GLORIOUS
The Impact of Gaia on Eruptive Accretion and the Crucial Role of NIR-Gaia

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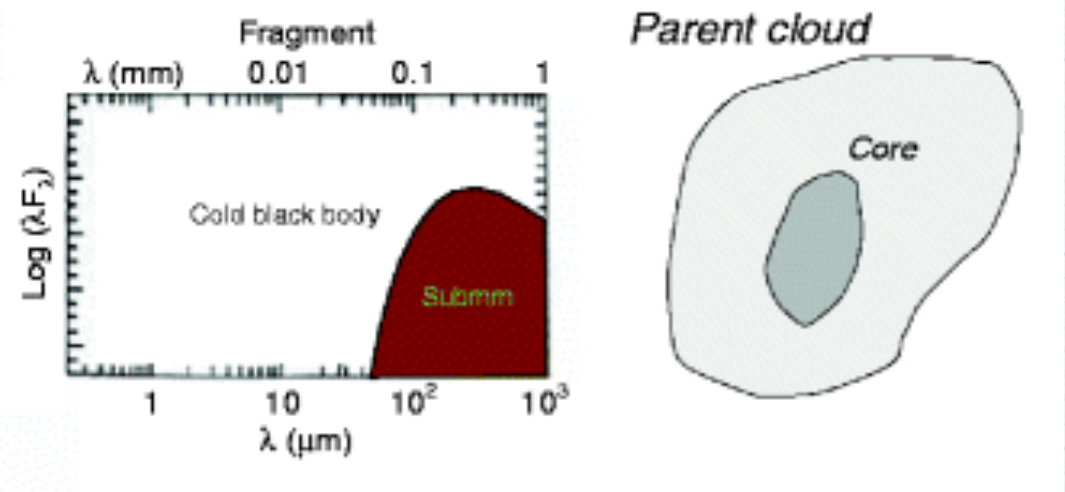
Star-formation phases

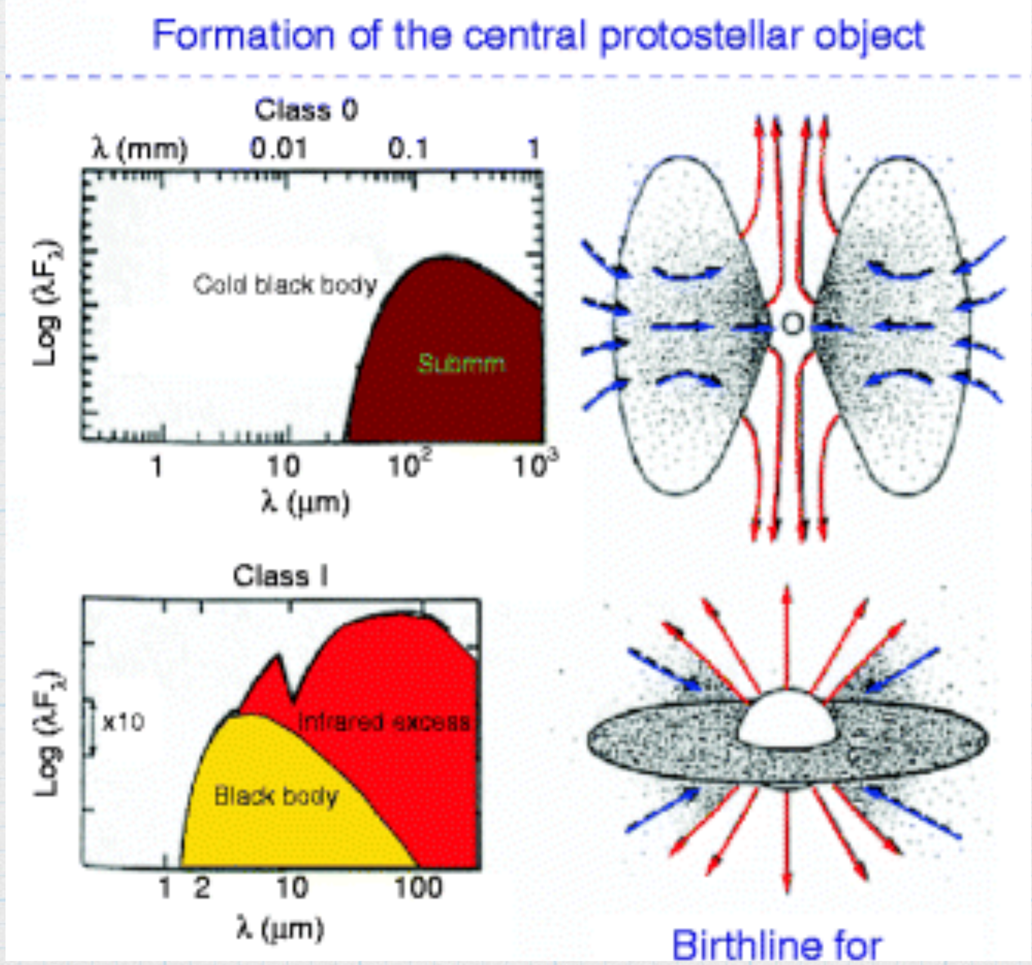
$M_\star < 2\,M_\odot$



Pre-stellar Phase

Pre-stellar cores
there is no star

We can study these stages only in the NIR!

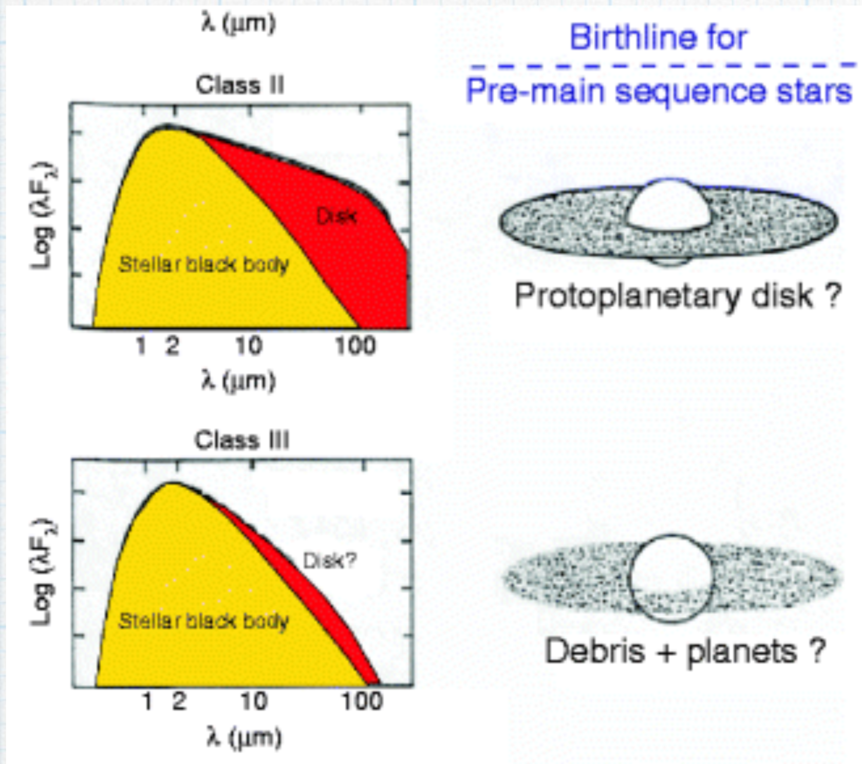


Protostellar Phase

Class 0 and I

The young stellar object is composed by the forming star, the disk and the envelope

Star-formation phases



Pre Main Sequence Phase
Class II and III

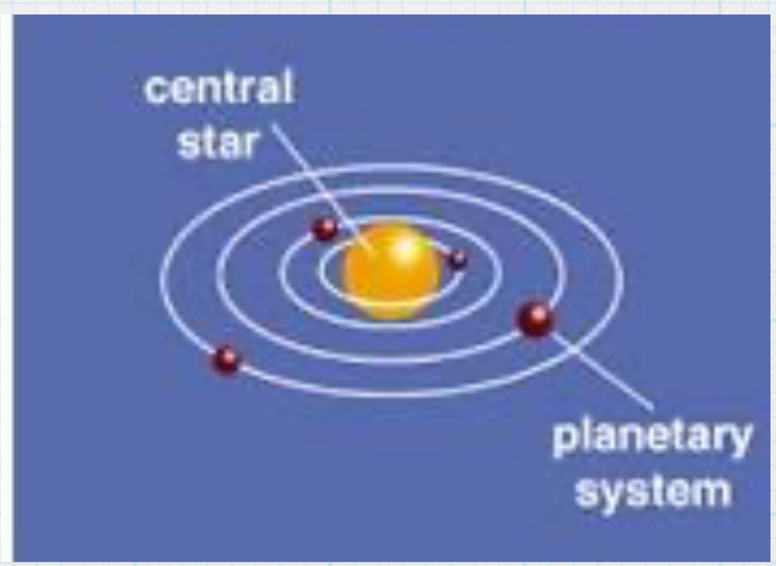
The envelope is mostly dissipated

Class II are also known as Classical TTauri stars

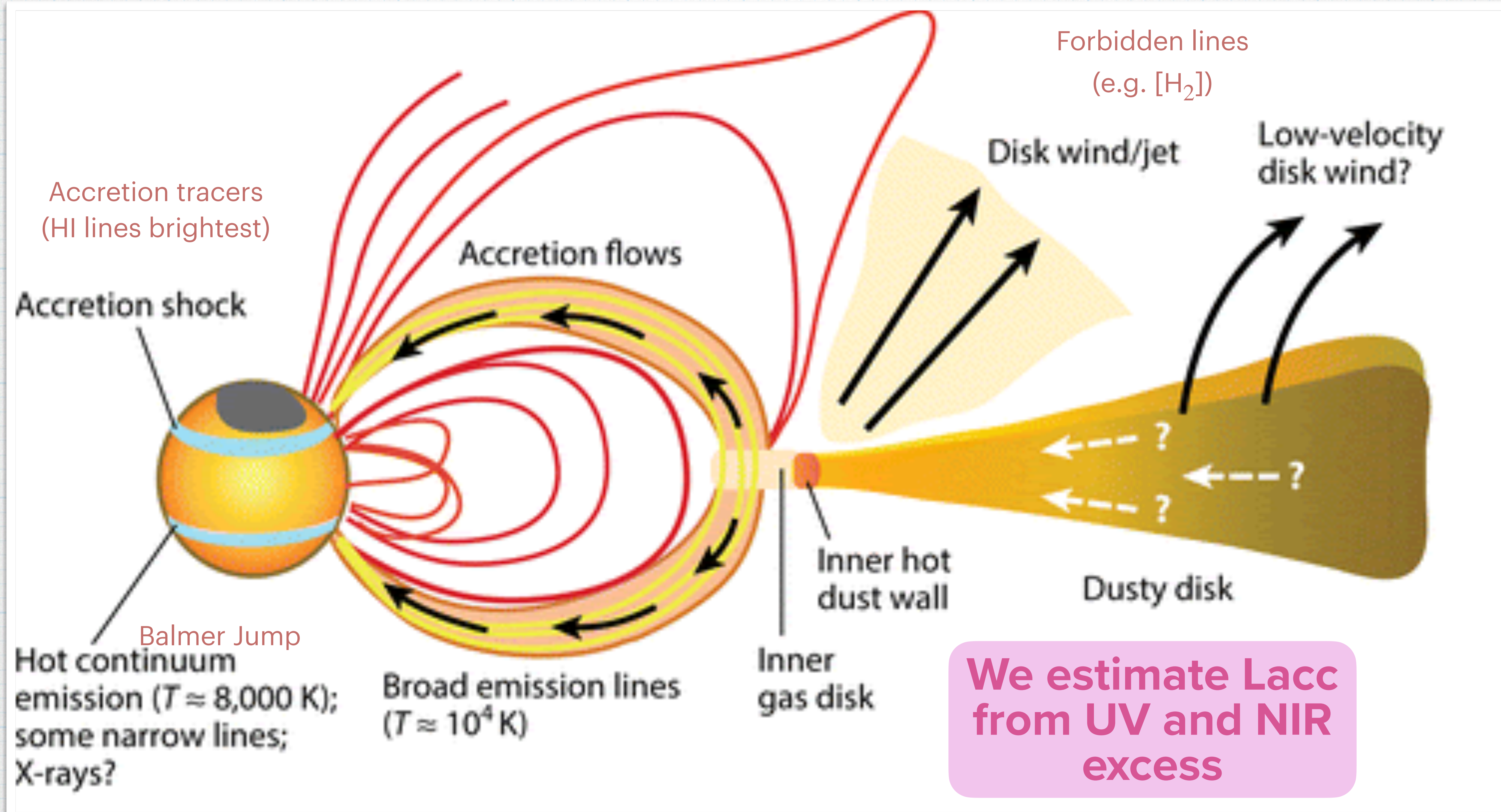
Class III are also known as Weak TTauri stars

Main Sequence

The star with its planetary system is formed



Magnetospheric Accretion



We estimate Lacc from UV and NIR excess

1AU = 0.006 arcsec at 150 pc

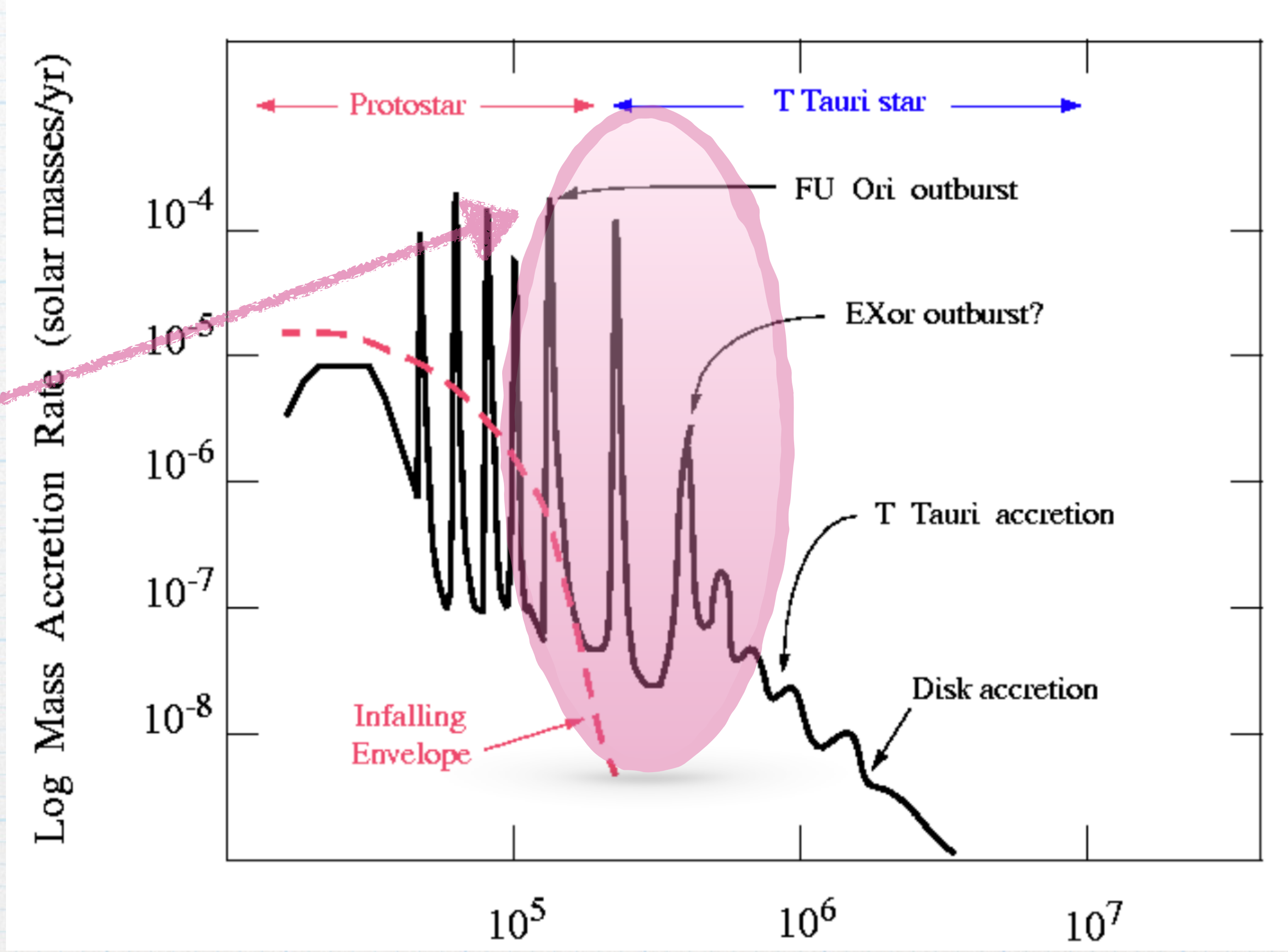
Hartmann 2016

Eruptive Young Stars

Accretion is not a steady process but it is characterised by variability and episodic bursts caused by disk thermal or gravitational instability and fragmentation.

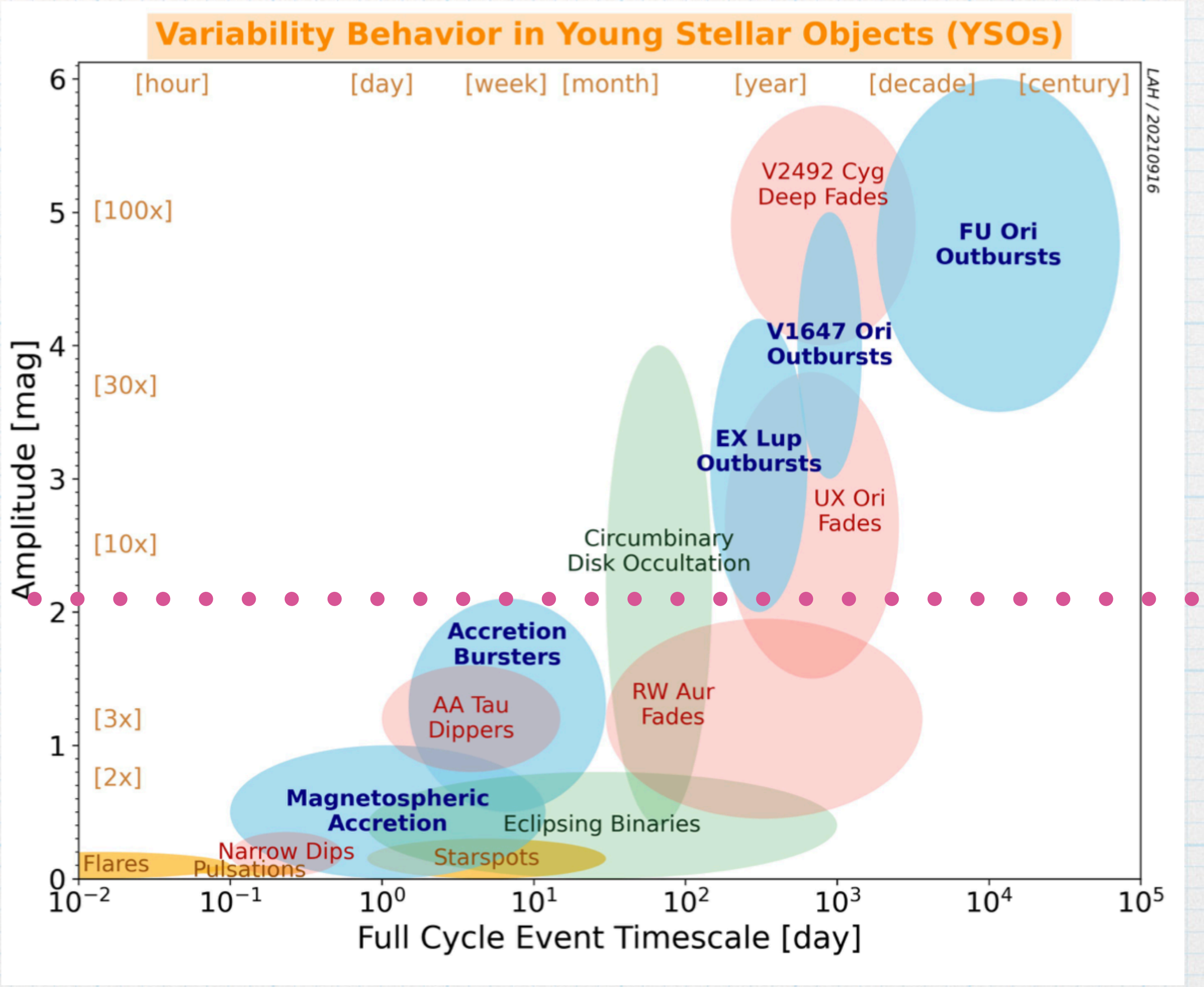
This phenomenology is what we observe in FUor and EXor-type young stars, collectively known as eruptive sources.

The occurrence of eruptive bursts is estimated to be once every 10^4 yrs (Scholz et al. 2013).



Variability of Young Stars

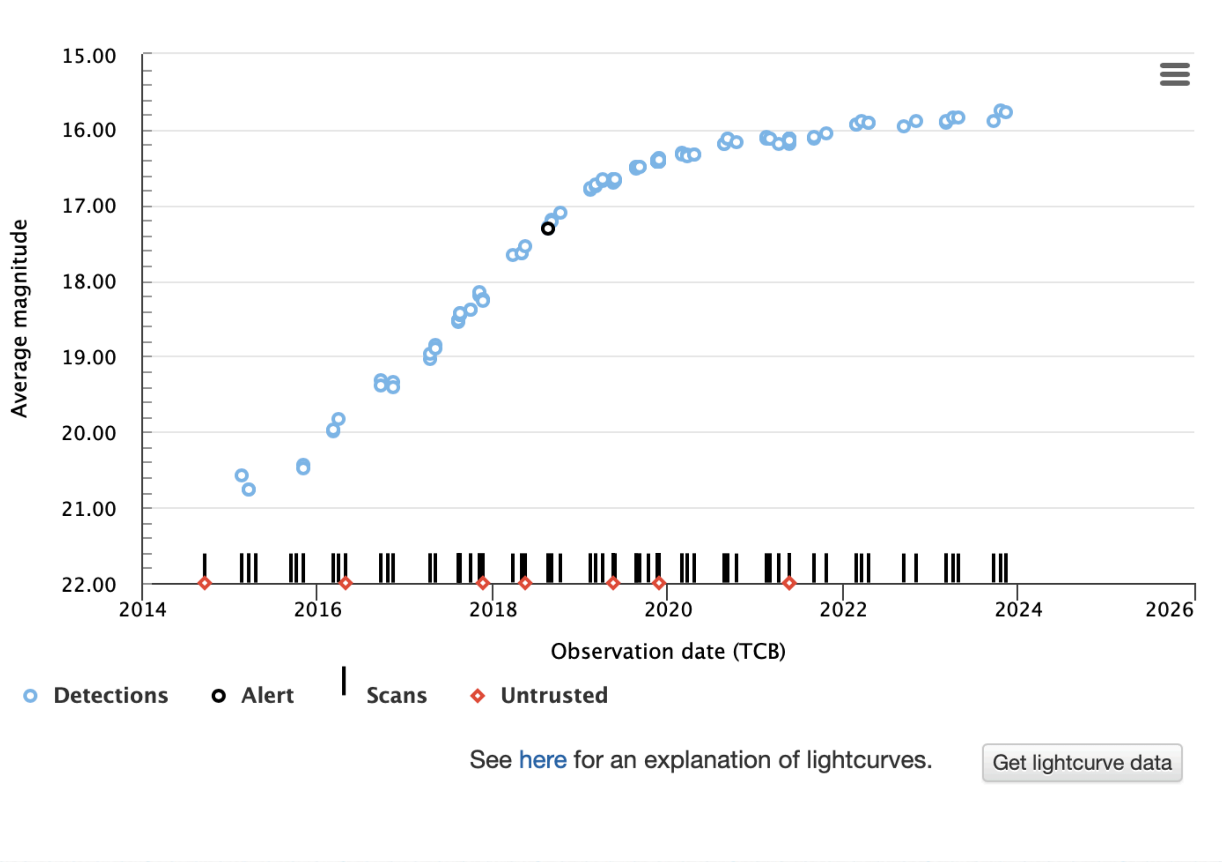
Eruptive sources show photometric variability larger than 2 mag in the visible



Hillenbrand. 2021
Fischer et al. 2023

GLORIOUS: Gaia science aLerts tO find eRuptIve yOUng stellar objectS

* Monitoring the Gaia Photometric Science Alerts Program (Hodgkin + 2021)
* Monitoring campaign with local photometry (REM, RC80, Shore, ADY60, NTT...)
* Archival photometry (ZTF, PanSTARRS, 2MASS, UKIDSS, WISE, ASAS-SN...)
* Spectroscopic Follow up (VLT, GTC, NTT, LBT, IRTF...)

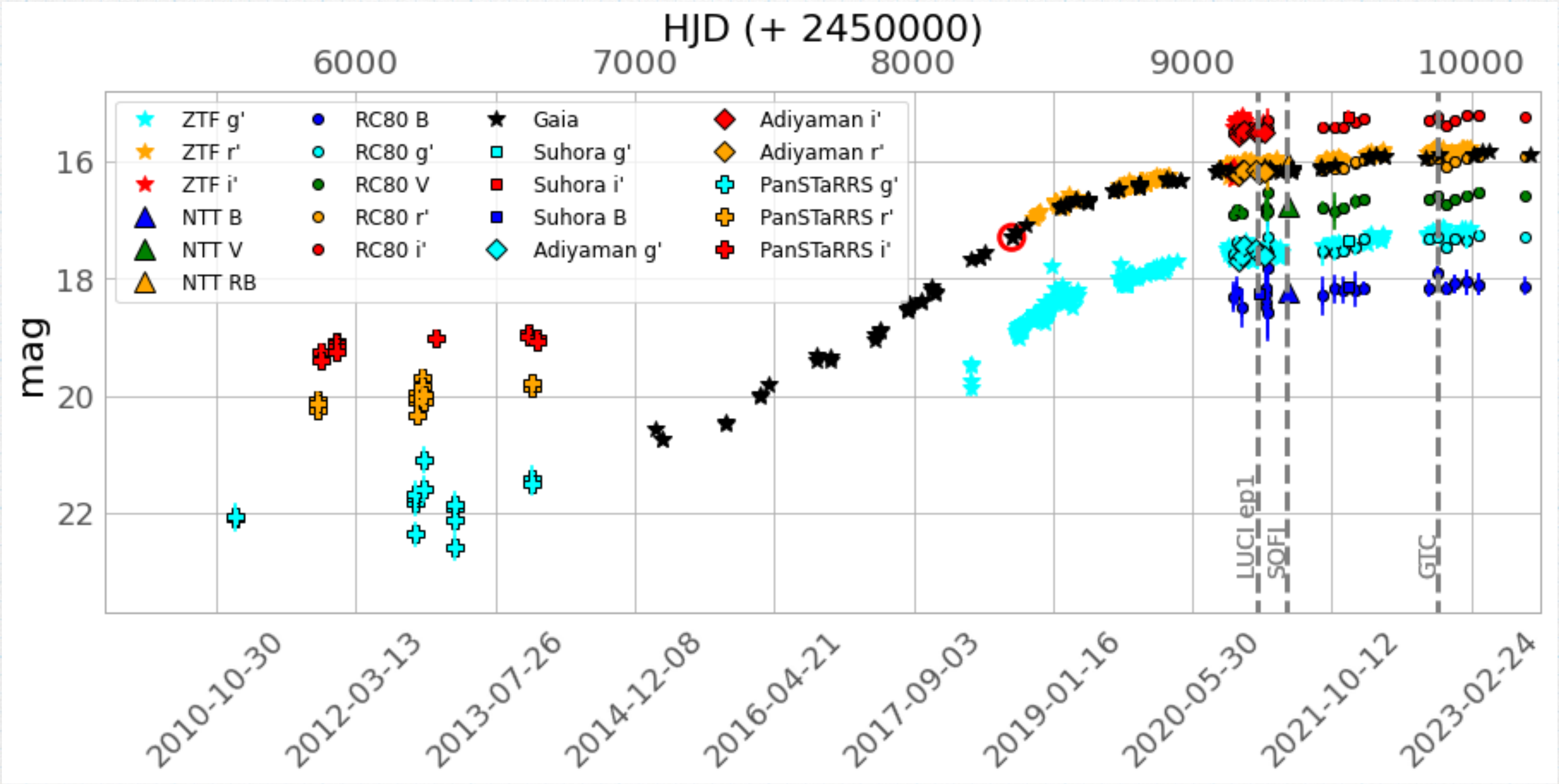


GLORIOUS: Gaia science aLerts tO find eruptive yOUng stellar objectS

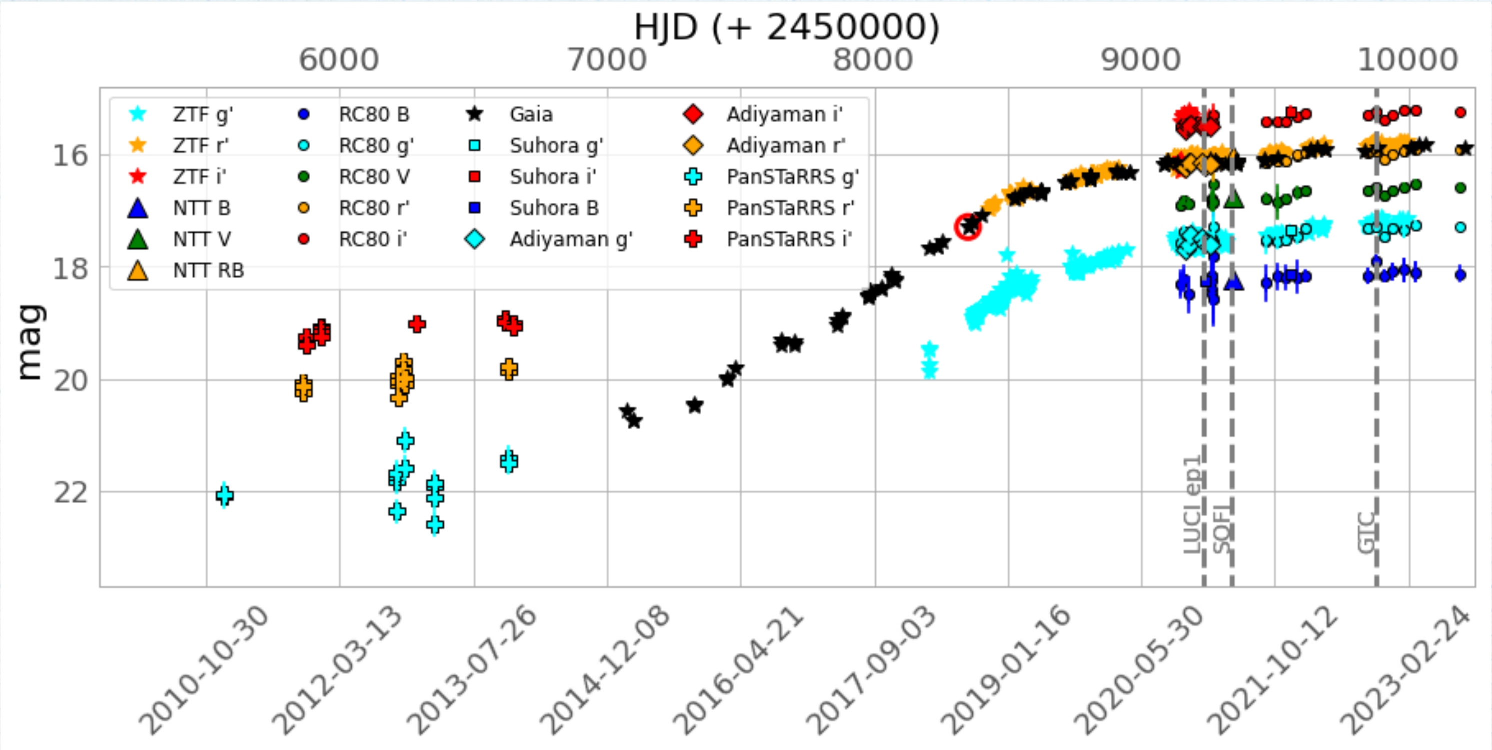
11 new eruptive young stars have been discovered:

* Gaia17bpi (Hillenbrand et al. 2018)
* Gaia18dvy (Szegedi-Elek et al. 2020)
* Gaia21bty (Siwak et al. 2023)
* Gaia21elv (Nagy et al. 2023)
* Gaia18dvz (Hodapp et al. 2019)
* Gaia19fct (Park et al. 2022)
* Gaia20eae (Cruz-Sáenz de Miera et al. 2022, Ghosh et al. 2022)
* Gaia19ajj (Hillenbrand et al. 2019)
* Gaia19bey (Hodapp et al. 2020)
* Gaia18cjb (Fiorellino et al. und. rev.)
* Gaia23bab (Kuhn et al. 2023; Giannini et al. und. rev.; Nagy et al. in prep.)

An example of a light curve



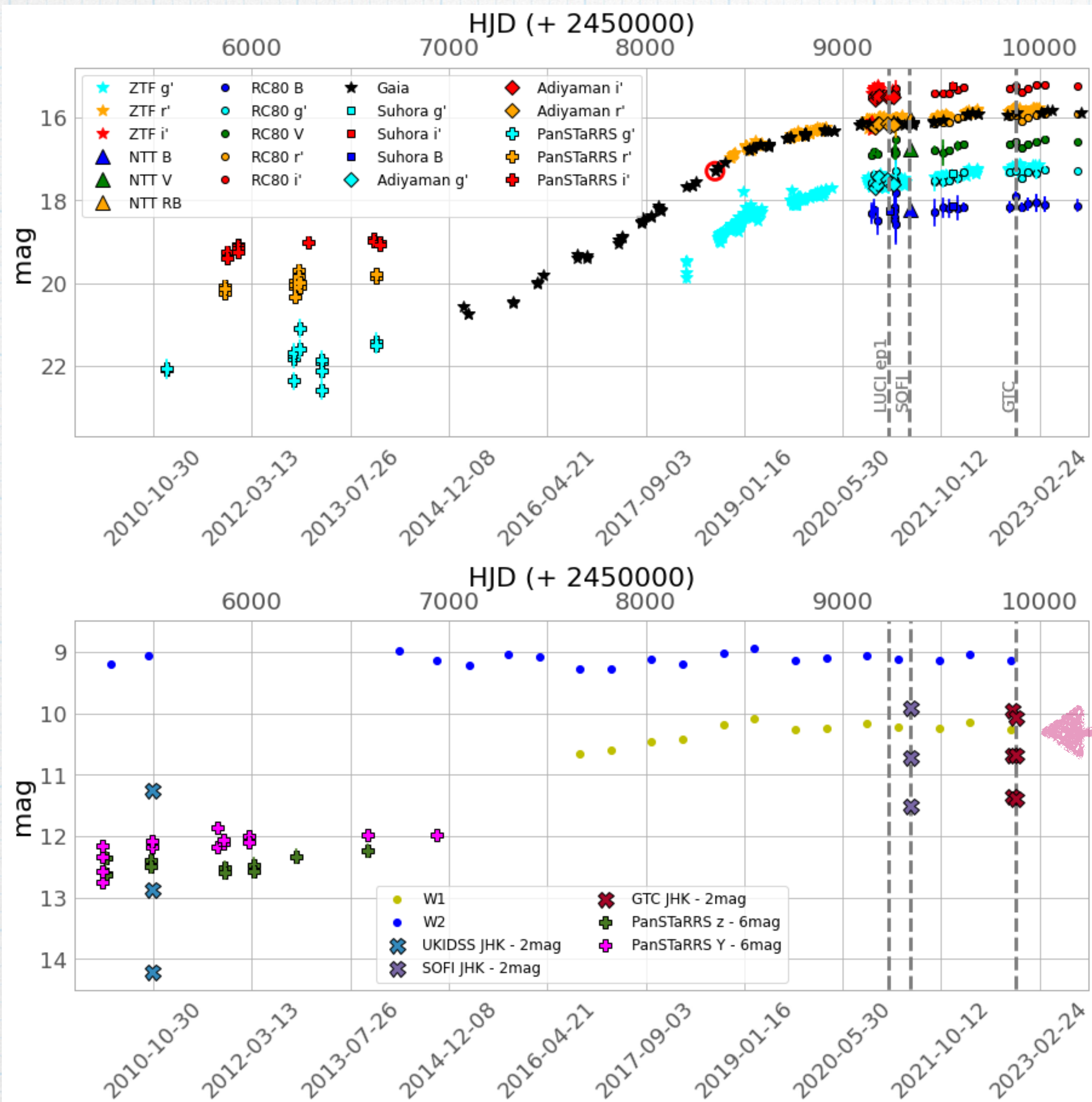
An example of a light curve



Based on the optical light curve, we propose spectroscopic follow up at both optical and NIR wavelengths

BUT we don't have NIR info

An example of a light curve



In this case, we were lucky, but often we fail to observe NIR spectra because the strong and/or unpredictable variability of these objects prevents us to estimate NIR magnitudes

Why we need GaiaNIR

* The goal of GLORIOUS is to discover and characterise new eruptive sources to unveil the accretion phenomena
* For this purpose we need an all-sky NIR survey to study eruptive YSOs in the NIR
* To discover even more embedded eruptive YSOs
* If some 5000 resolution spectroscopy is possible: amazing!

Thanks!