Thermal properties and evolution of a coronal cavity as observed by the X-Ray Telescope on Hinode

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Coronal cavities are voids in coronal emission often observed above high latitude filament channels. Sometimes, these cavities have areas of bright X-ray emission in their centers (i.e. Hudson et al 1999). In this study, we use data from the X-ray Telescope (XRT) on Hinode to examine the thermal emission properties of a cavity observed during July 2008 that contains bright X-ray emission in its center. Using ratios of XRT filters, we find evidence for elevated temperatures in the cavity center. The area of elevated temperature evolves from a ring-shaped structure at the beginning of the observation, to an elongated structure two days later, finally appearing as a compact round source four days after the initial observation. We use a morphological model to fit the cavity emission, and find that a uniform structure running through the cavity does not fit the observations well. Instead, the observations are reproduced by modeling several short cavity "cores" with different parameters on different days. These changing core parameters may be due to some observed activity heating different parts of the cavity core at different times. We also find that core temperatures of 1.75 MK, 1.7 MK and 2.25 MK (for 19 July, 21 July and 23 July, respectively) in the model lead to structures that are consistent with the data, and that line-of-sight effects serve to lower the effective temperature derived from the filter ratio.