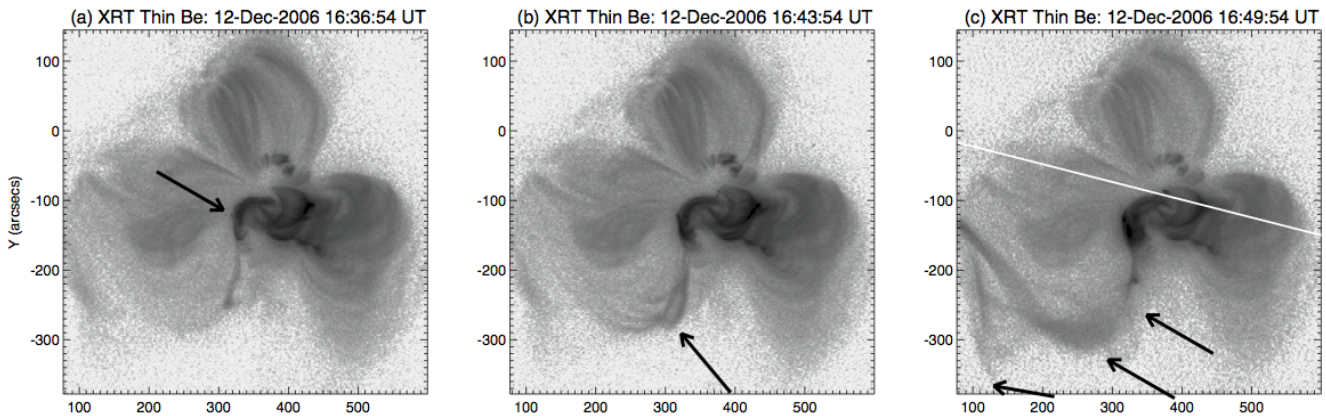
Figure 1 The time evolution of event b starting at 23:00 UT, 15 December 2006. The upper panels and the lower panels show X-ray images and difference images with respect to the initial state at 23:00:35, respectively. We can observe the time evolution of clear evaporation upflows from both footpoints in the lower panels. The yellow dotted lines show the minimum distance L between the tips of a pair of bright arcs.

Soft X-ray images from XRT are ideal for identifying and measuring evaporative flows in coronal loops. The flows result from rapid chromospheric heating due to high energy particles or thermal conduction fronts. Data suggests that up-flows fall into two categories ~100km/s and >400km/s. The origin of the different speeds is under study.

Clear Detection of Chromospheric Evaporation Upflows with High Spatial/ Temporal Resolution by Hinode XRT Nitta, Imada & Yamamoto, 2012 Sol. Phys. 276, 183

“Offset” CMEs from the 2006 Dec. 13 flares

Multi-instrument observations are used to study the origin of CMEs that are offset from the underlying flare loops. Analysis shows that even though the direction of the CME is dependent on the details of the magnetic field configuration, but still consistent with the standard CME/Flare model.



Lateral offset of the CMEs from the X-flare of 2006 December 13 and its two precursor eruptions, Sterling, Moore & Hara, 2011 ApJ 742, 63