Photometric conservation in HiPS processing

How can we assess aperture photometry degradation after HiPS transformation?

Context:

- HiPS is an emerging IVOA standard designed to cope with pressing challenges for data visualisation and distribution
- Initially developped at CDS (figure 1), it is based on HealPix tesselation of the sky which defines cells of equal area on all sky
- Here we raise the question of potential quality degradation in producing the HiPS version

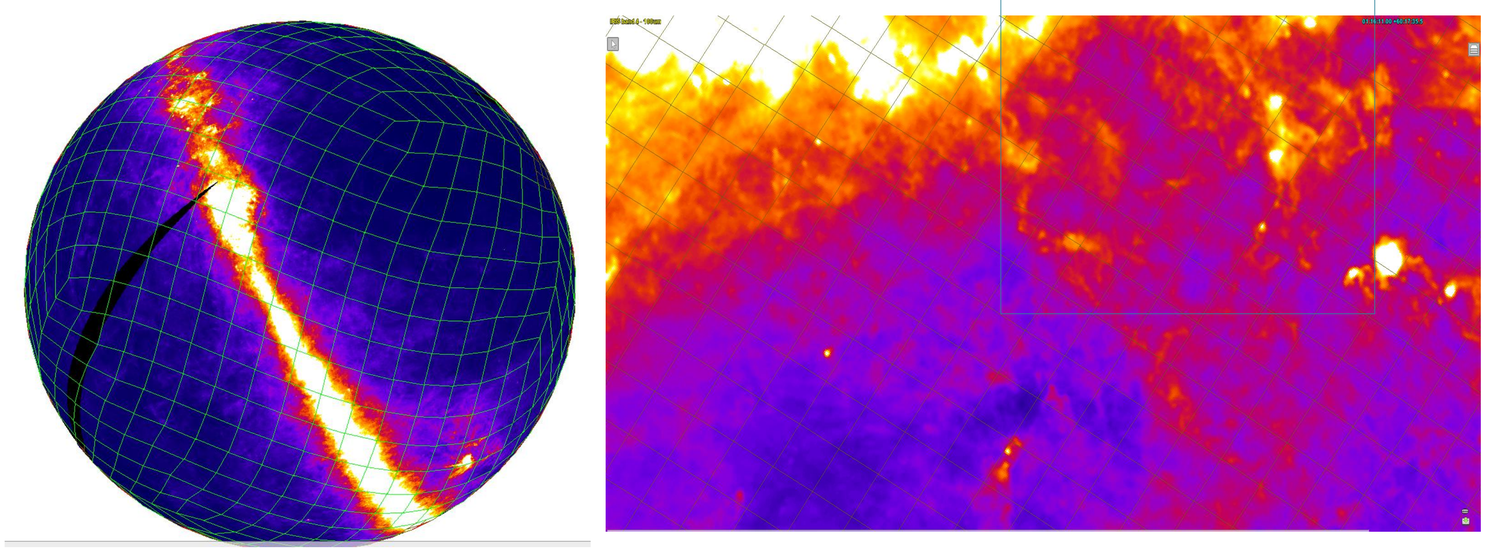

Figure 1: IRIS @100micron HiPS visualisation within Aladin: high resolution on the right

HiPS in two words:

- **HiPS** tiles can be defined for HealPix cells at different resolutions according to Healpix order
- They are hierarchically organized
- Values stored in a given tile are interpolated from original data pixel neighbouring HealPix cell centers values

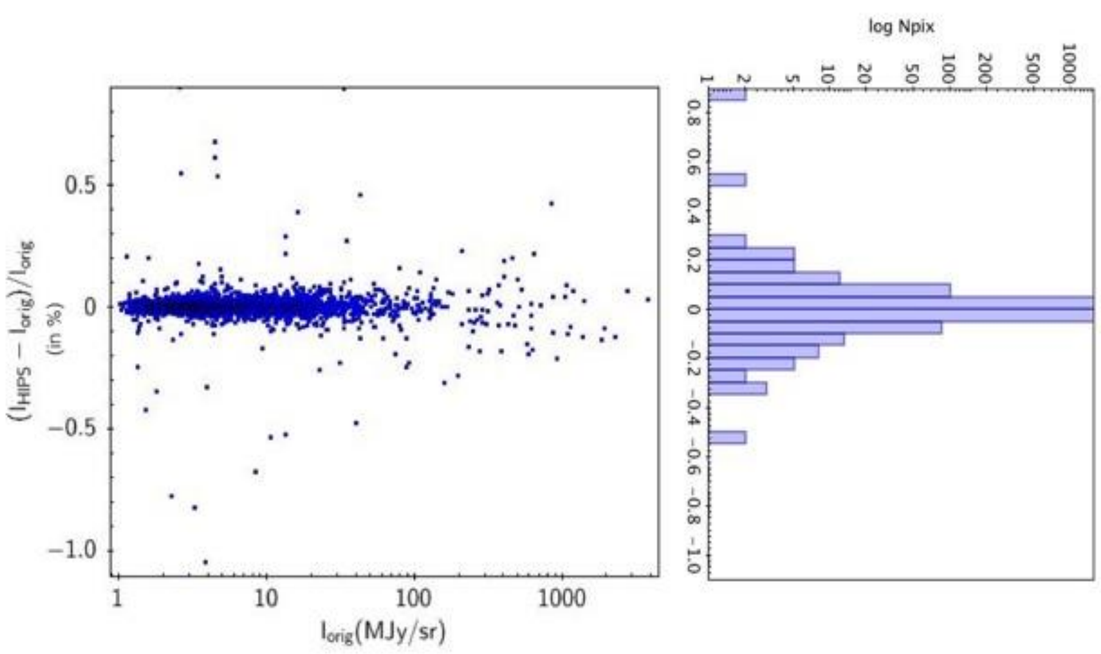

Figure 2: Fractional difference (as a percentage) between the HIPS and original surface brightnesses as a function of the average surface brightness. The histogram of the fractional difference is shown on the right.

Test data and procedures:

- The IRIS data collection is a reprocessing of the IRAS Sky Survey Atlas , recalibrated using DIRBE and made of 12.5 degrees joint images at 12, 25, 60 and 100 µm
- Mean surface brightness is estimated in circular areas on both original images and corresponding areas in the HiPS representation using ***Aladin*** code controlled via a python module.

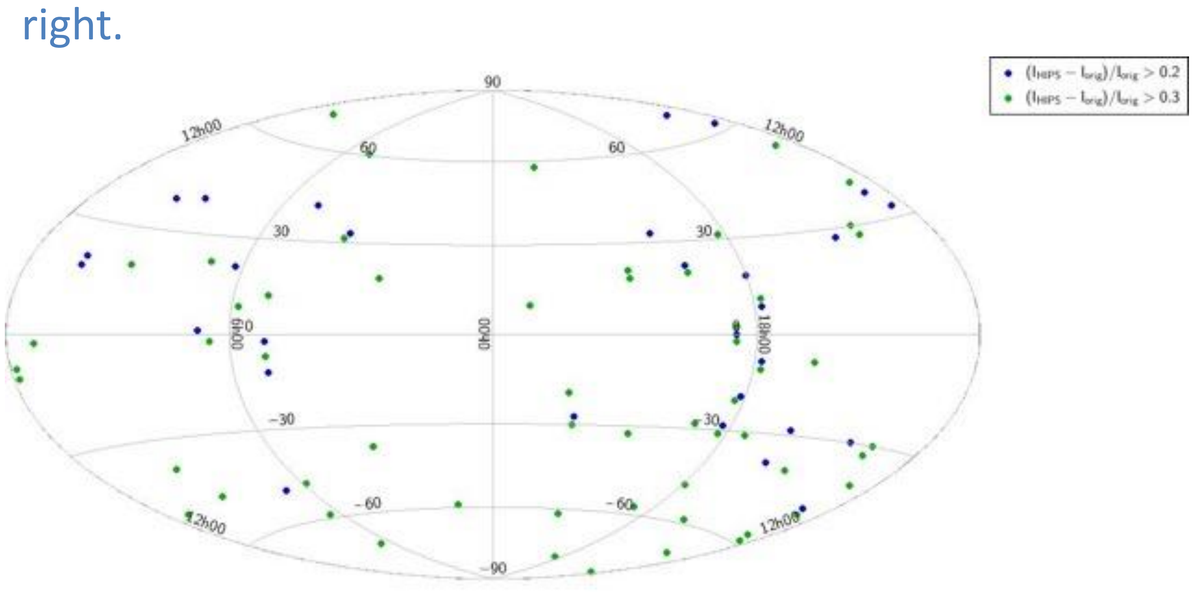

Figure 3: Repartition of higher deviations over the sky

Results and conclusions:

- Relative photometric difference is extremely small (< 0.3% !!!) typically much smaller than other sources of uncertainties (fig 2)
- No obvious spatial bias in the results (fig 3) but further tests needed.
- Tests scheduled for source photometry on appropriate surveys
- **For IRAS/IRIS data it is fairly equivalent to measure photometry on data distributed in the HiPS format than on original ones**

F.Bonnarel, D.Teodori, P.Fernique, C.Bot, M.Louys (*francois.bonnarel@astro.unistra.fr)*

CDS, Observatoire Astronomique de Strasbourg, UMR 7550, Unistra and CNRS