The Connection Between Solar Coronal Cavities and Solar Filaments

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Filaments are structures in the solar corona made up of relatively cool, dense, partially ionized plasma. Coronal cavities, circular or elliptical regions of low plasma density, are observed above prominences on the solar limb when viewed in EUV and white light coronal images. Since most filament/cavity eruptions lead to a coronal mass ejection (CME), determining the likelihood of an eruption event will improve our ability to predict space weather. We examine SDO/AIA cavity metadata and HEK filament metadata to determine which cavities are associated with which filaments from 2012 to 2015. Our study involved 140 cavities and 368 filaments that appeared poleward of ±30 degrees. We categorized the cavities and filaments based on the stability of the structures, defined by whether or not the cavity and filament exist long enough to track fully across the solar disk. Using these categories we perform a statistical study on various filament qualities within the metadata. Our findings indicate that filaments with cavities are observed more often at high latitude in compared to filaments without cavities. Moreover, our study indicates that a statistically significant difference exists between the filament length and tilt distributions for certain categories.

Keywords: solar corona, solar filaments

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