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OBSERVING M DWARFS UV AND OPTICAL FLARES FROM A CUBESAT AND THEIR IMPLICATIONS FOR EXOPLANETS HABITABILITY

Abstract

M dwarfs show the highest rocky planet occurrence among all spectral types, in some instances within the Habitable Zone. Because some of them are very active stars, they are often subject to frequent and powerful flaring, which can be a double-edged sword in regard of exoplanet habitability. On one hand, the increased flux during flare events can trigger the chemical reactions that are necessary to build the basis of prebiotic chemistry. On the other hand, sufficiently strong flares may erode exoplanets' Ozone layers and reduce their UV protection. Recent observations of flares have shown that the flaring flux can be x100 times stronger in UV than in the optical. UV is also preferable to constrain more accurately both the prebiotic abiogenesis and the Ozone depletion. For these reasons, we propose to use a CubeSat to complement current flare surveys operating in the optical. This CubeSat will observe a high number of flaring M dwarfs, following an all-sky scanning law coverage, both in UV and optical to better compare the differences in flare colors. The cheap cost and fast building of such a CubeSat will allow us to complement the data of bright optical flares acquired from the ground-based, high-cadence, wide FoV surveys with additional UV data from space. Another scientific planned goal will be to conduct few-minutes after flare follow-up time-resolved spectroscopy from the ground in the optical, that will be triggered by the detection of UV flares in space on board of the proposed CubeSat. Finally, the study of M dwarfs stellar activity in the UV band will provide useful data for larger forthcoming missions that will survey exoplanets, such as ARIEL, PLATO and LUVOIR.