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[Abstract]

Morphological Comparison of the Quiet and Active Sun

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Abstract: The solar atmosphere exhibits clear morphological differences between the widespread coronal network structures dominant during quiet phases and the bright loop systems, flares, and coronal mass ejections (CMEs) characteristic of active phases (Shibata & Magara, 2011). In this study, single-frame observations from SDO/AIA at 171 Å (Fe IX, ≈0.7 MK) are used to compare a low-activity period with a high-activity period (Lemen et al., 2012; Pesnell, Thompson & Chamberlin, 2012). Visual inspection shows that on the quiet day the corona appears more homogeneous, with lower contrast and small-scale structures, whereas on the active day it is dominated by intense loop bundles, nearly saturated bright cores, and extended brightness tails, producing a higher-contrast morphology. Quantitative assessments indicate that both the mean brightness and the variability of the intensity distribution increase significantly during the active period, with the coronal emission evolving toward a more clustered configuration. The results obtained in the 171 Å band can be extended to multi-wavelength analyses (94/131/193/211/304 Å) to demonstrate how activity levels leave measurable imprints across different thermal components of the solar atmosphere (Lemen et al., 2012; Pesnell, Thompson & Chamberlin, 2012).

Keywords: Solar physics, Corona, Solar activity, SDO/AIA

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