

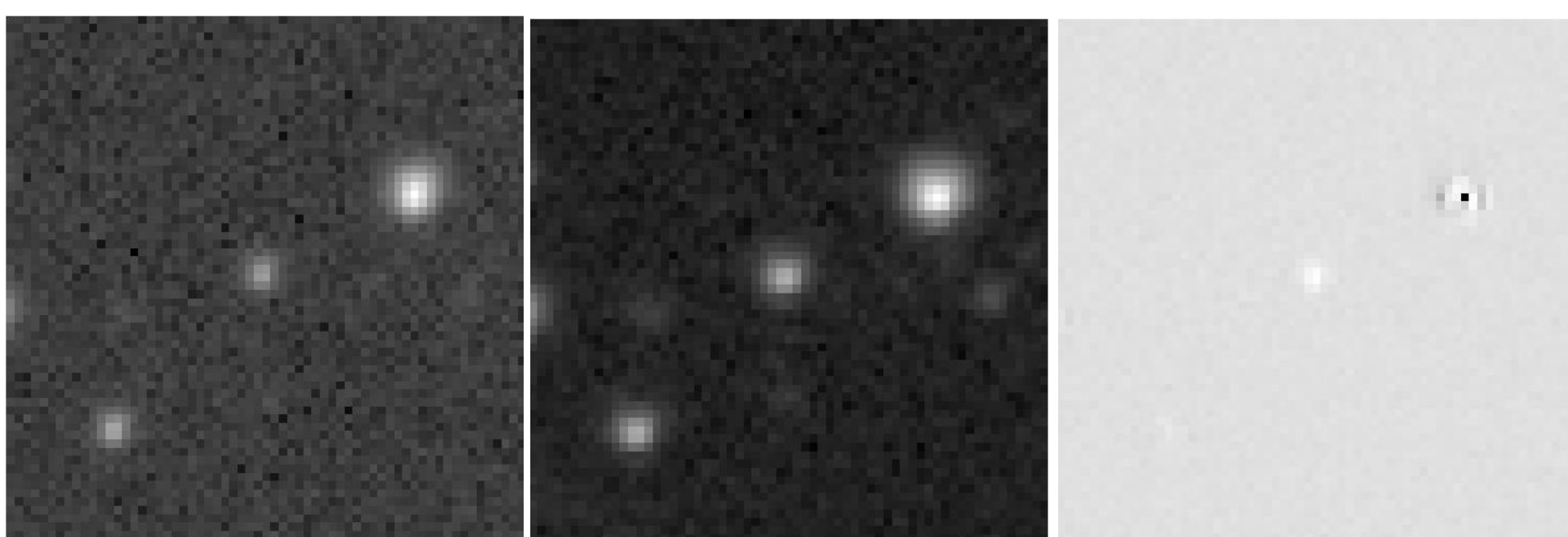
Assess the robustness of computationally cheap (and with high discriminant power) features against observations a la LSST. In particular the Irregular Autoregressive model.

Irregular Autoregressive model (IAR): computationally inexpensive feature (used by ALeRCE on ZTF alerts) providing degree of autocorrelation for unevenly sampled light curves (LCs).

$$y_{t_j} = \phi^{t_j - t_{j-1}} y_{t_{j-1}} + \sigma \sqrt{1 - \phi^{2(t_j - t_{j-1})}} \epsilon_{t_j}$$

With ZTF data as the starting point, we resamples the LCs both from the latest (at the time) Data Release (DR9) (Fig. 2) and from the Forced Photometry service (FP).

ZTF Stamps



Science Template Difference

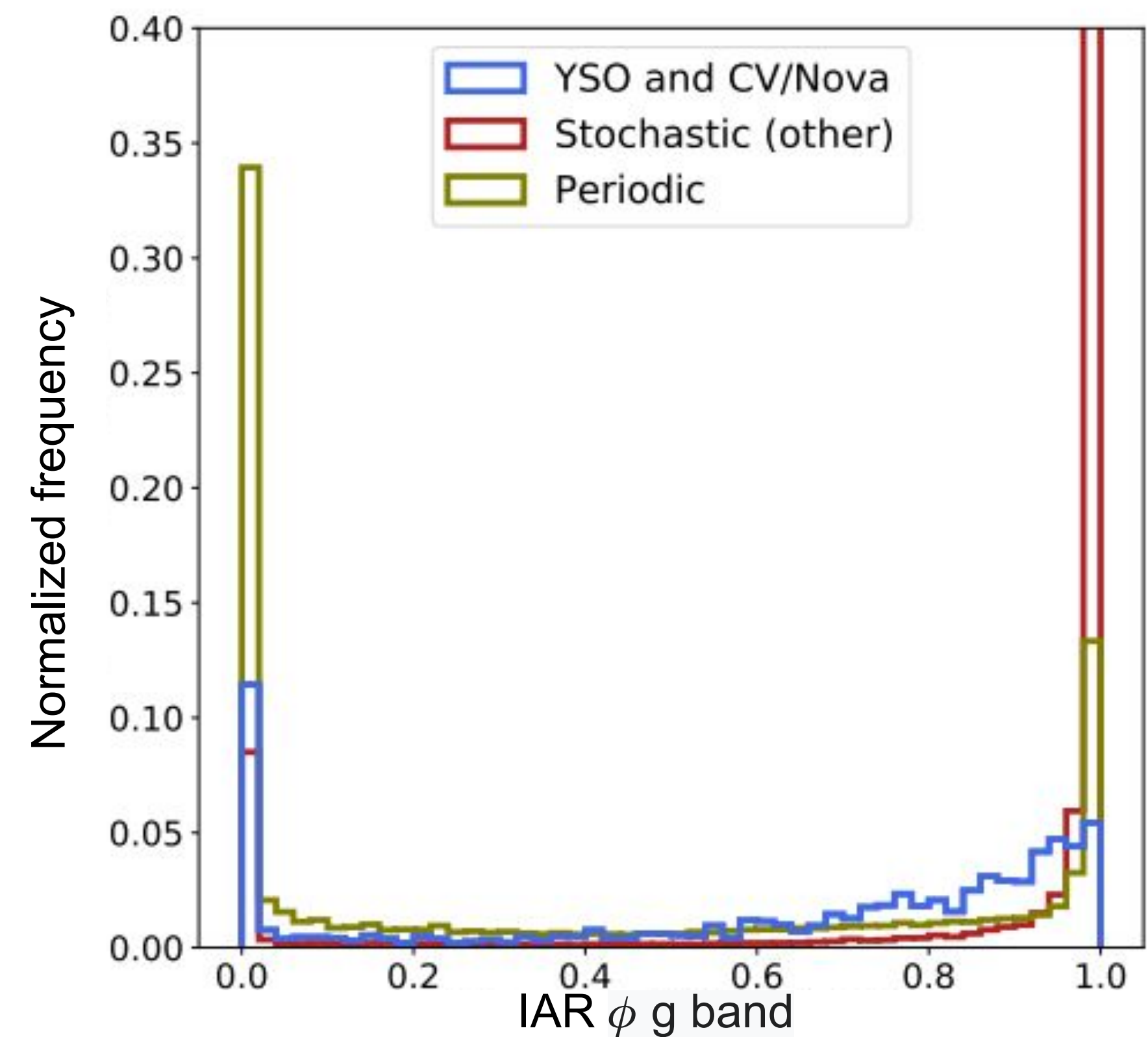


Fig 1: IAR distributions of different kinds of objects computed from the alert LCs. Credit: Sanchez-Saez et al 2021.

There are some minor issues in the Data Release Sample results due to the “faulty” PSF photometry for extended objects (Fig. 3).

Conclusions: the IAR is a fast and cheap feature that can work on LSST cadences (Fig. 4 and 5) with the same discriminatory power shown for alert LCs (Fig. 1).

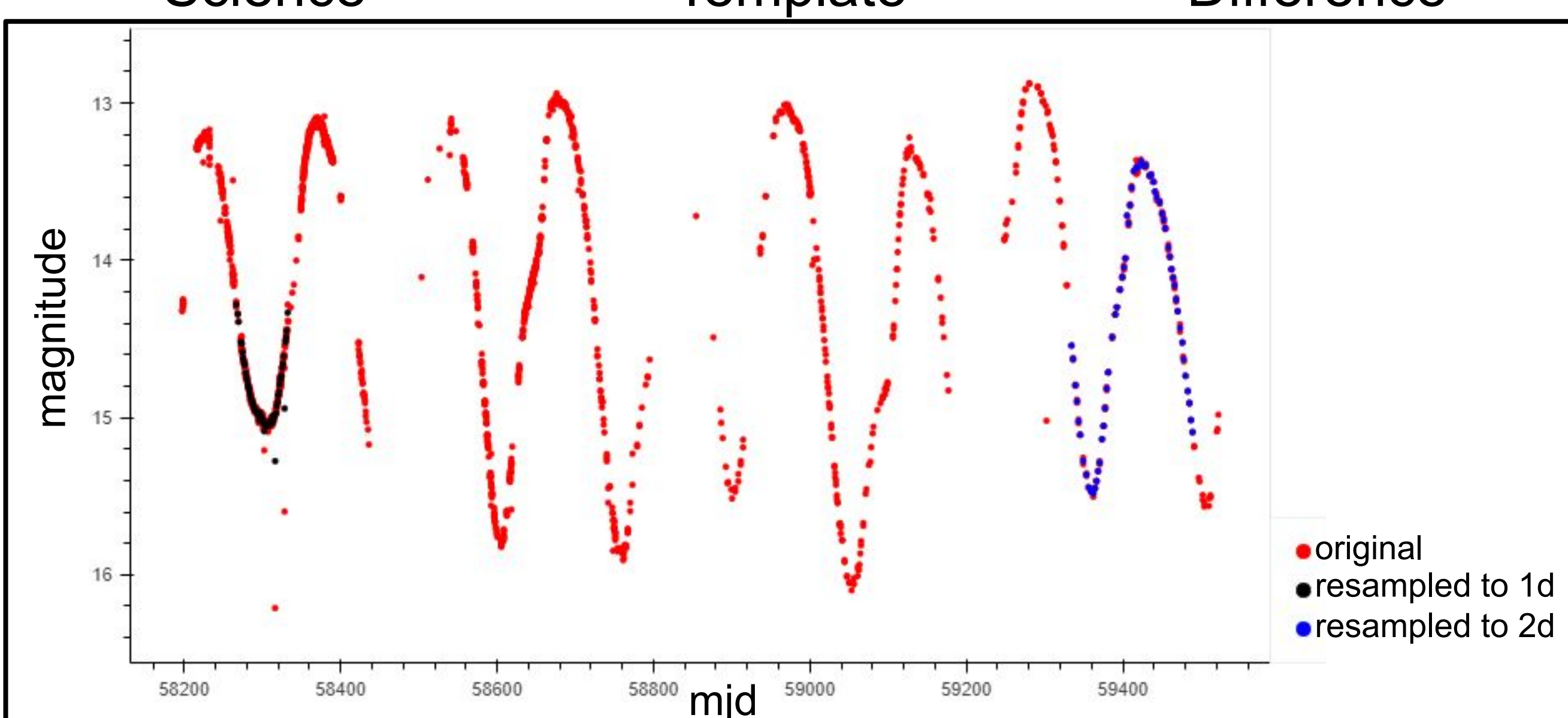


Fig 2: Example of LC resampling for one object in the DR set.

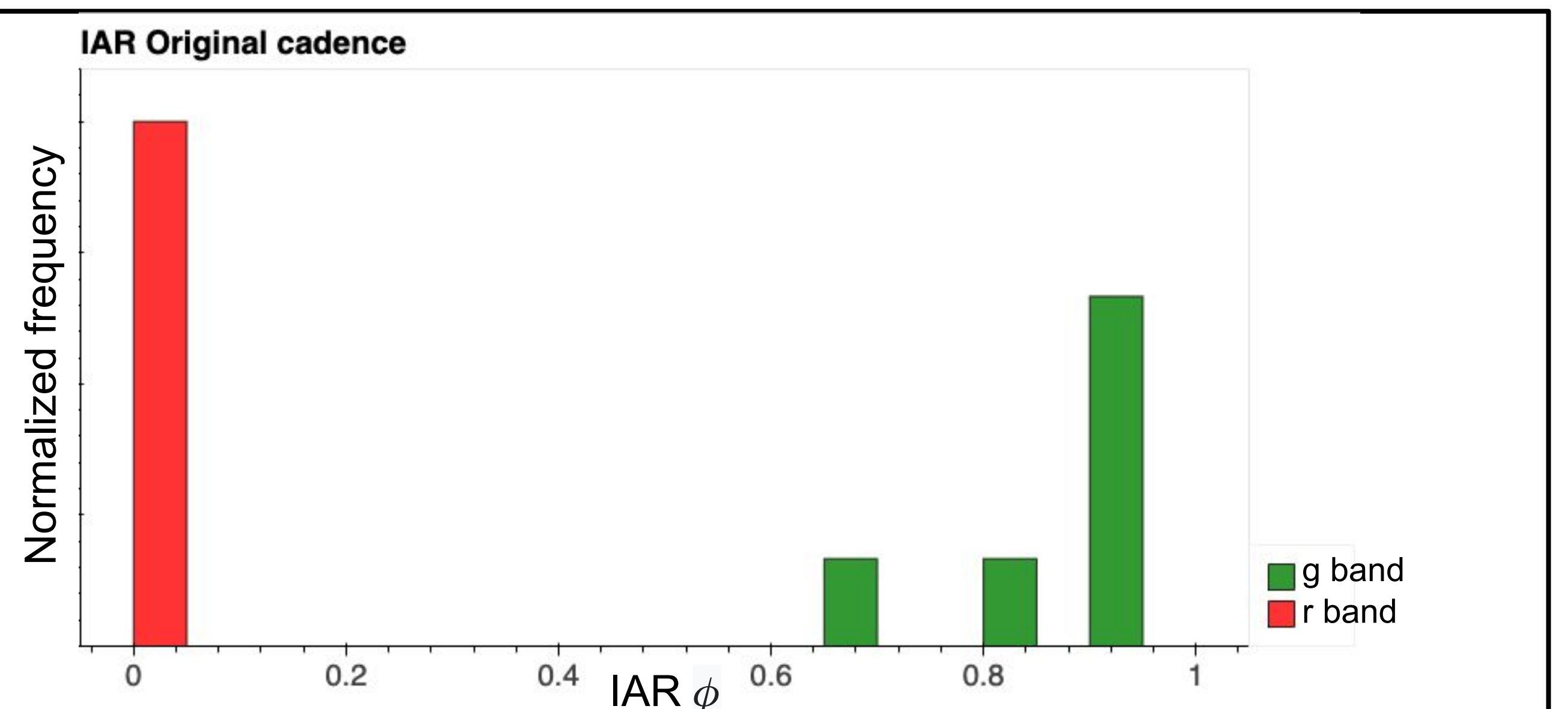


Fig 3: Distribution of the IAR for the set of AGNs within our sample of DR.

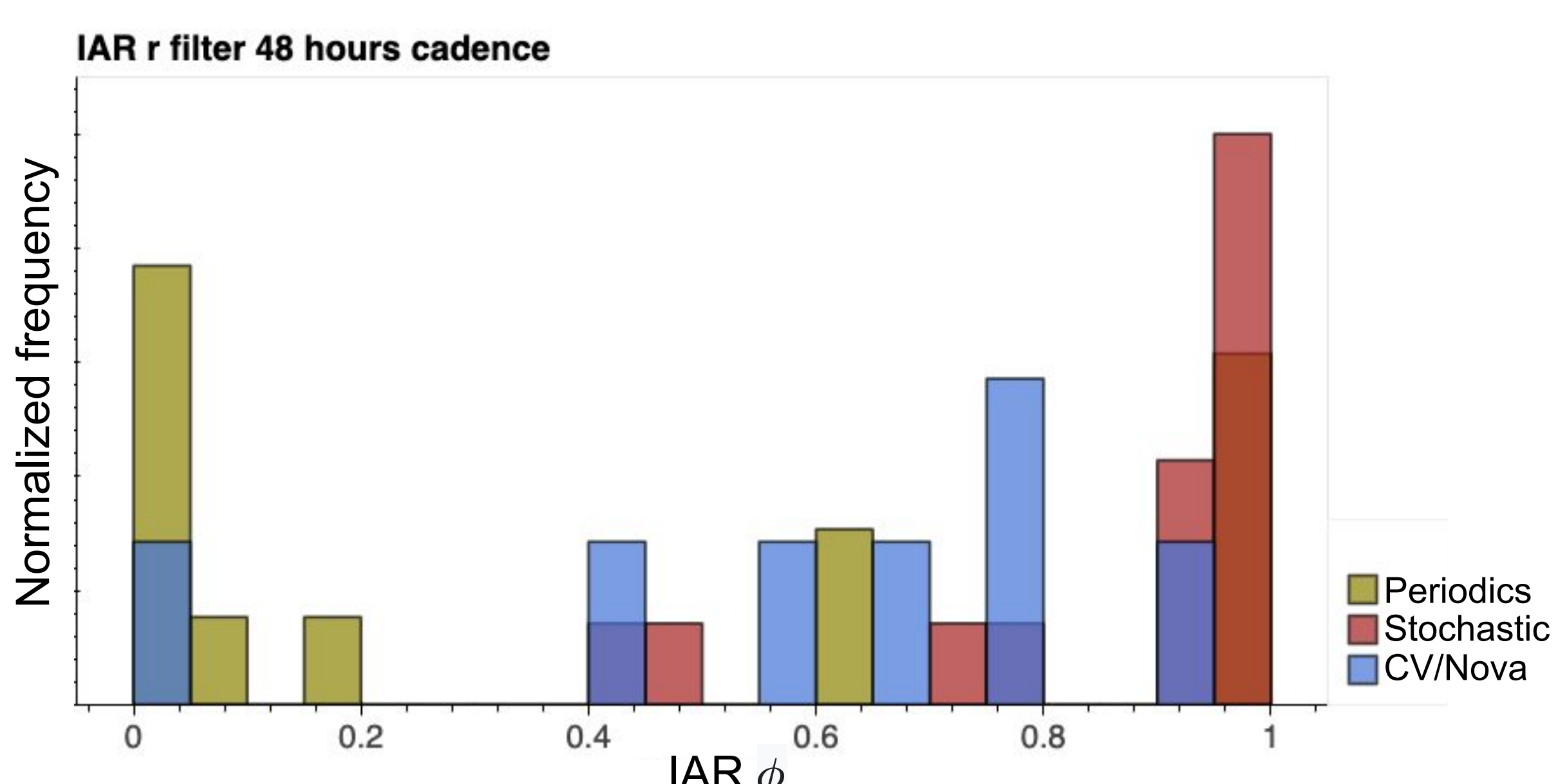


Fig 4: IAR distribution for Data Release in r-band for a 48 hrs cadence

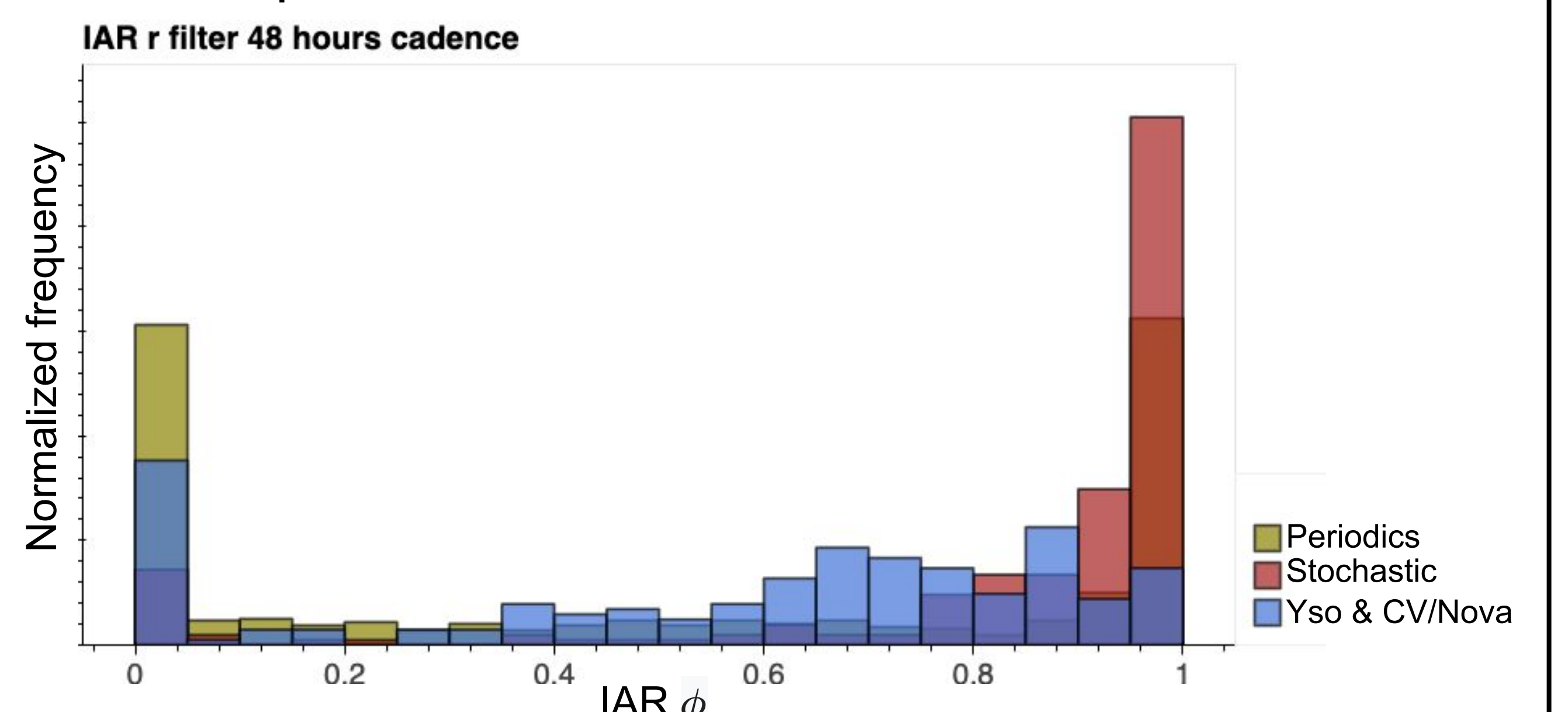


Fig 5: IAR distribution for Forced Photometry in r-band for a 48 hrs cadence

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