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DEEP BLANK FIELDS FOR THE GTC

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The use of deep blank fields is crucial for the correct operation of the GTC. Hitherto, the list of deepest blank fields was the compilation by M. Azzaro for the ING telescope. However, they demonstrated to be shallow for large class telescopes. We used TESELA, a new VO tool, to determine blank fields for their use with OSIRIS at the GTC. The result is a catalogue with the deepest blank fields known so far, which have demonstrated to be extremely useful for medium and large size telescopes at the northern hemisphere.

In observational astrophysics, and in particular focusing in imaging acquisition through the optical window, image flatfielding and sky subtraction constitute two of the most common and important reduction steps of astronomical data. An inadequate flatfielding or sky subtraction easily leads to the introduction of systematic uncertainties in the data. Therefore, the observation of blank fields (BFs), defined as regions of the sky devoid of stars down to a given threshold magnitude, is a very important aspect in astronomical observations.

Recently, a systematic all sky catalogue of optical BFs up to 11 magnitude was published (Cardiel et al. 2011). Together with the catalogue, a new VO tool TESELA[4] was created to facilitate the user to retrieve the BFs. Another commonly used resource is the collection by Marco Azzaro[5], consisting in a short list of 38 BFs from 10 to 16 magnitude. However, even these last BFs have demonstrated to be not deep enough for large class telescopes. In particular, the GTC equipped with the OSIRIS camera ideally needs BFs free of stars down to 18 magnitude. This requirement will be even more demanding in the case of the future E-ELT.

With the goal of creating a catalogue of BFs up to 18 magnitude to be used at the GTC, we tessellated the whole sky above declination $-30°$.

As explained in Cardiel et al. (2011), tessellating above 11–12 magnitude requires too much computer resources, even subdividing the sky in many smaller subregions. Thus, we adopted a different approach. We divided the northern sky in regions 1h wide in RA. Then, we selected 11 magnitude BFs with a size larger than $10'$ (i.e. larger than the FOV of OSIRIS) from the catalogue of Cardiel et al. and individually tessellated them using stars up to 18 magnitude at the R band from the USNO-B1 catalogue. Finally we selected those BFs larger than $10'$.

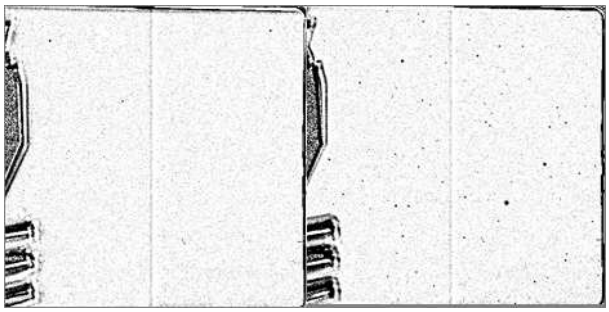

Fig. 1. Comparison of two BFs images taken with OSIRIS. They are 2 second exposure images at the Sloan r filter, with a background level of ∼30,000 ADUs, of two BFs with similar RA. Left: from our catalogue. Right: from Azzaro's catalogue.

The result is a catalogue with the deepest BFs known so far. Due of the heterogeneous location of the objects in the sky, we found ∼150 BFs free of stars down to 18 magnitude located mainly in two RA ranges: 1–6 h and 15–19 h. At the rest of RA range shallower BFs were found, although always deeper than the Azzaro's BFs.

We are currently using the GTC as a test-bed for the validation of our BFs. So far, they have demonstrated to be much better than those of Azzaro, and consequently they have been adopted as reference BFs for the nightly operation of the GTC. In Figure 1, we show a comparison of one of our BFs with another one from the Azzaro's catalogue.

This catalogue will be soon accessible at The Astronomical Data Center of the SVO (`http://sdc.cab.inta-csic.es`).

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[5]`http://www.ing.iac.es/~meteodat/blanks.htm`.

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