Multiwavelength Observations of M Dwarf Flares Simultaneous with TESS

Naylynn Tañón Reyes | Elisa Quintana | | Joshua Schlieder | Tom Barclay
Allison Youngblood | Emily Gilbert | Padi Boyd | Knicole Colón | Jackie Villadsen

ABSTRACT

Low-mass stars are the most common stars in the galaxy and are prime targets to search for and characterize small, Earth-like planets. These stars are highly active, exhibiting frequent flares and energetic particle emission that can be detrimental to planetary habitability. We have developed a program to obtain multiwavelength observations (UV, X-ray, radio) simultaneous with TESS using a variety of ground and space-based facilities. TESS' long-baseline, high-cadence observations for many hundreds of nearby low-mass stars is going to revolutionize our understanding of M star activity.

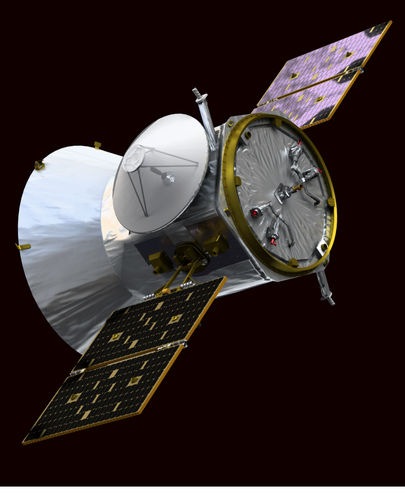
MORE RESULTS FROM OUR PROJECT WILL BE PRESENTED IN POSTERS BY:

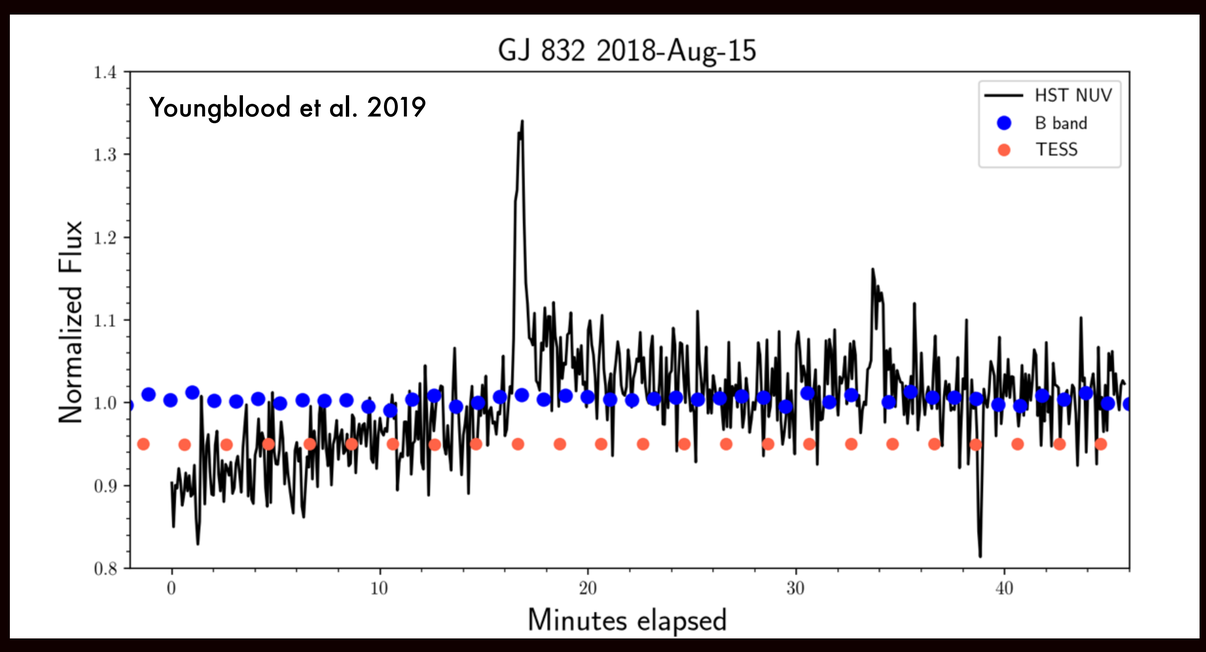
PADI BOYD (GSFC)

EMILY GILBERT (UCHICAGO)

OBSERVATIONS FROM GROUND & SPACE

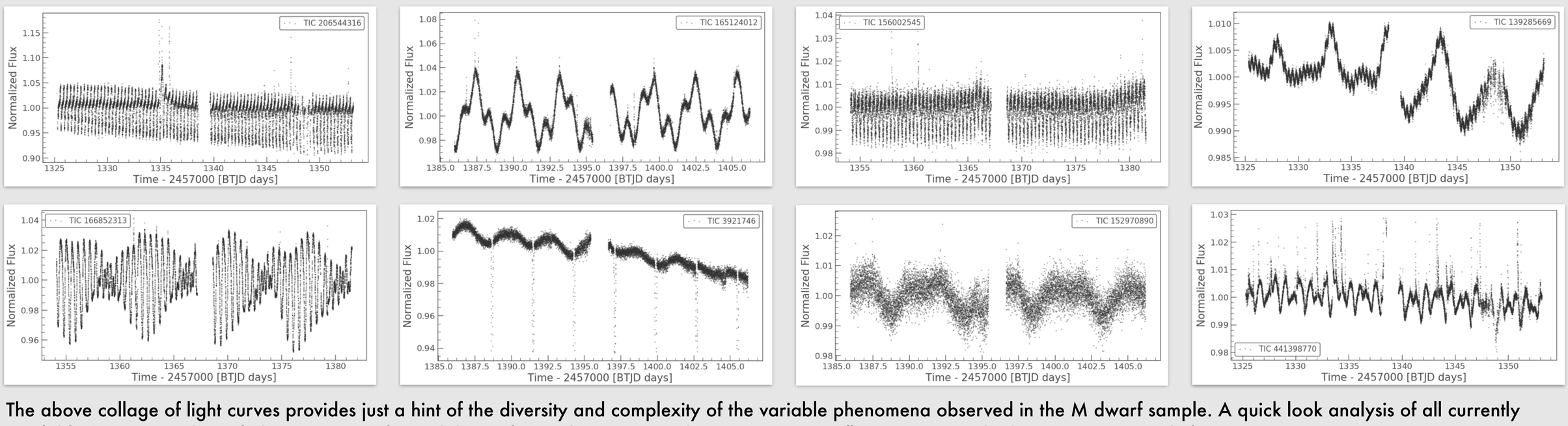
Optical: TESS | K2
UV: Swift | HST
X-ray: Swift
Radio: VLA | GMRT | ATCA
Ground: LCO | SNIFS



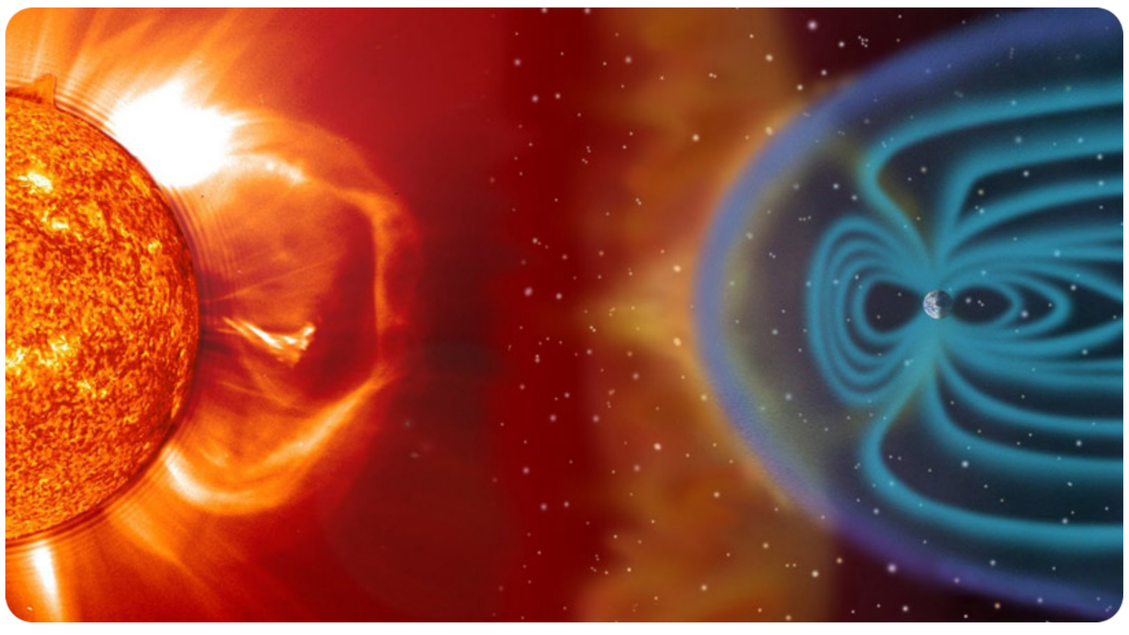


Hubble Space Telescope observations of GJ 832 show stellar activity in near-UV data, but no flare activity in TESS' optical data. Multiwavelength observations enable us to gain a complete picture of the underlying physical processes behind stellar activity.

FIRST LOOK AT M DWARF LIGHT CURVES



The above collage of light curves provides just a hint of the diversity and complexity of the variable phenomena observed in the M dwarf sample. A quick look analysis of all currently available 2 minute cadence light curves reveals candidate eclipsing binaries, rapid rotators, extreme flare activity, and other intriguing morphologies.



M DWARF FLARES & PLANET HABITABILITY

We are observing a wide range of M dwarfs with TESS 2-minute cadence data, including stars with ages from 10 Myr to 10 Gyr and masses from 0.1 to 0.7 solar masses. The multiwavelength observations simultaneous with TESS will enable us to probe correlations between flare energy and particle flux. We will explore how space weather changes over time and how the cumulative effects of this radiation impact exoplanet habitability.