N04a Sun-as-a-star Multi-wavelength Observations as a Milestone for Characterization of Stellar Active Regions

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Recent observations have revealed that massive stellar flares "superflares" can occur on solar-type stars. The magnetic energy prior to release is likely to have been stored in stellar active-region atmospheres. Thus for explaining the origin and occurrence of stellar flares, it is important to monitor the evolutions of these stellar active regions, not only in visible light but also in ultraviolet (UV) and X-rays. To this end, we perform multi-wavelength irradiance monitoring of transiting solar active regions by using full-disk observation data from four satellites including Hinode and SDO. We confirm that the visible continuum that corresponds to the photosphere becomes darkened when the spot is at the central meridian, whereas most of the UV, EUV and X-rays, which are sensitive to chromospheric to coronal temperatures, are brightened, reflecting the bright magnetic features above the starspots. It is also found that the EUV light curves sensitive to transition-region temperatures are sometimes dimmed because the emission measure of 0.6–0.8 MK is reduced as the corona is heated over a wide area around the active region. In addition, the time lags between the coronal and photospheric light curves have the potential to probe the extent of coronal magnetic fields above the starspots. These results indicate that, by measuring the stellar light curves in multiple wavelengths, we may obtain information on the structures and evolution of stellar active regions.