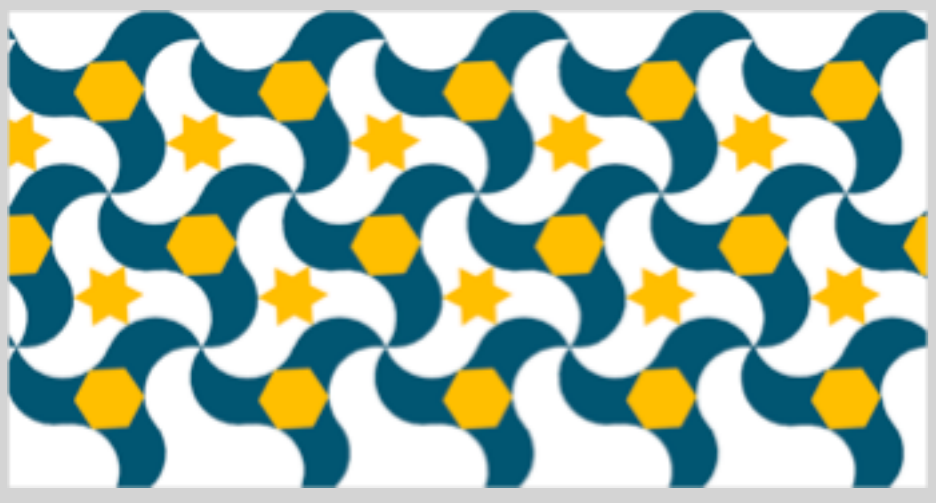


# SURVEY OF YOUNG STELLAR CLUSTERS IN THE NORTH HEMISPHERE



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## ABSTRACT

Five years ago, the Stellar Systems Group of the IAA began an observational programme of young stellar clusters containing massive stars, whose main objective is the characterization of their stellar population using optical ( $UBVRI + Ha$ ) and NIR ( $JHKs$ ) photometry. With these data, we can obtain the physical parameters of the clusters and determine the mass function of the cluster members, their spatial distribution by mass range, as well as a census of populations at different masses and evolutionary states for two distinct environments: a) isolated clusters, and b) clusters contained within a larger star-forming region. So far, we have observed around 40 clusters, which are at different stages of analysis.

The optical data were secured from the 1.5m telescope at Sierra Nevada Observatory (OSN), while the NIR data were taken using the Nordic Optical Telescope (NOT) at Roque de los Muchachos Observatory. The last year, we began the optical observations of the survey with a larger field of view (13' size) at the 0.9m telescope (OSN). The analysis of the set of standard stars observed along the whole project enabled us to determine a reliable estimation of the atmospheric extinction as well as to analyze the stability of the photometric transformations at OSN to calibrate the data. In this poster, we present the results of the calibration analysis.

## TELESCOPES



Table 1: Characteristics of the telescopes

OBSERVATORY	TELESCOPE	FIELD OF VIEW	FILTERS
OSN	1.5 m	8' x 8'	$UBVRI + Ha$
OSN	0.9 m	13' x 13'	$UBVRI$
NOT	2.5 m	4' x 4'	$JHKs$

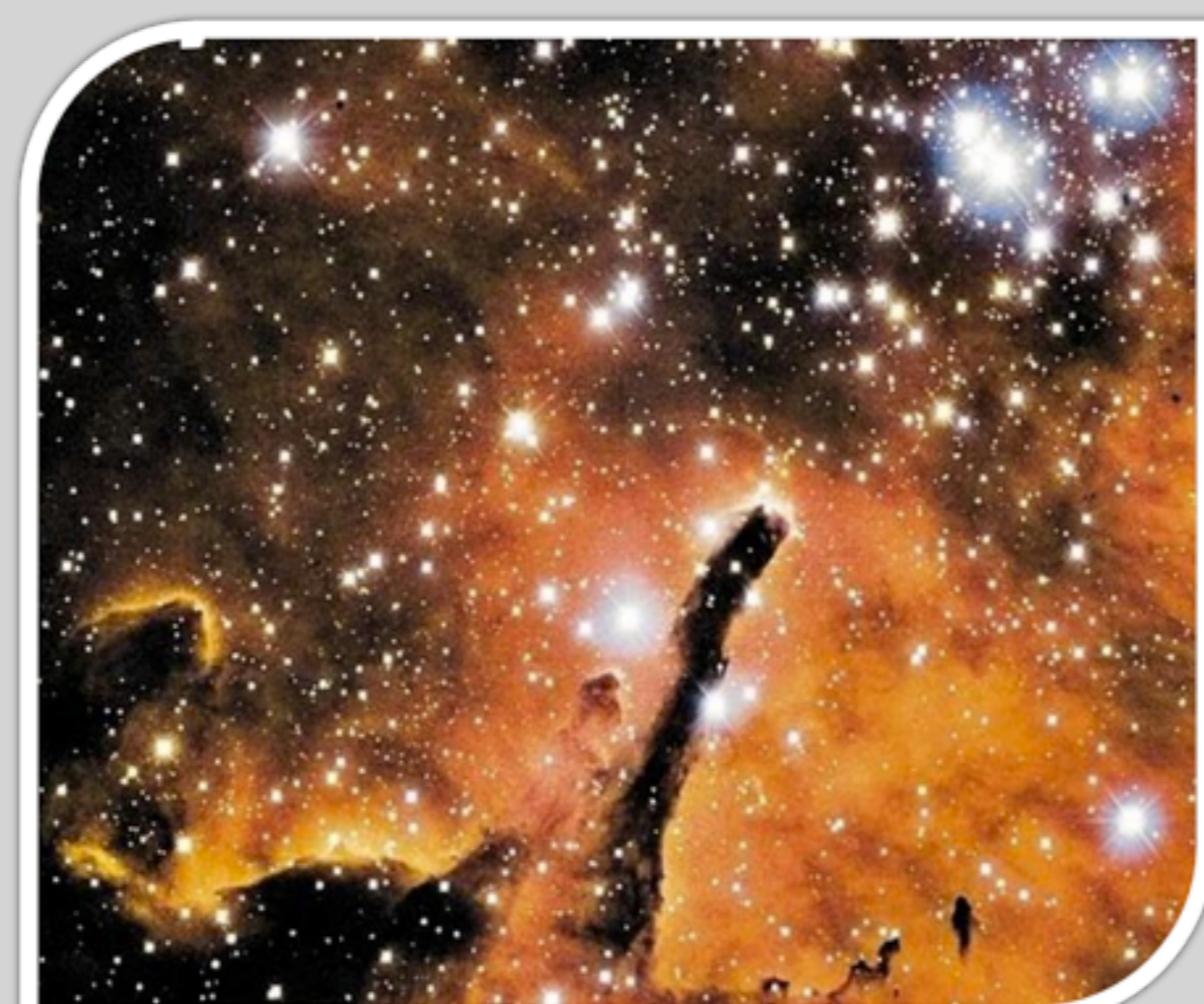
## SAMPLE OF YOUNG STELLAR CLUSTERS

The sample of the young stellar clusters observed is formed by different kinds of objects, in the sense that they are isolated or being part of a larger star-forming region which could include an important gas remnant. The range of the reddening  $E(B - V)$  is between 0.3 and 1.2, for a range of the distance from 0.7 to 4 kpc, and ages between  $\log \text{Age}$  6.3 and 8.0 (2 and 100 Myr). Figure 3 shows a sample of the targets in different environments and evolutionary states.

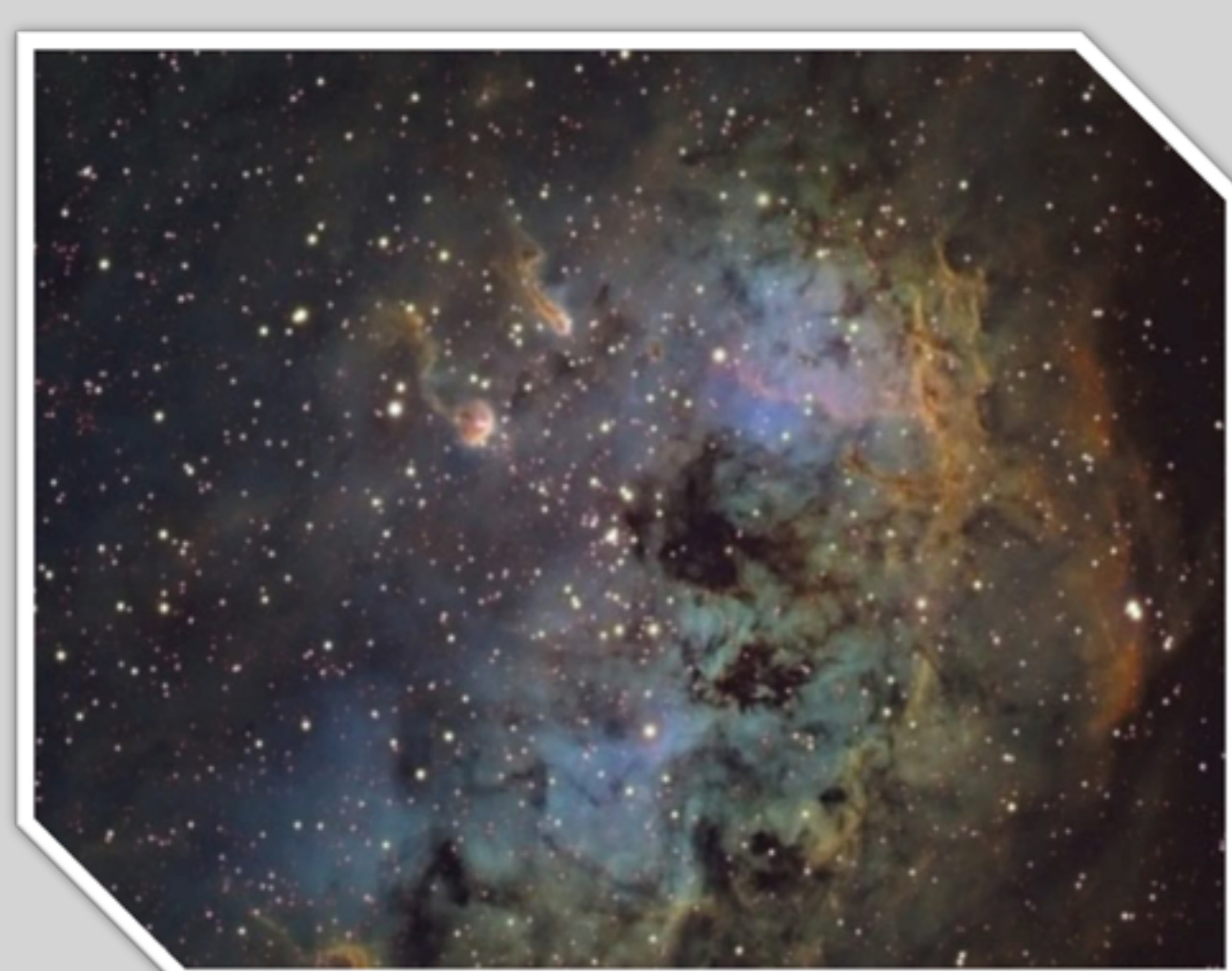
Figure 3: Examples of the clusters observed



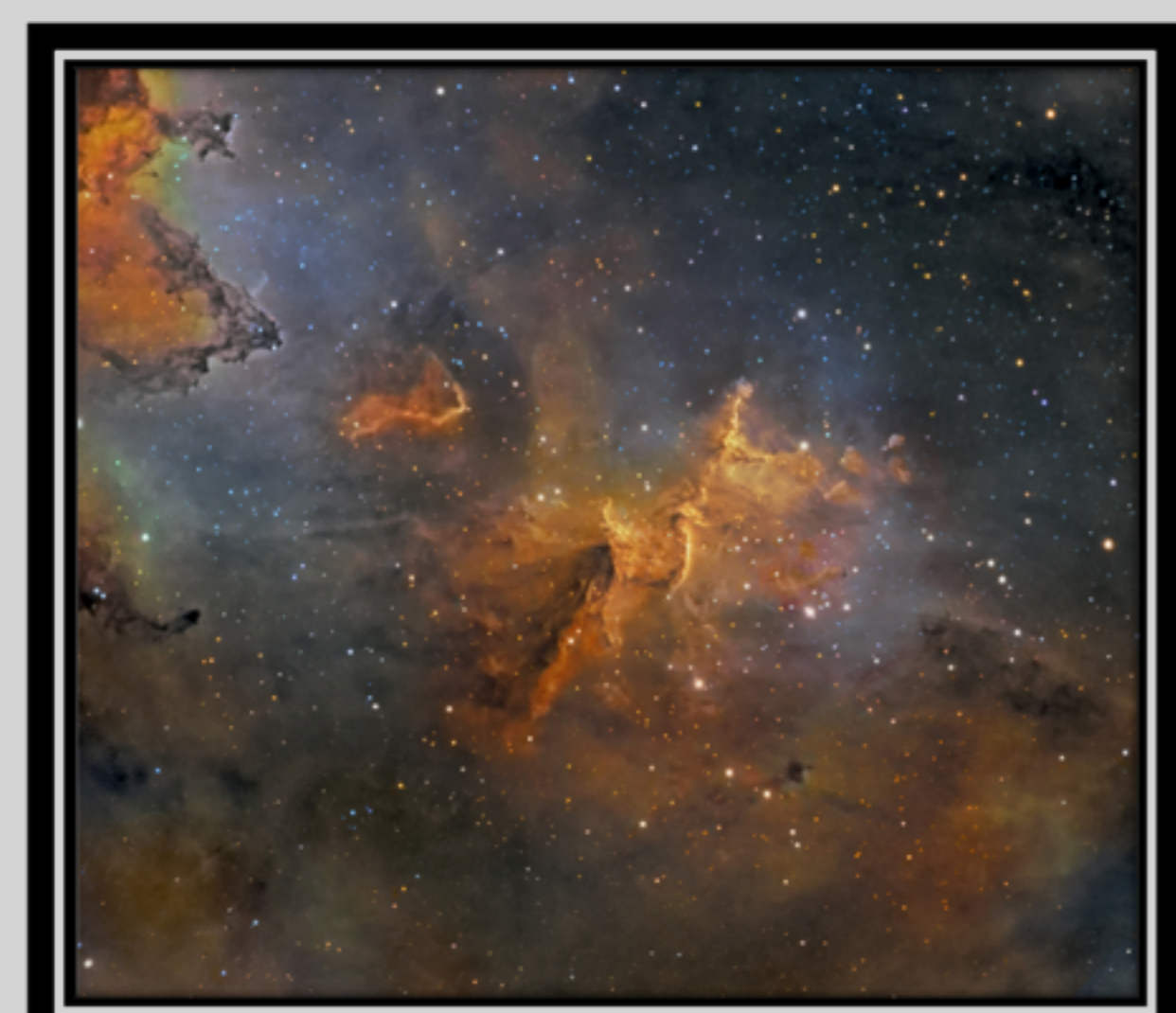
**NGC 1502**



**NGC 6823**



**NGC 1893**



**IC 1805**

## EXTINCTION & CALIBRATION

- We are carrying out the observation of the Landolt standards in different epochs using the same telescopes as for clusters to determine accurate instrumental-standard photometric calibrations.
- Mean extinction coefficients were estimated from the whole set of observing runs. We used a robust method that calculates the extinction ( $K$ ) as a lineal fit  $DM = K * DA$ , where  $DA$  is the difference for two different airmasses and  $DM$  is the difference for the correspondent magnitudes. This method allows to use all standard data independently of the field and the observing run.
- The values of extinction for each filter are in table 2, which are compatibles with the values giving by the OSN webpage (<http://www.osn.iaa.es>).
- Instrumental-standard photometric transformations for colours were calculated using a lineal model. Figure 2 shows these relationships for the colours in the optical range.

Figure 1: Fits to obtain the values of extinction

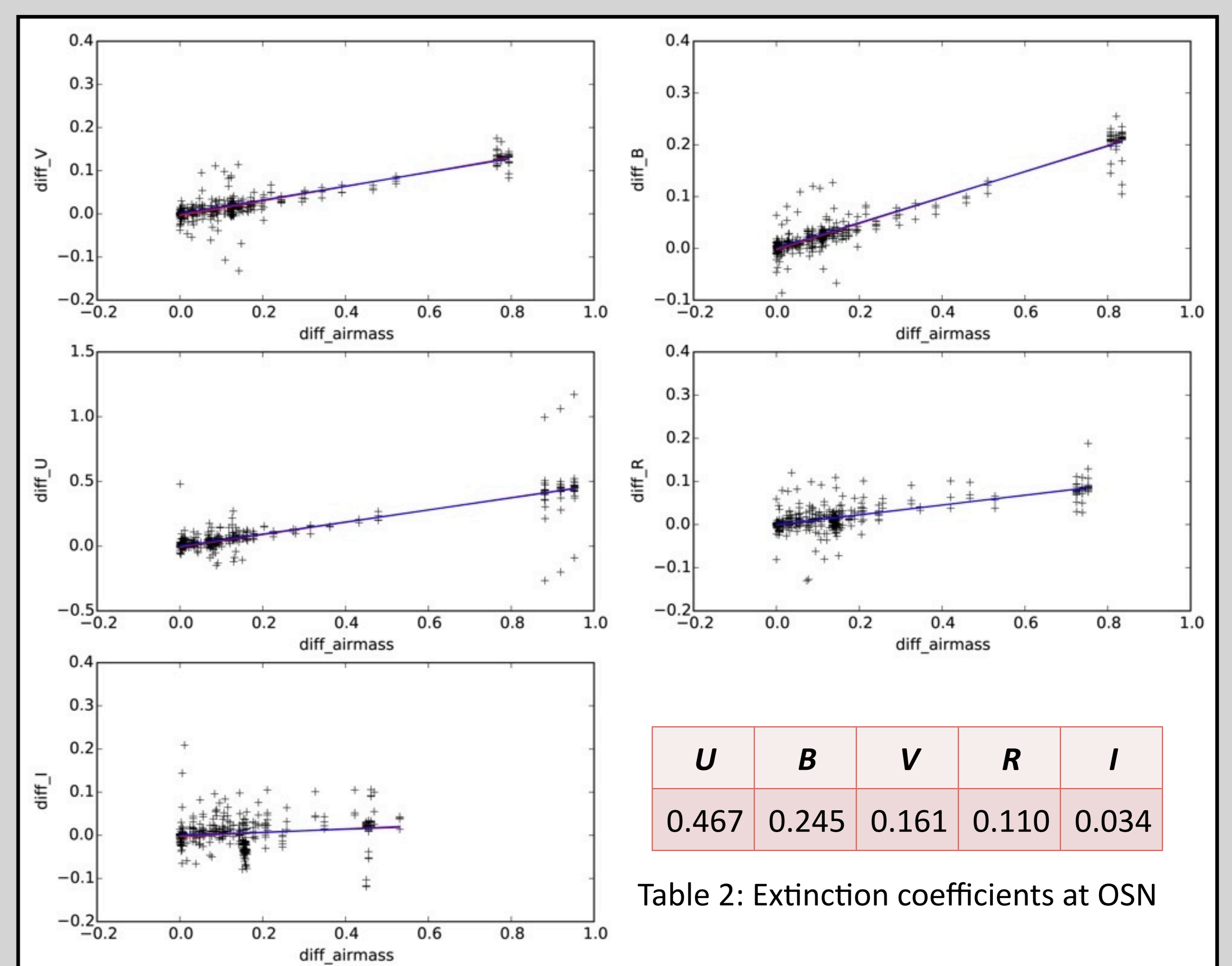


Figure 2: OSN colour calibrations

