Periodic Eruptions of a Supernova Impostor

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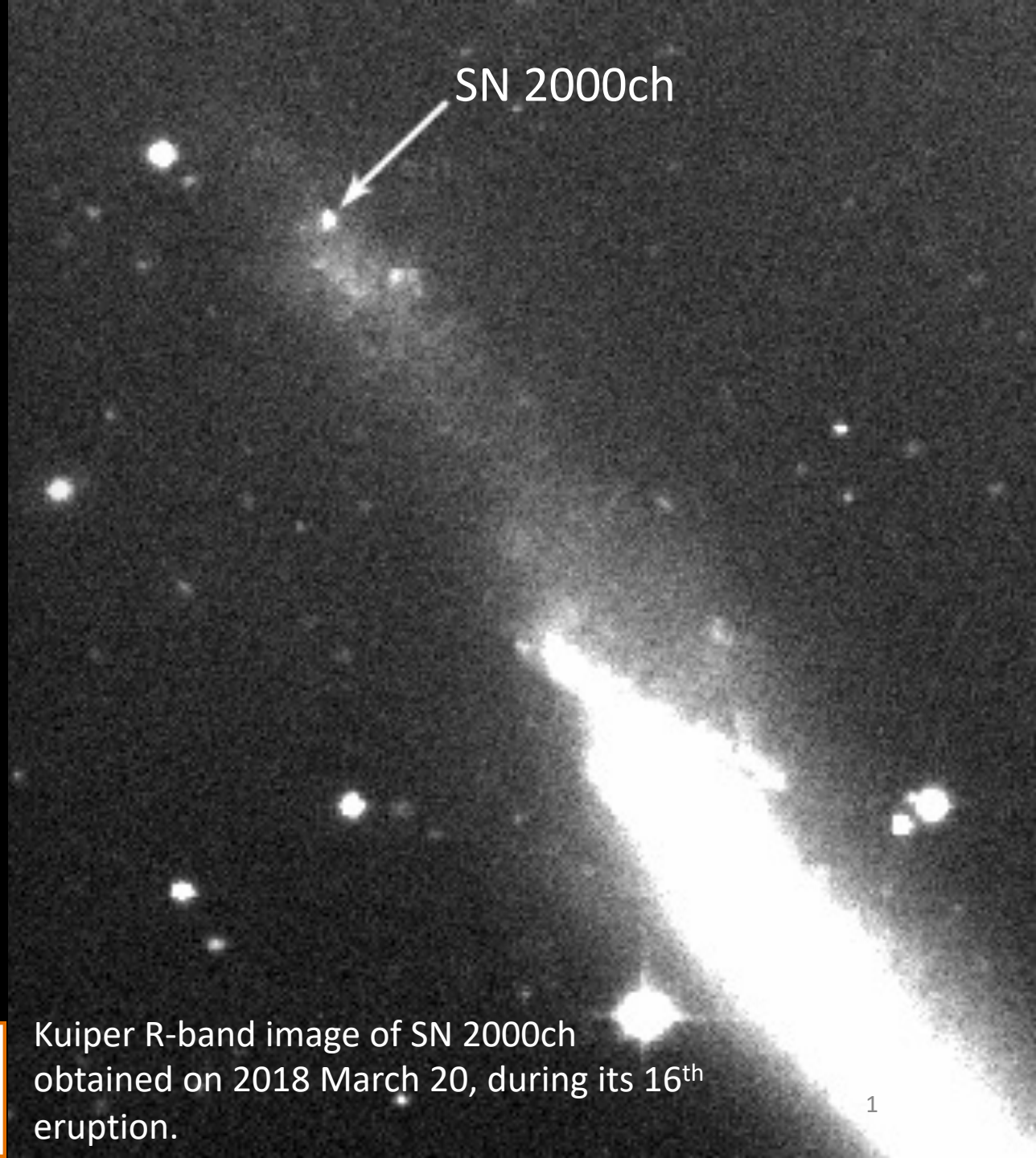


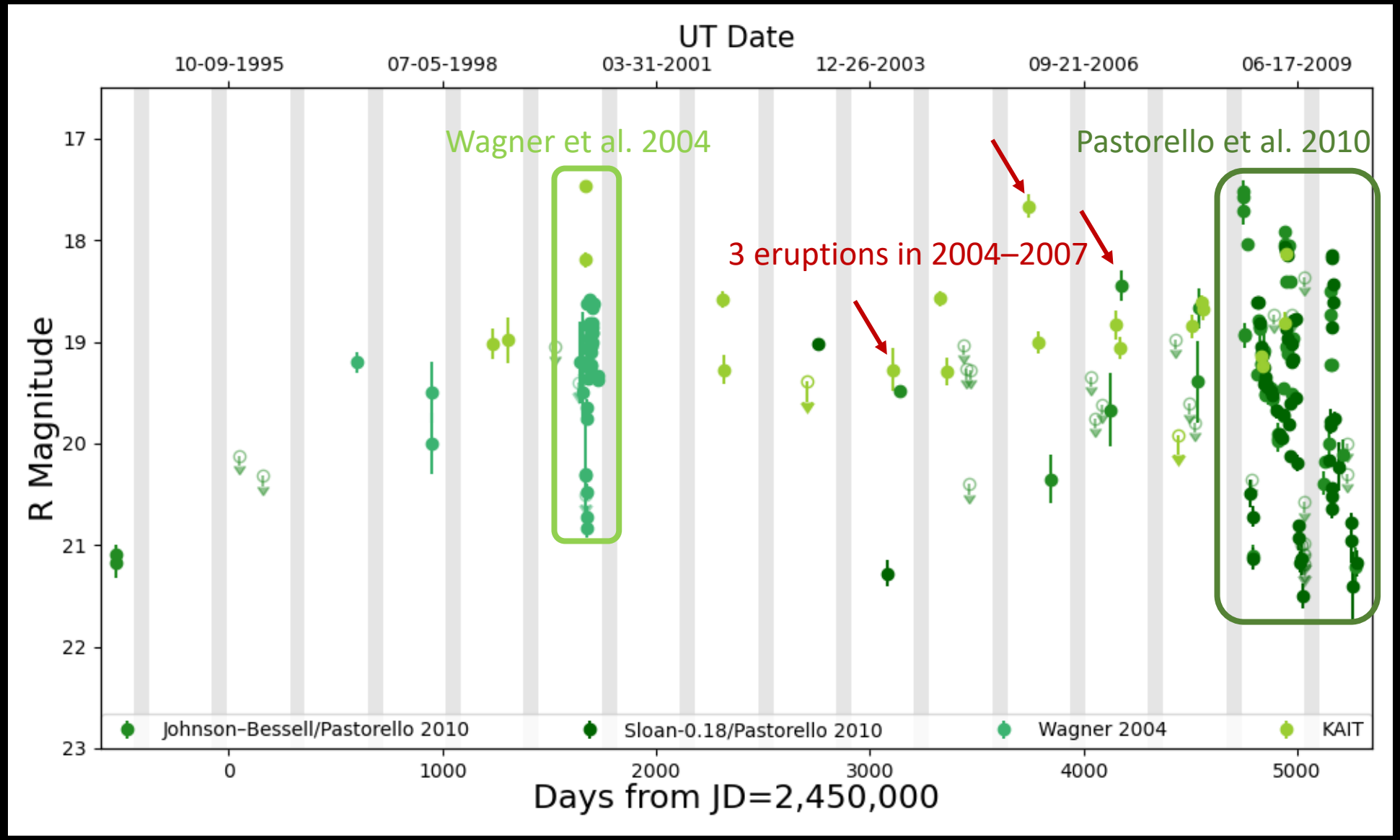
Kuiper R-band image of SN 2000ch obtained on 2018 March 20, during its 16th eruption.

Supernova Impostor & Luminous Blue Variable

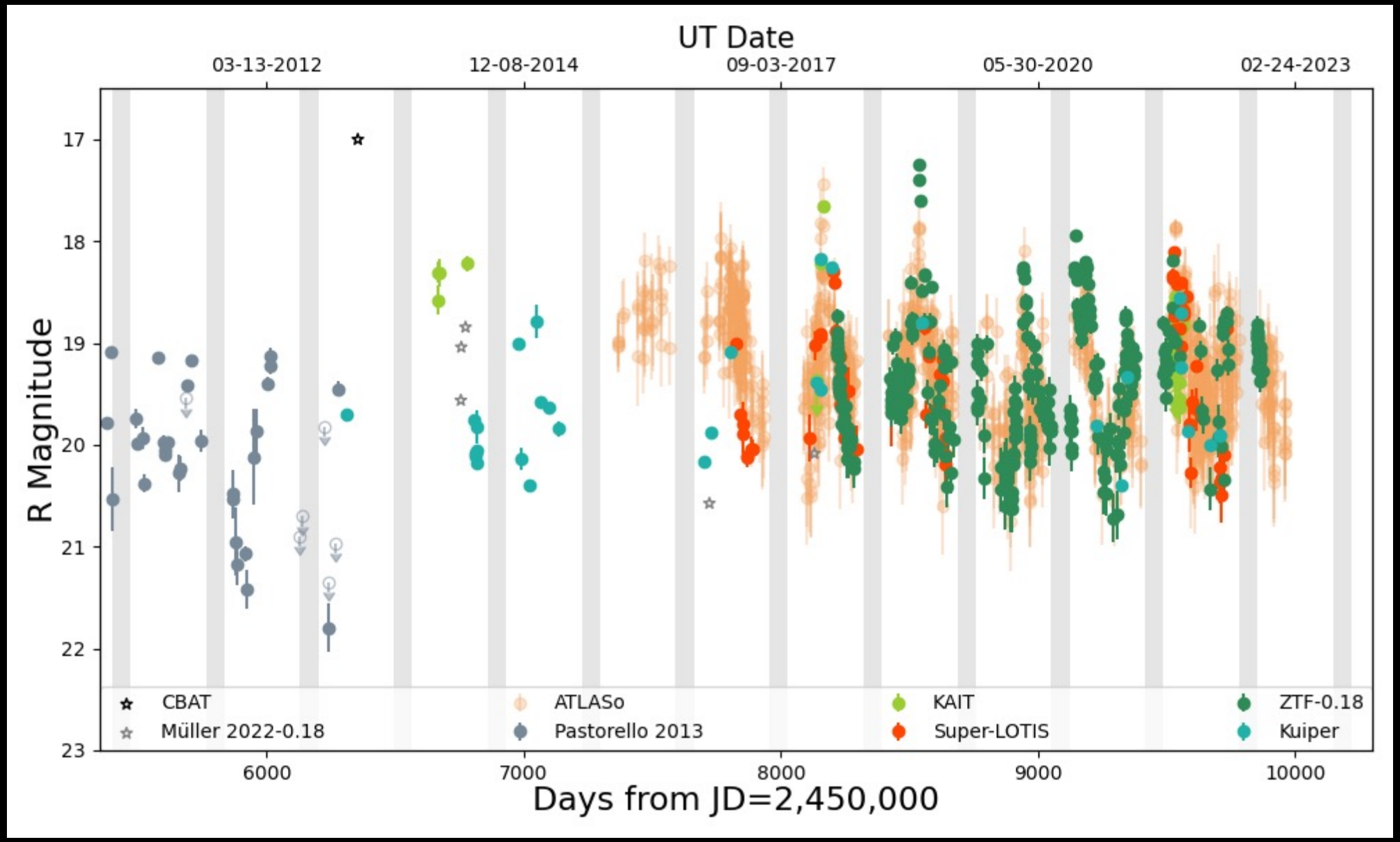
- SN impostors are evolved massive stars that have undergone nonterminal eruptions (Van Dyk et al. 2000; Smith et al. 2011).
- Occasionally misclassified as real SN explosions. However, since the stars survive the eruptions, they are labelled as SN impostors.
- Their eruptions are often interpreted as giant eruptions of Luminous Blue Variables (LBVs).
- The LBV phase is a short-duration stage of stellar life, during which a very massive star becomes an evolved unstable variable star.

Eta Carinae
NASA / ESA

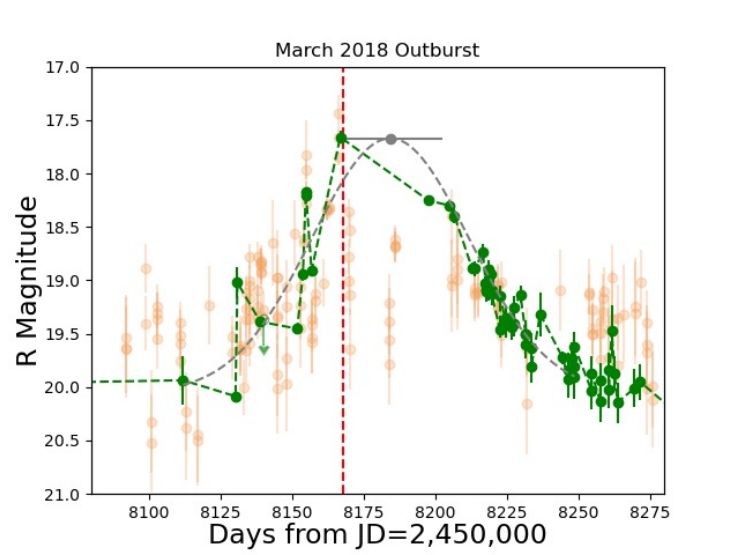
Previously Documented Eruptions

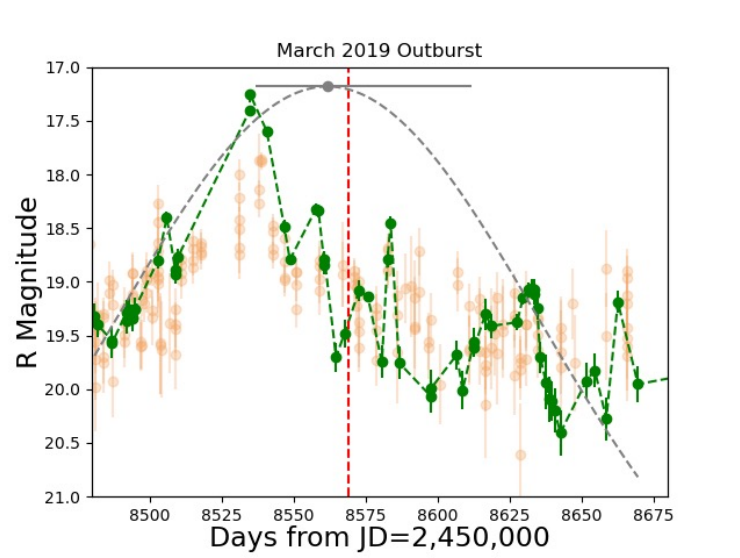


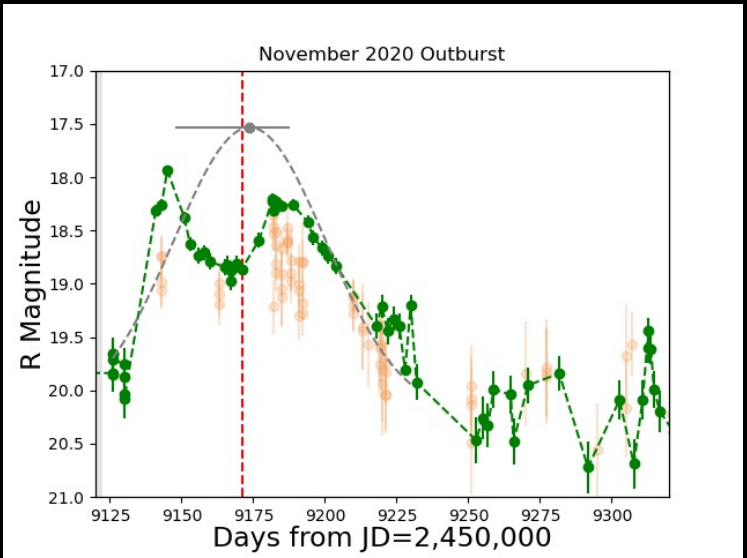
16 Additional Eruptions



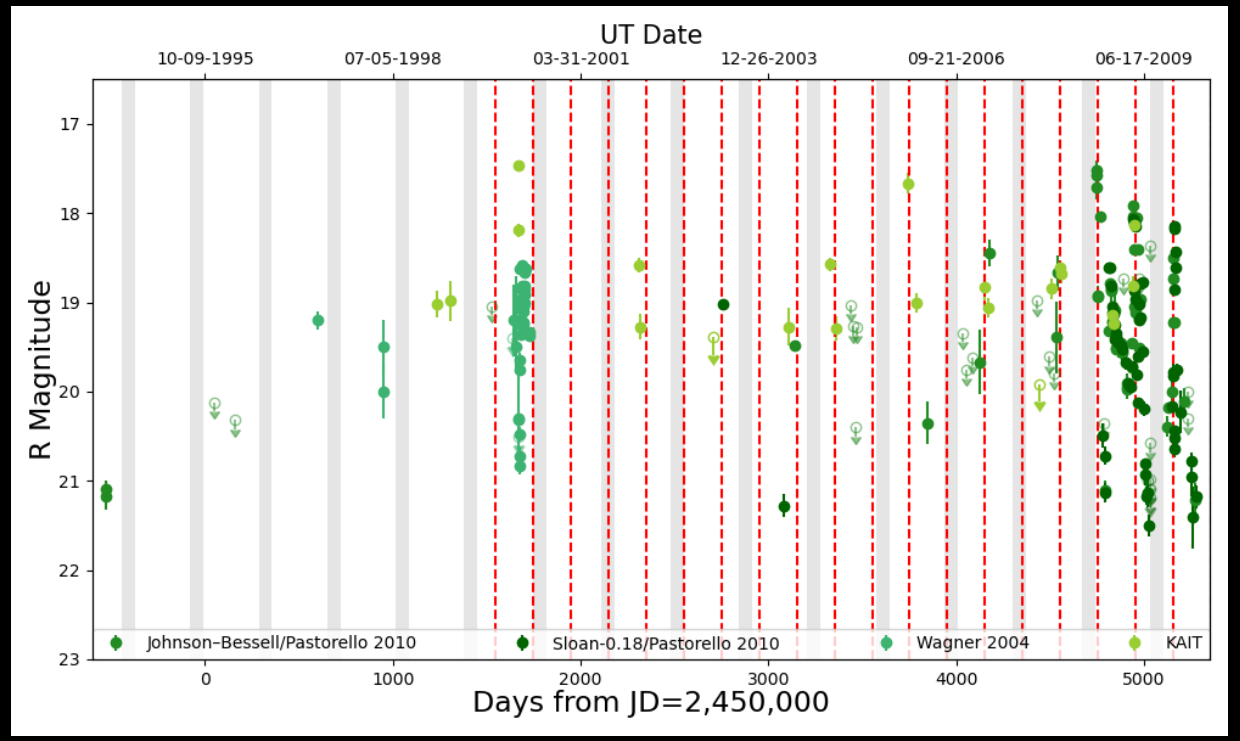
Post-2010 Eruptions

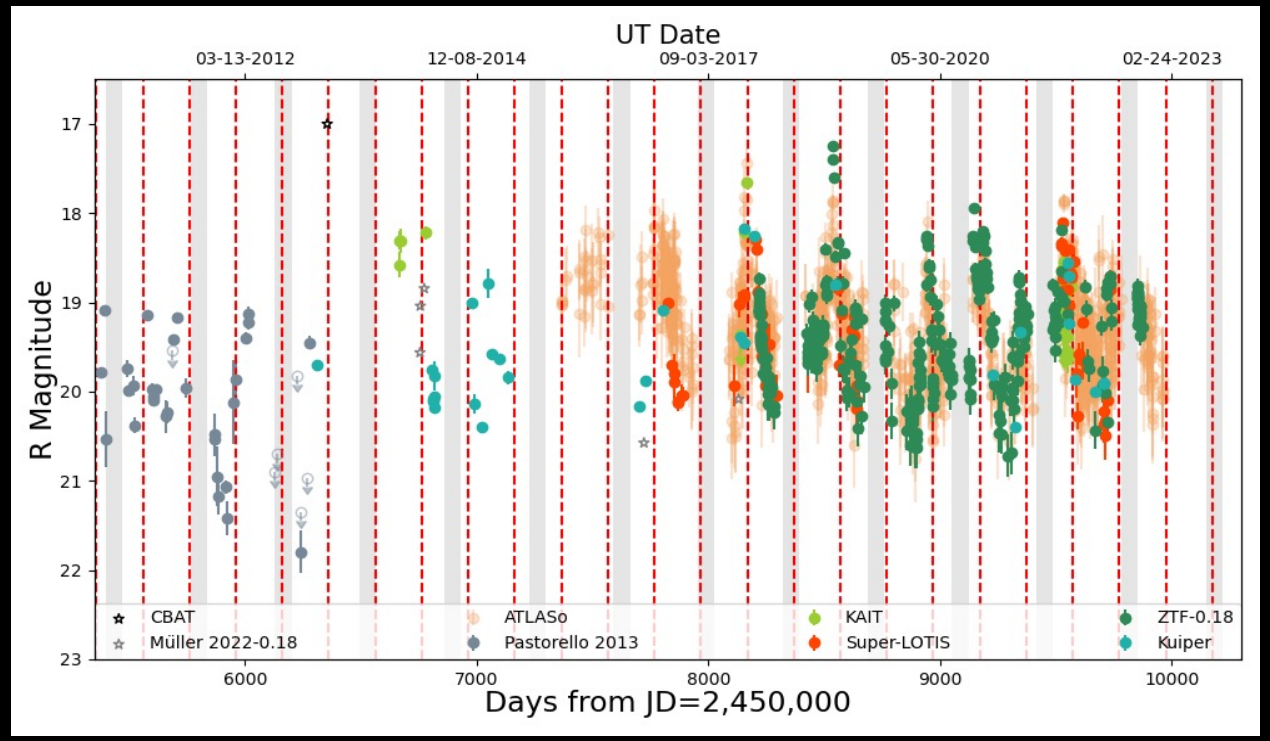






Repeating Periodic Eruptions

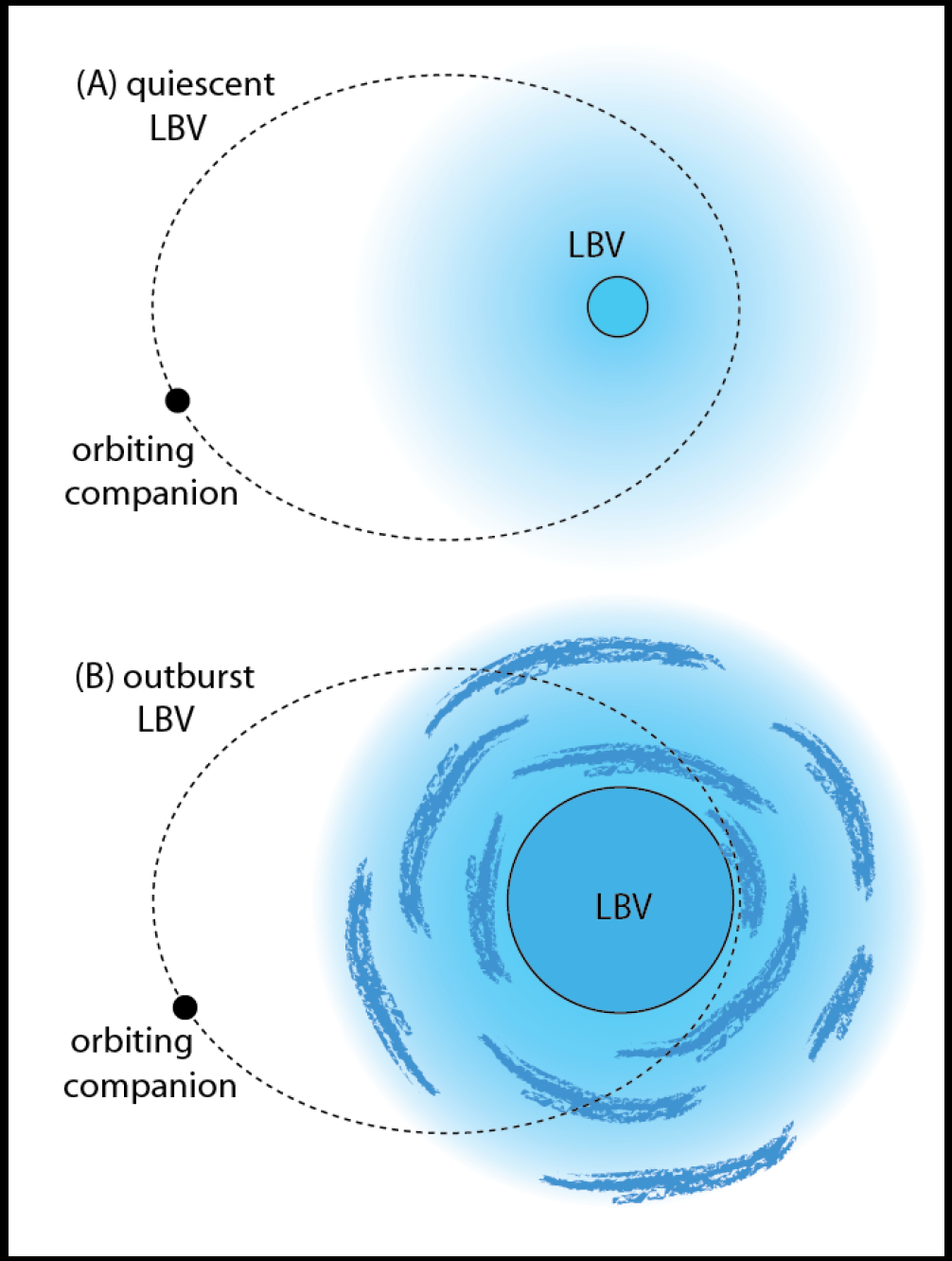




Recent eruptions repeat with a period of 200.7 ± 2 days

Interacting Binary System

- Binary System
- Eccentric Orbit
- LBV-like Primary Star



Target of Great Interest

- Similar to brief outbursts of η Car leading up to its 19th century Great Eruption (Smith 2011; Smith et al. 2018b).

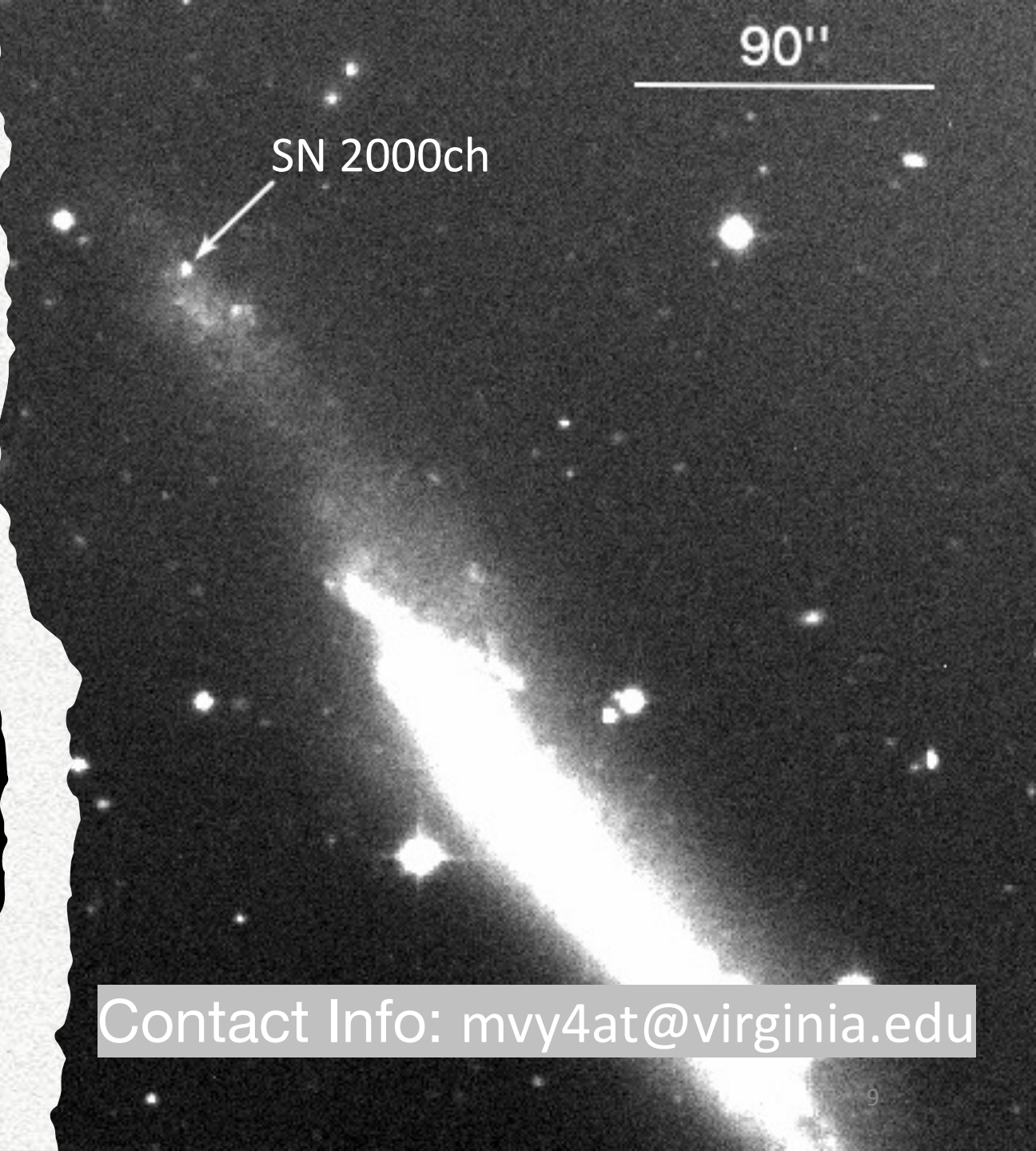
- Resembles the pre-SN eruptions of SN 2009ip (Smith et al. 2010; Pastorello et al. 2013).

- We encourage further monitoring and detailed observations of SN 2000ch considering that it may be a prelude to a merger or SN explosion.

Summary

- SN 2000ch experienced 23 eruptions.
- The eruptions repeat with a period of 200.7±2 days.
- These eruptions are caused by interaction around times of periastron in an eccentric binary system containing a luminous blue variable.
- Given the detected period, we predict upcoming eruptions in 2024.

Paper Link:



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