

THREE DIMENSIONAL MAPS OF INTERSTELLAR MEDIUM: GAIA IMPACT

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GEPI/ Observatoire de Paris

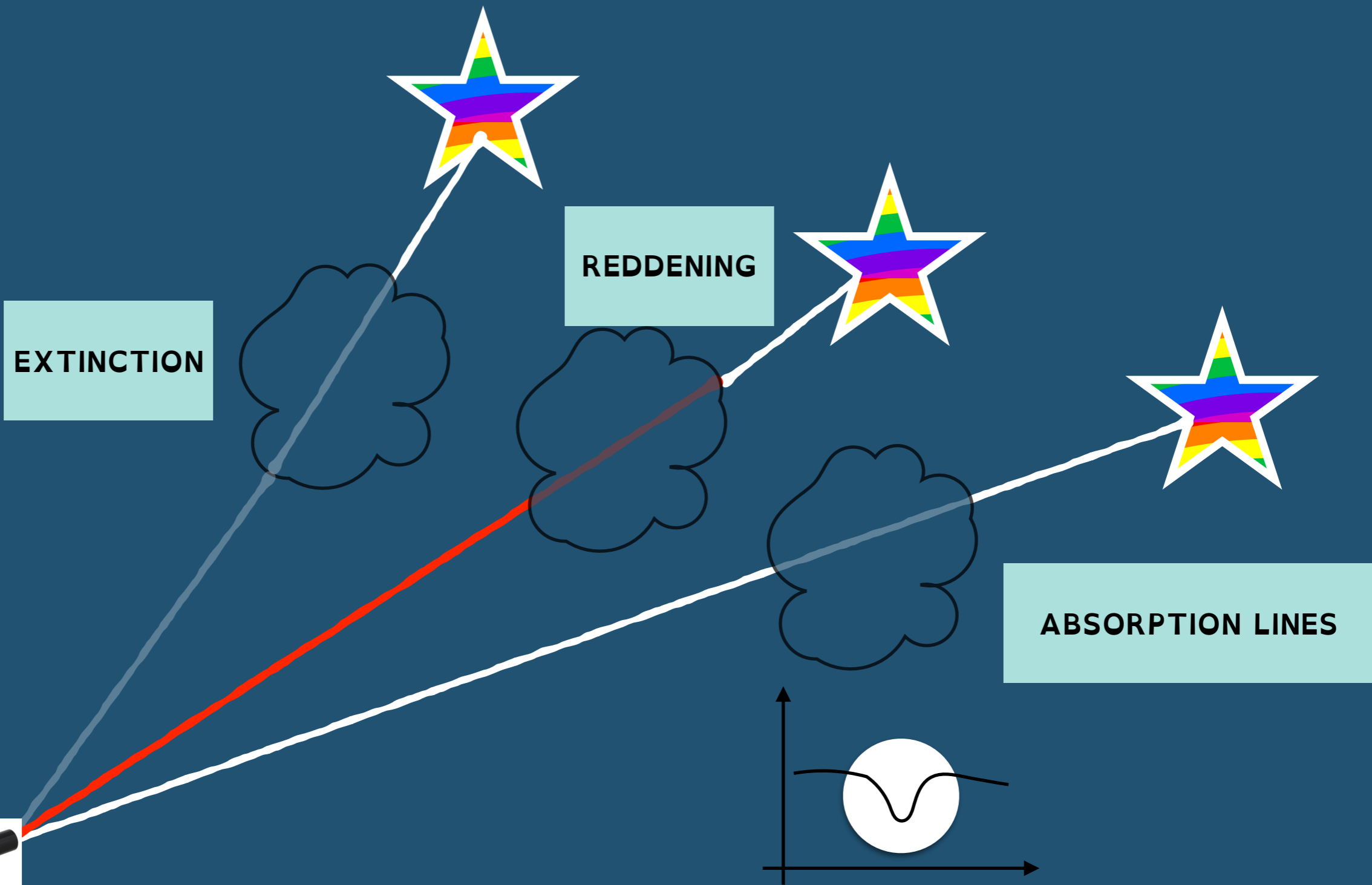
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A. Monreal-Ibero^{1,3}

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Canarias, La Laguna, Tenerife

3D inversion maps

Since DR1

Preparation for future



RECONSTRUCTION SIGHTLINE BY SIGHTLINE

TARGET STARS IN
A NARROW SOLID
ANGLE

- ASSUME ALL TARGETS ALIGNED
- SEVERAL METHODS TO RECONSTRUCT REDDENING VS DISTANCE

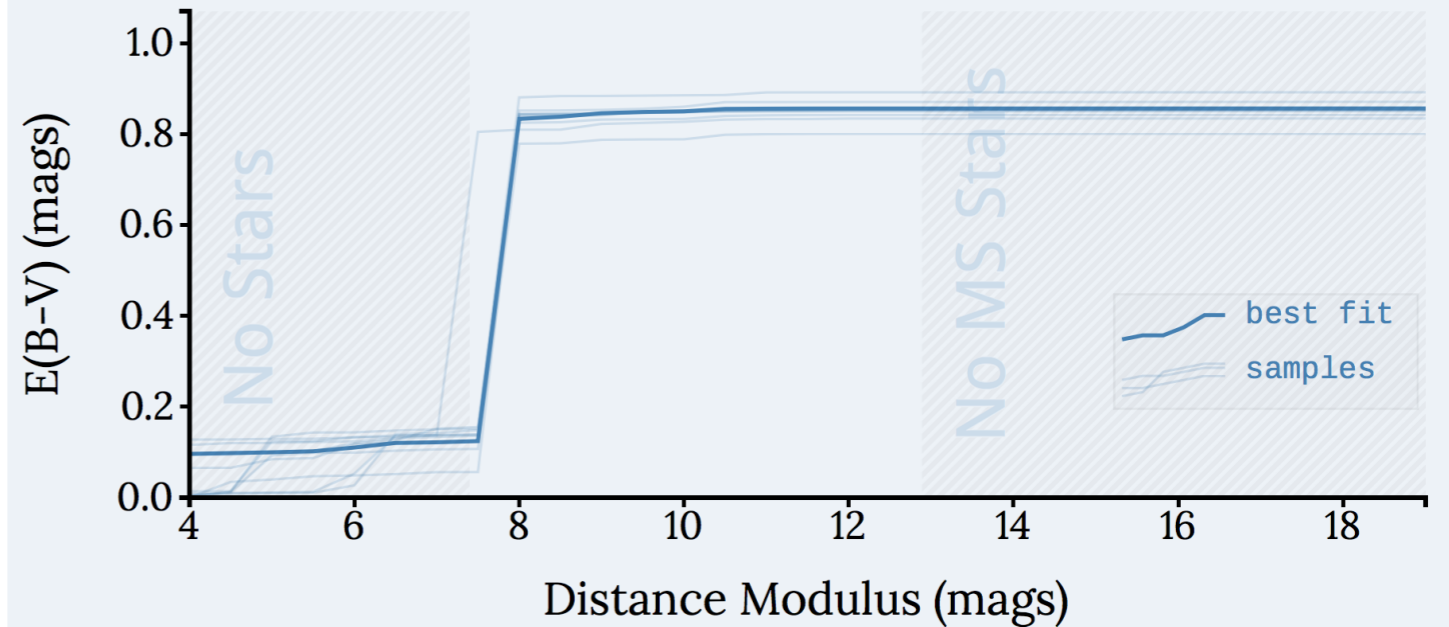


PAN-STARRS MAP - Green15

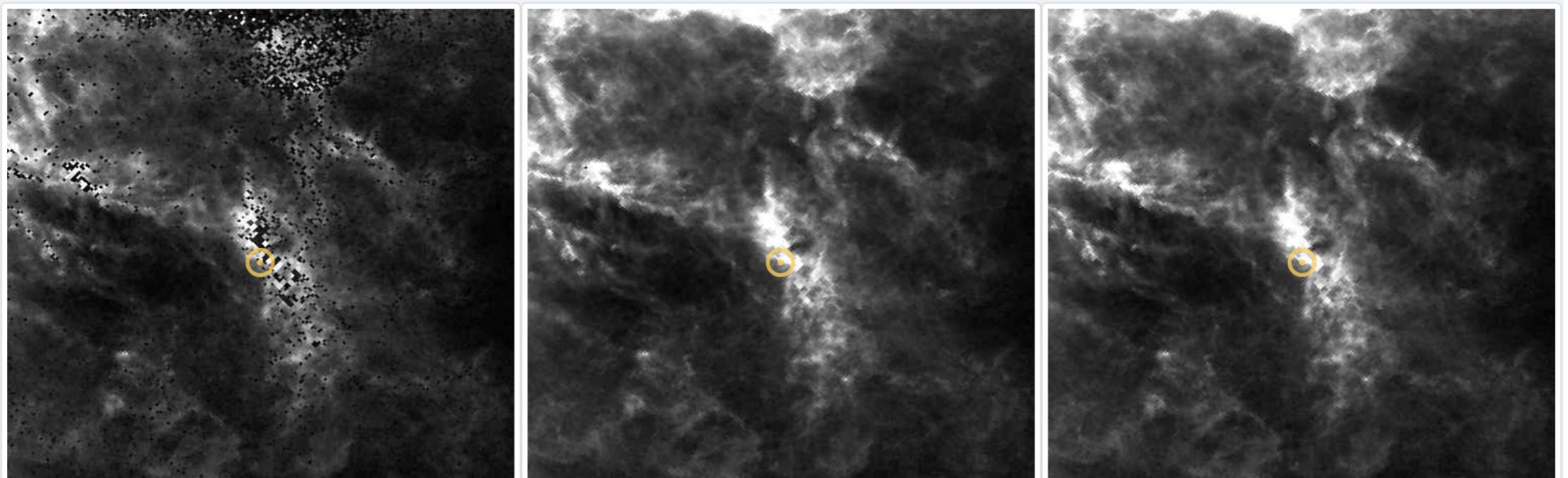
$l = 160$ $b = -15$

- **Excellent angular resolution (5')**
- **Reliable absolute data**

Reddening vs. Distance

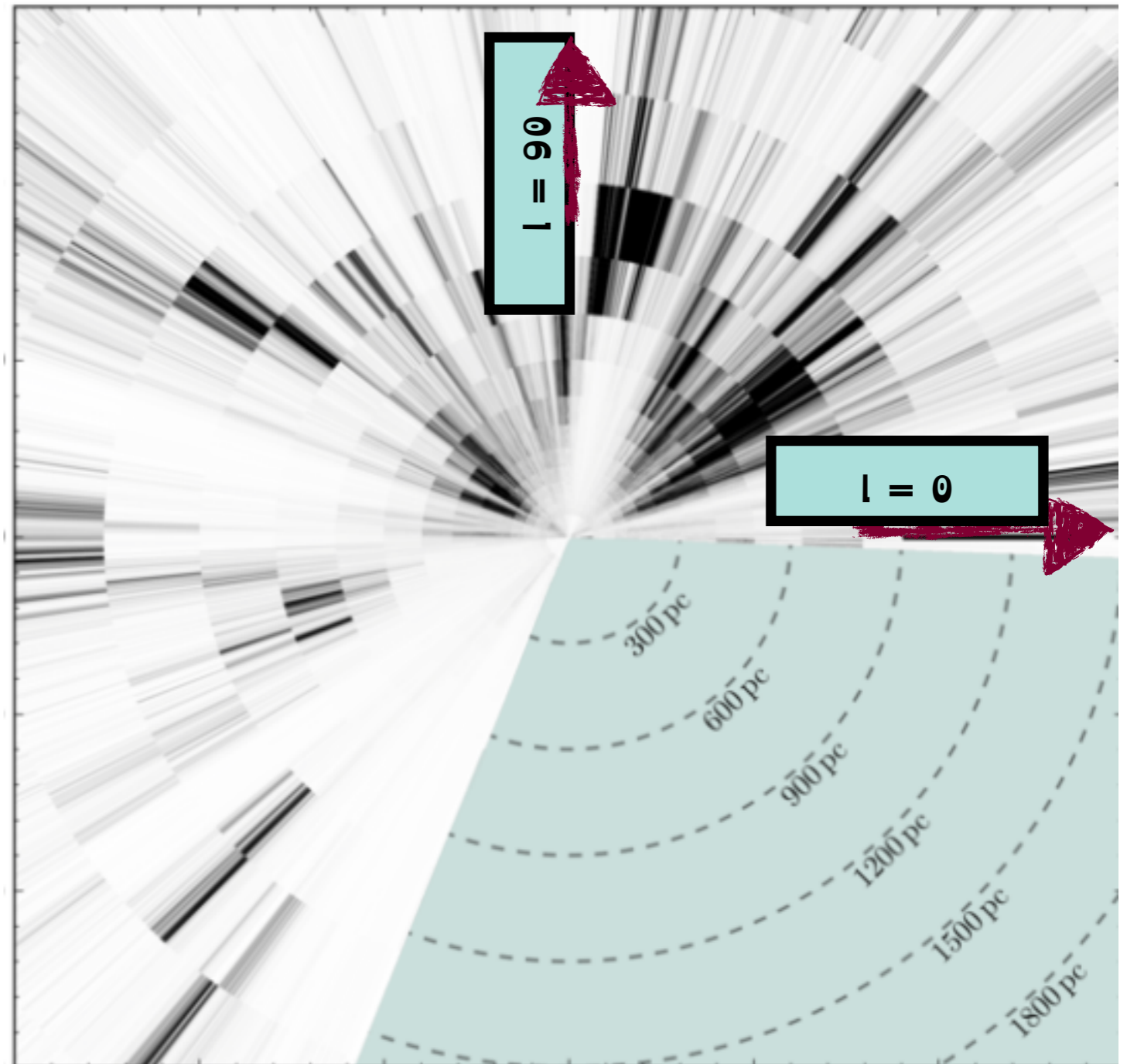


Postage Stamps

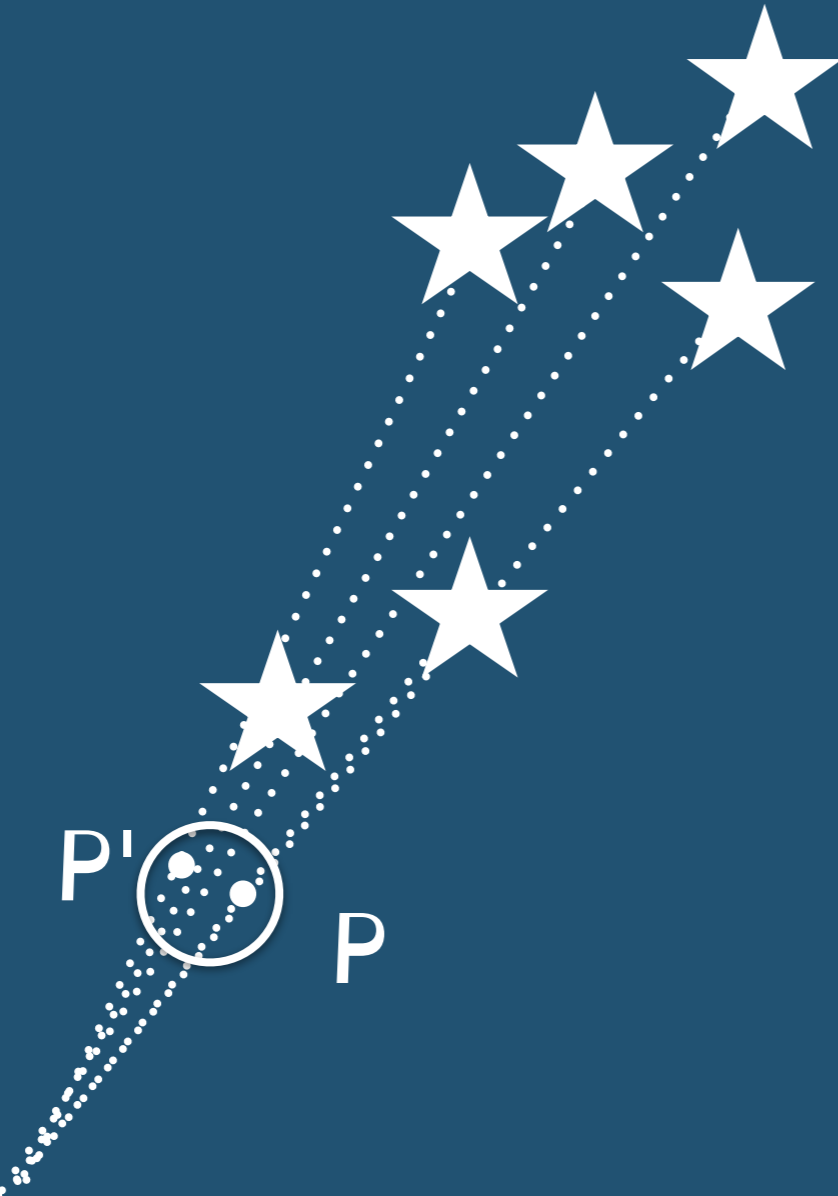


PAN-STARRS MAP

- Lower distance resolution
- No local values
- Only north hemisphere



FULL 3D INVERSION

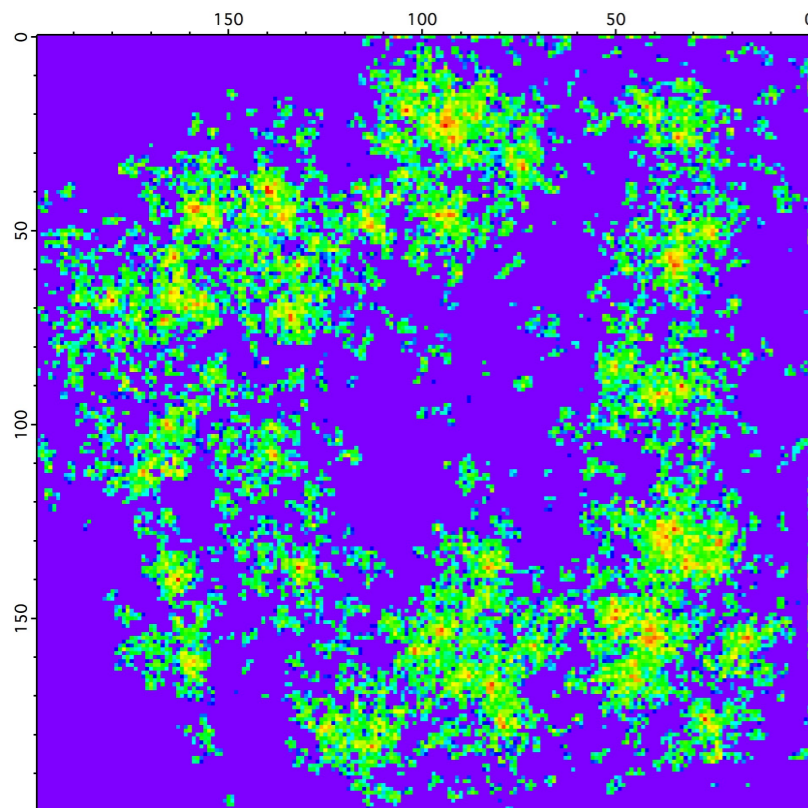


3D DUST OPACITY DISTRIBUTION

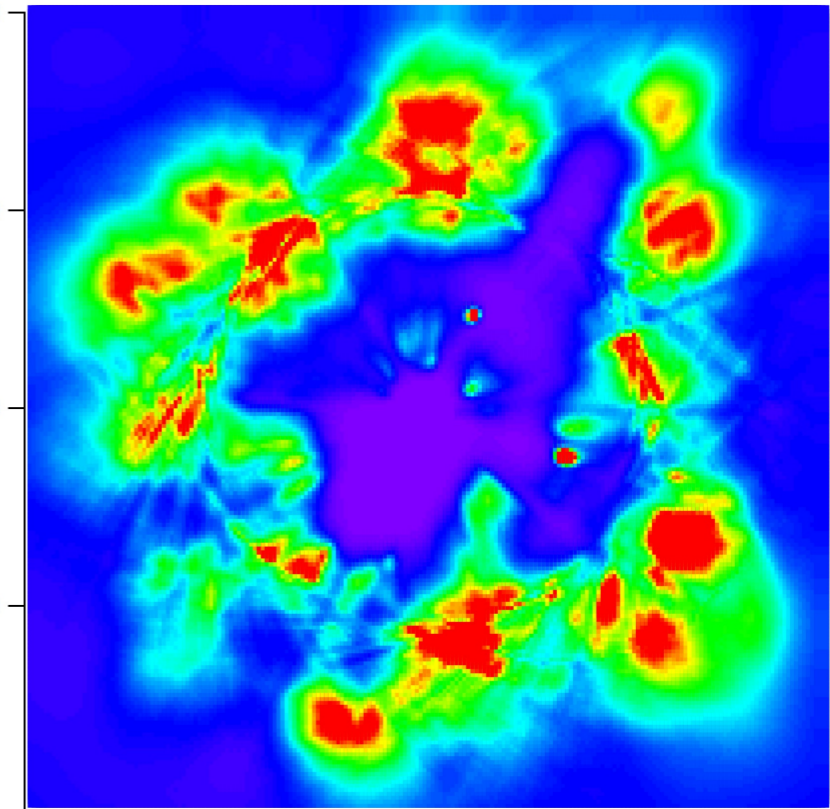
- $E(B-V)$: COLUMN DENSITY
- $\rho(P)$ $\rho(P')$: 3D INFORMATION
- PRIOR

SIMULATED 3D DISTRIBUTION (~23000 STELLAR TARGETS)

INPUT DISTRIBUTION



OUTPUT MAP



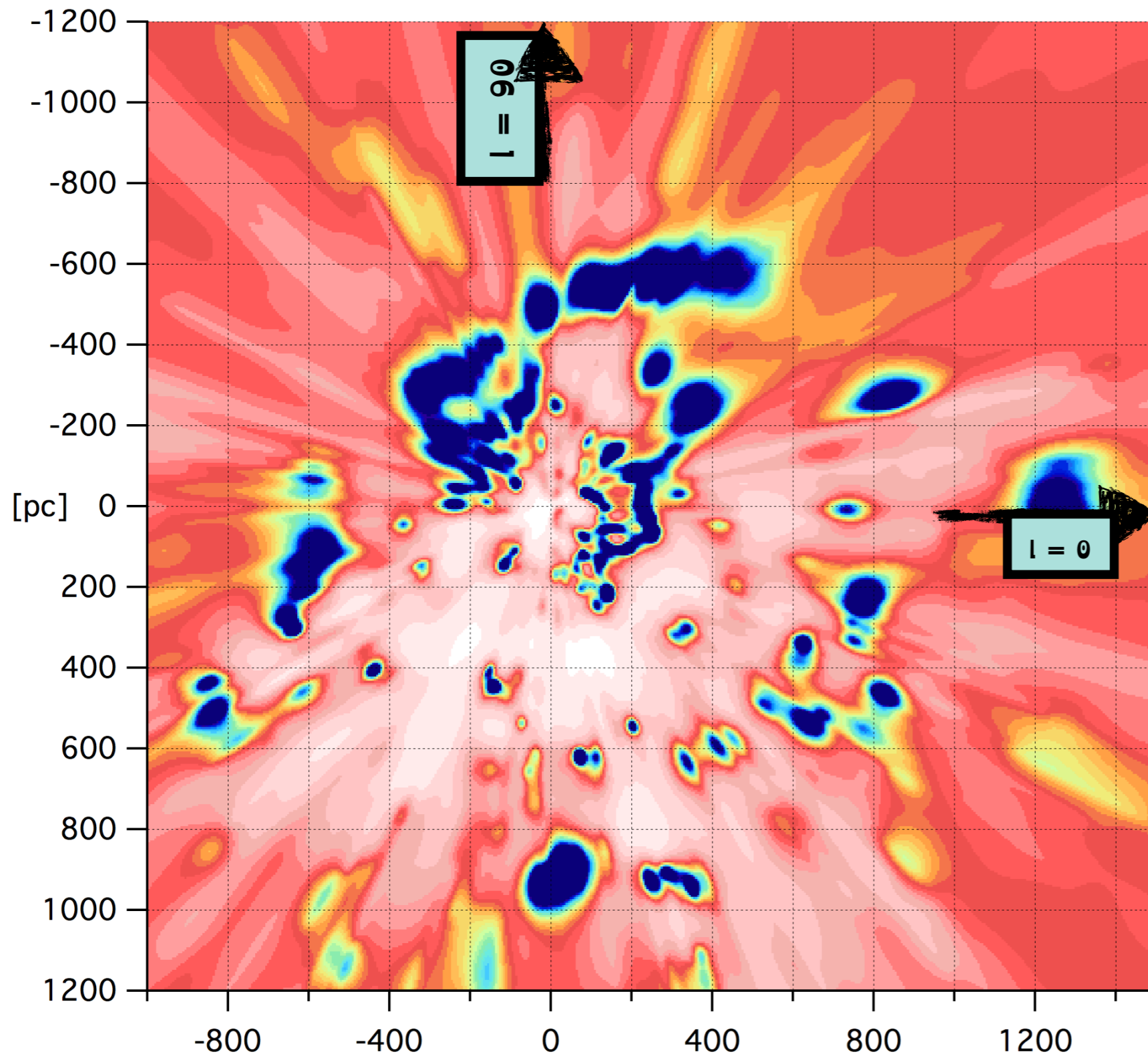
- low spatial resolution
- spreading of opacities in large volumes



- ortho-radial information used,
- adapted to small distances



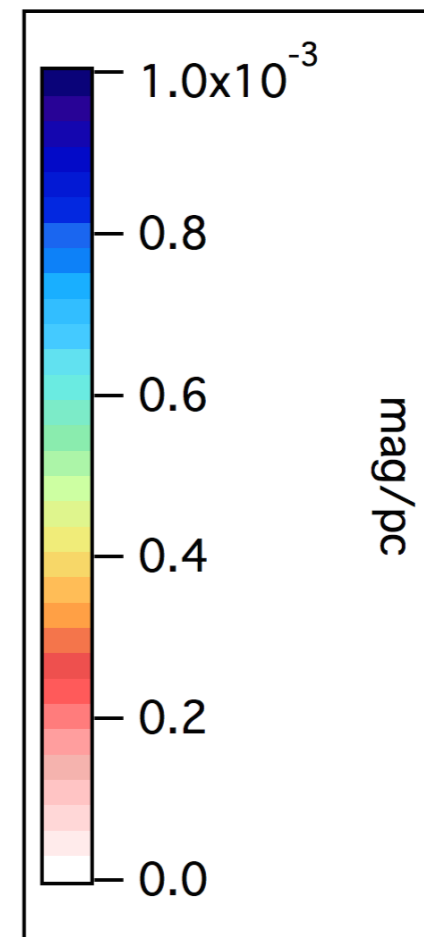
OLD MAPS - LALLEMENT2014



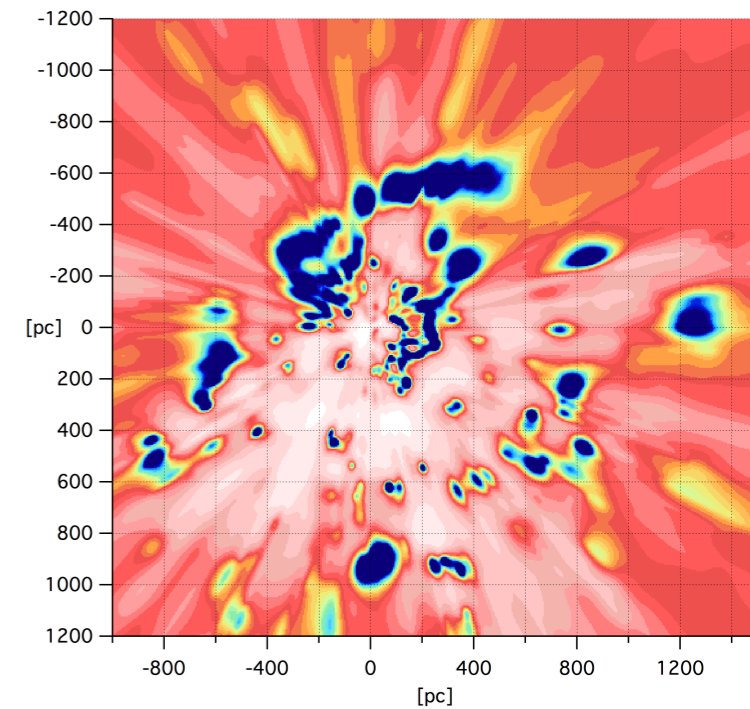
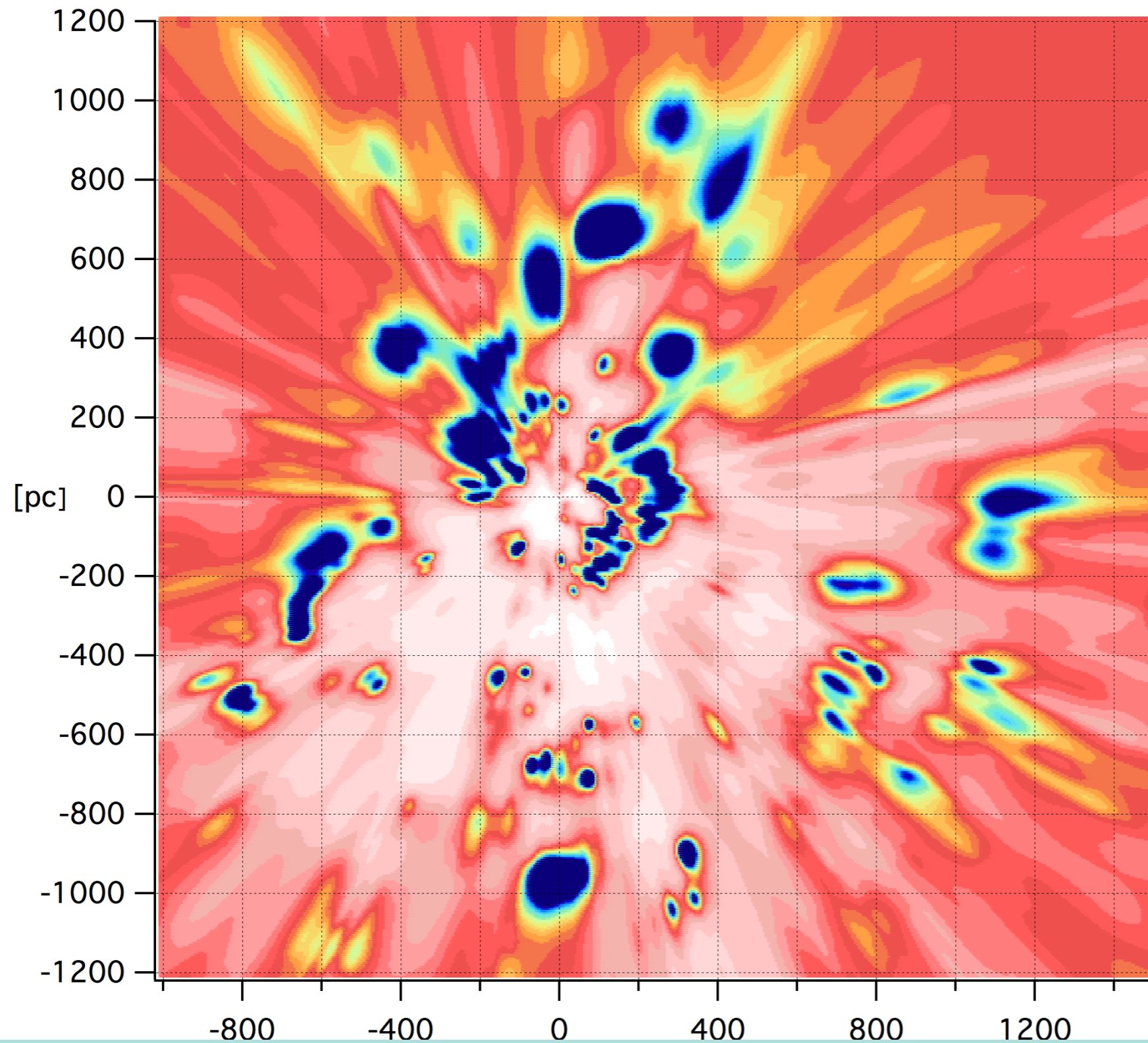
22467 targets

22 % Hipparcos distances

78% photometric



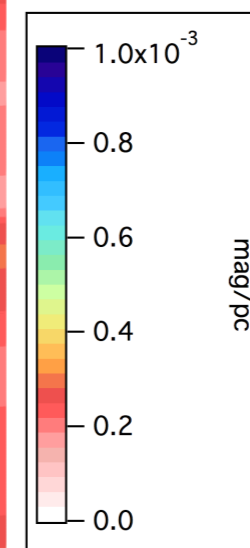
DR1 DISTANCES!



23444 targets

~80% Gaia TGAS distances

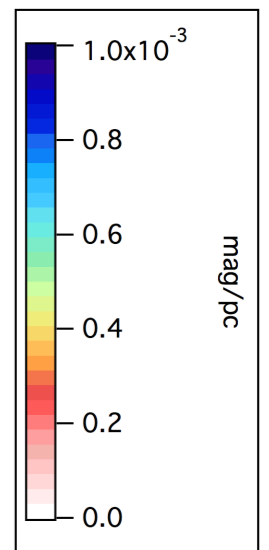
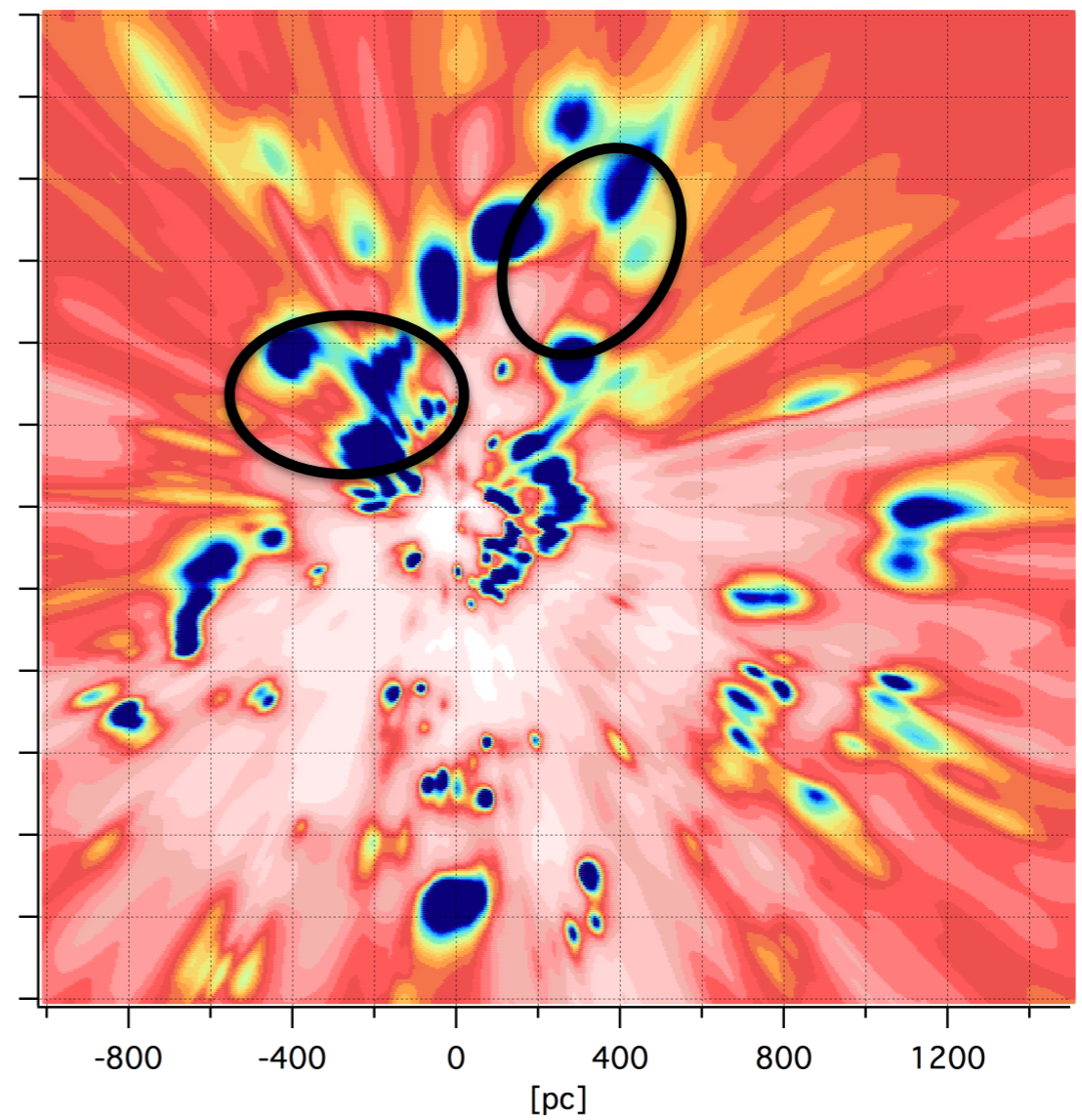
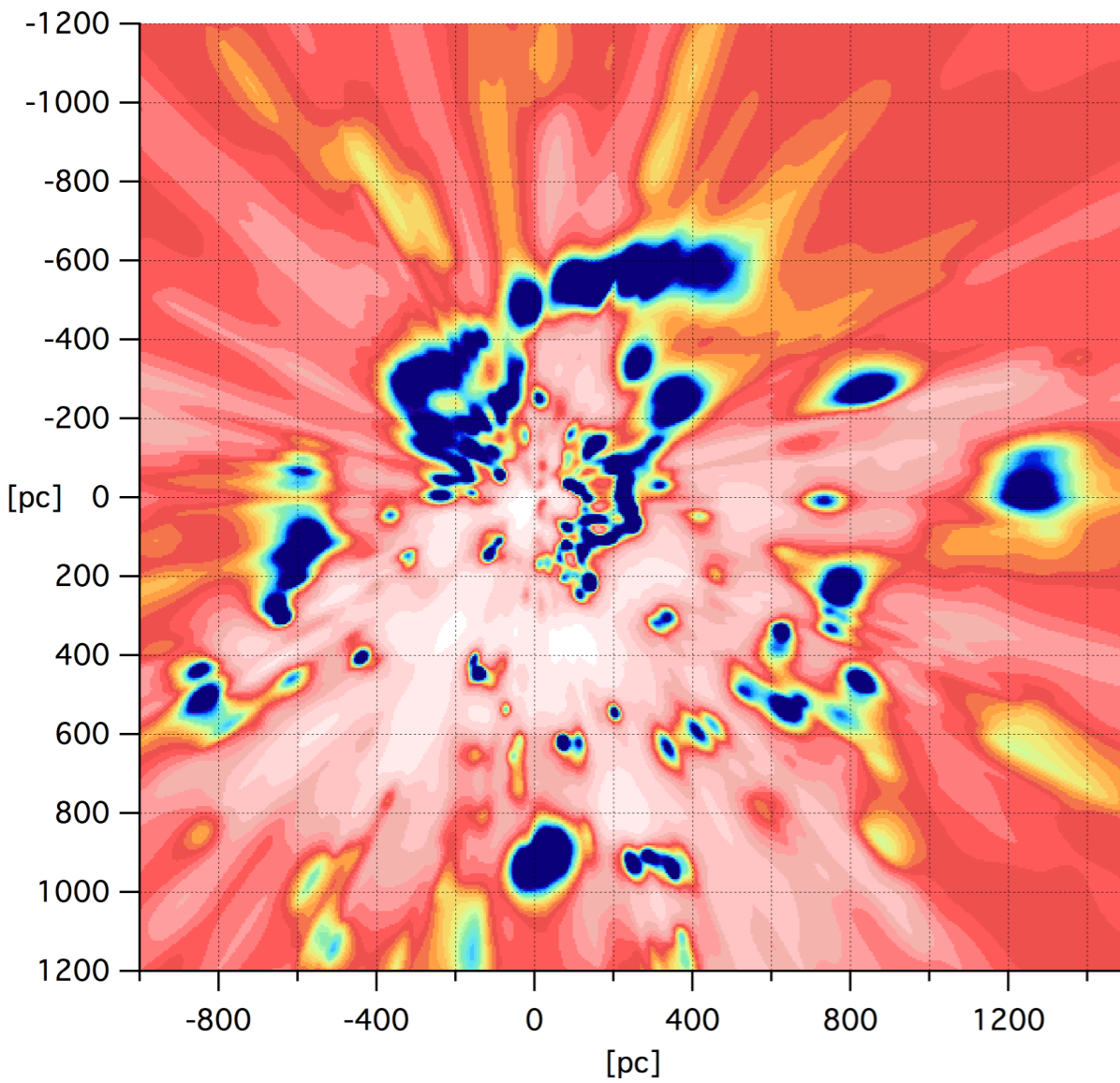
20% photometric



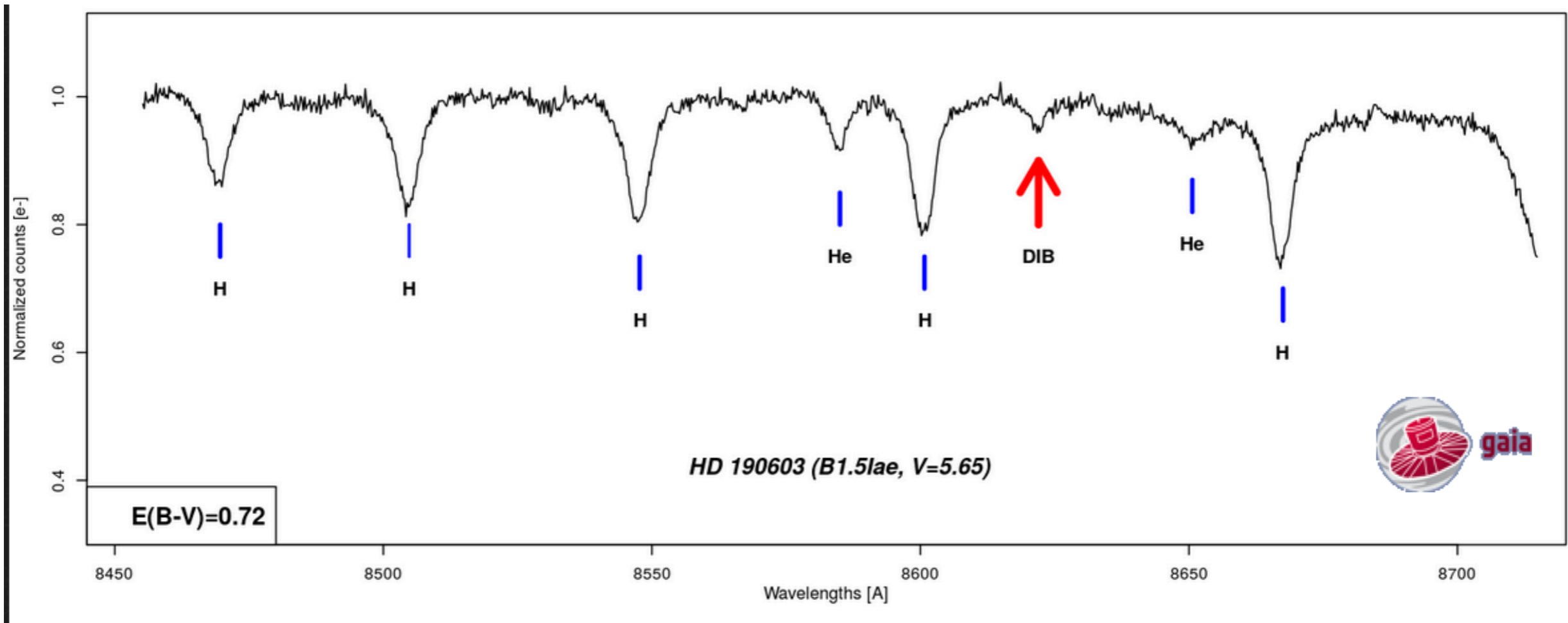
COMPARISON : OLD DISTANCES VS DR1 DISTANCES

PRE-Gaia

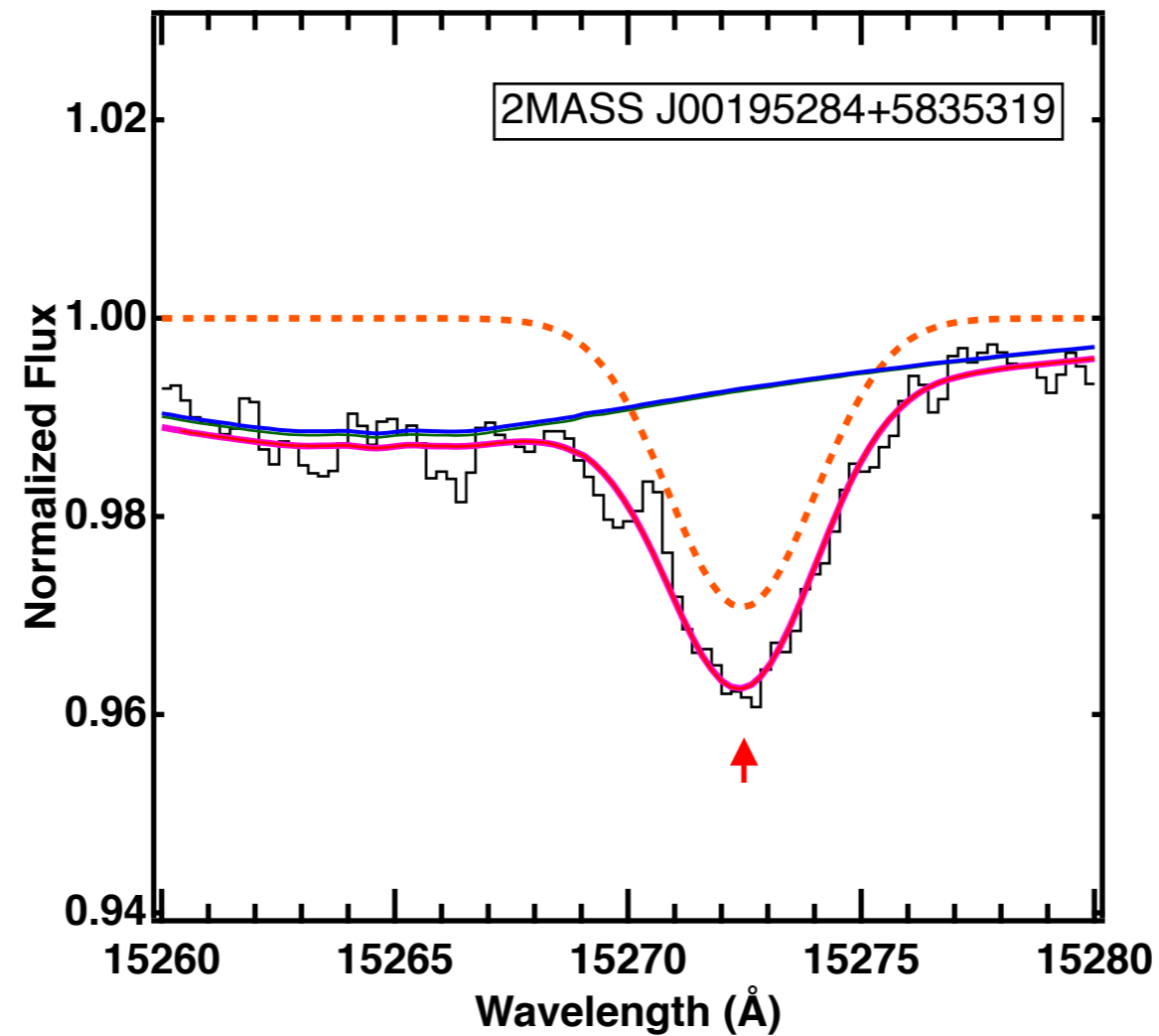
POST-Gaia



DIBs AS MATTER TRACER?



DIBs AS MATTER TRACER?

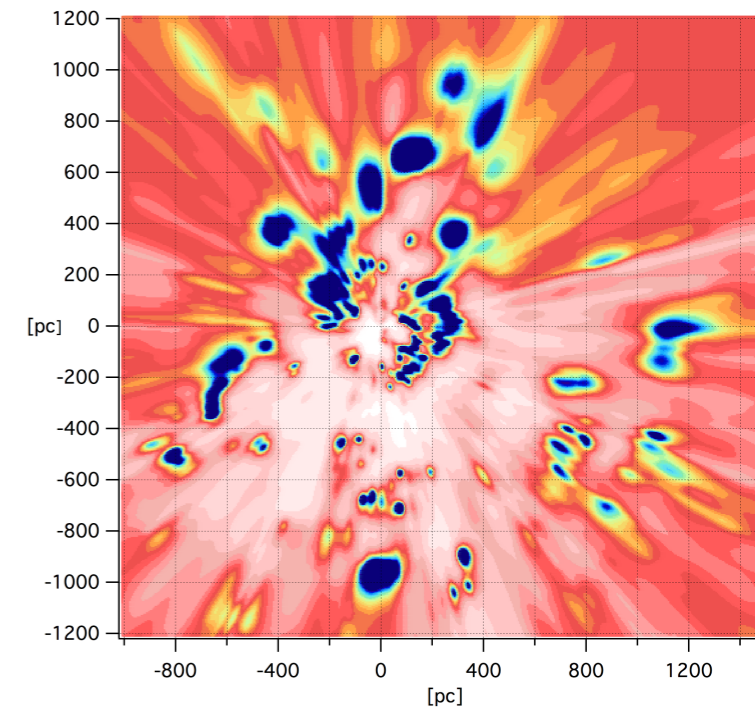
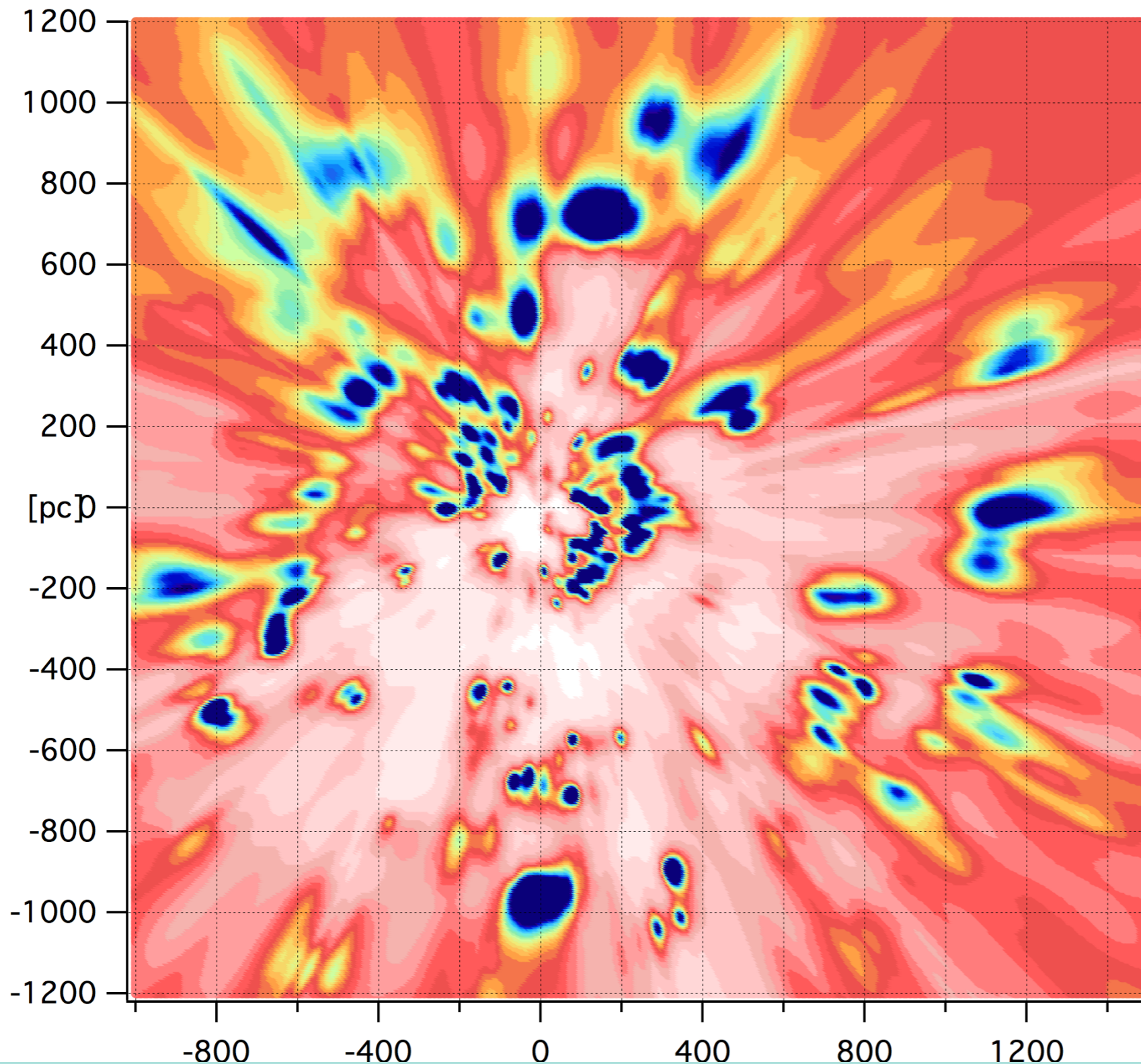


Elyajouri et al., 2017

$$E(B-V) \text{ mag} \approx \text{EW}(\text{Ang}) * 3.3$$

Zasowski et al, 2015

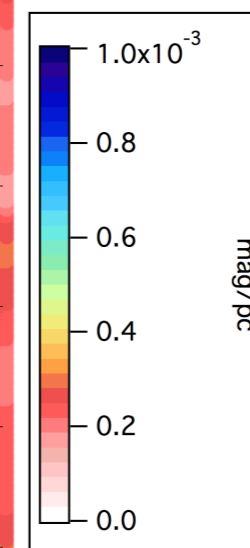
WAITING FOR DR3 SPECTRA



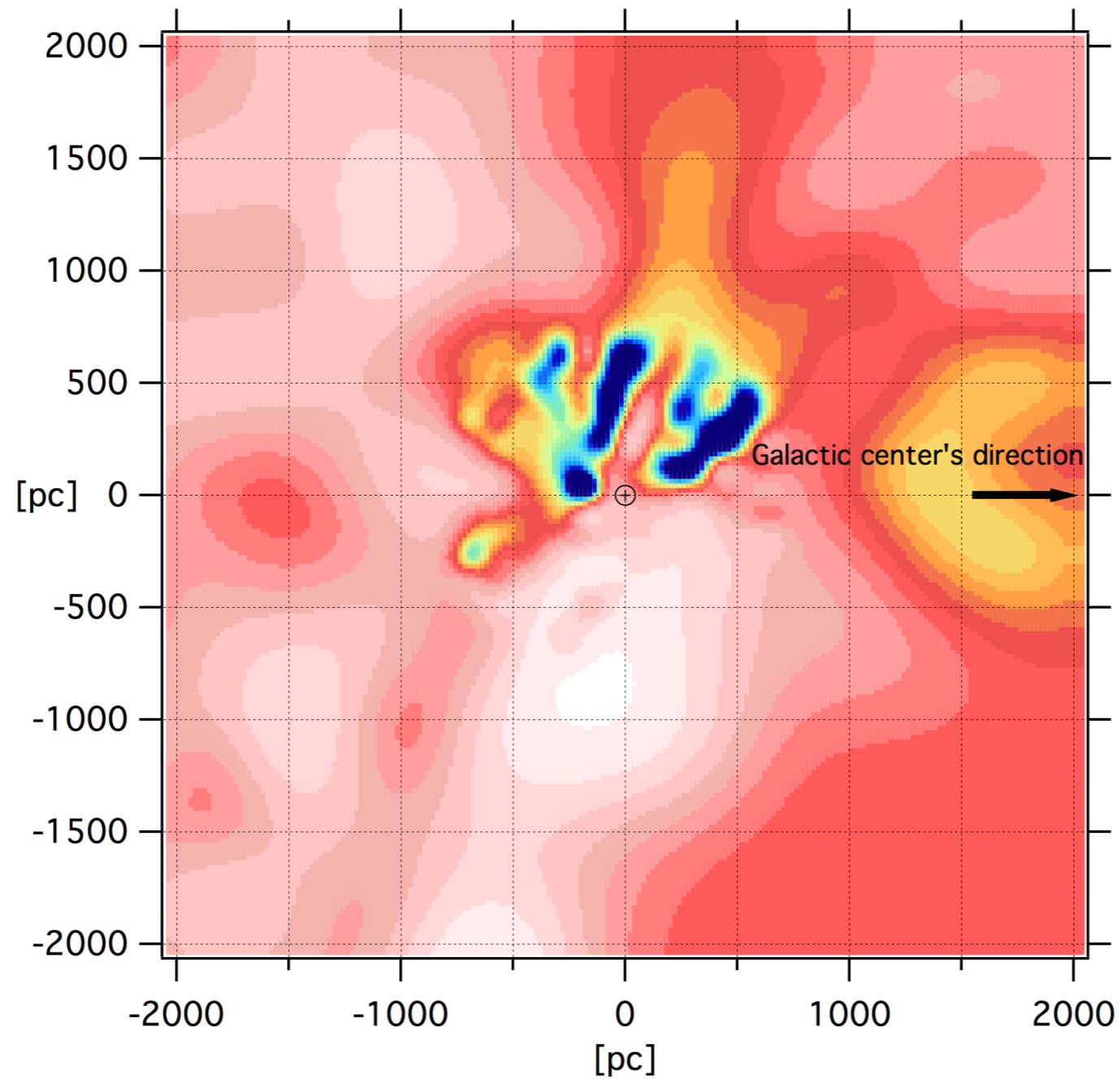
~ 28000 targets

~5000 DIB-BASED

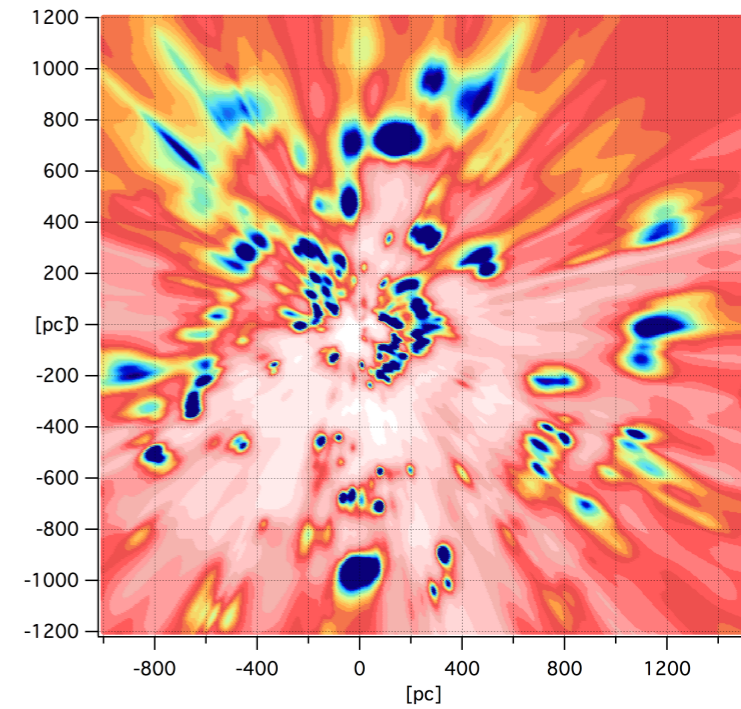
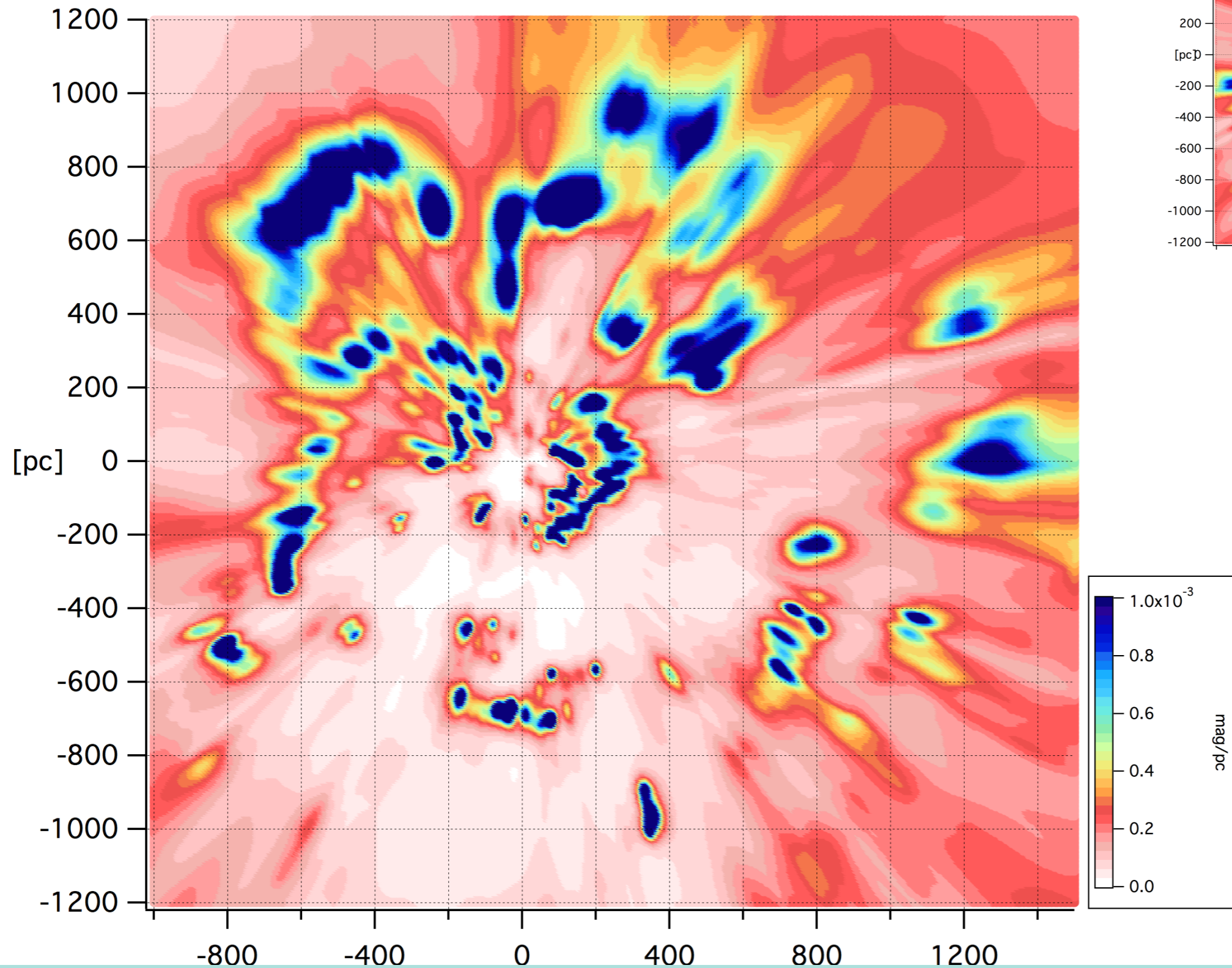
EXCESS OF COLOUR



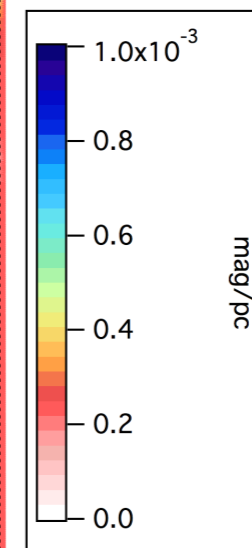
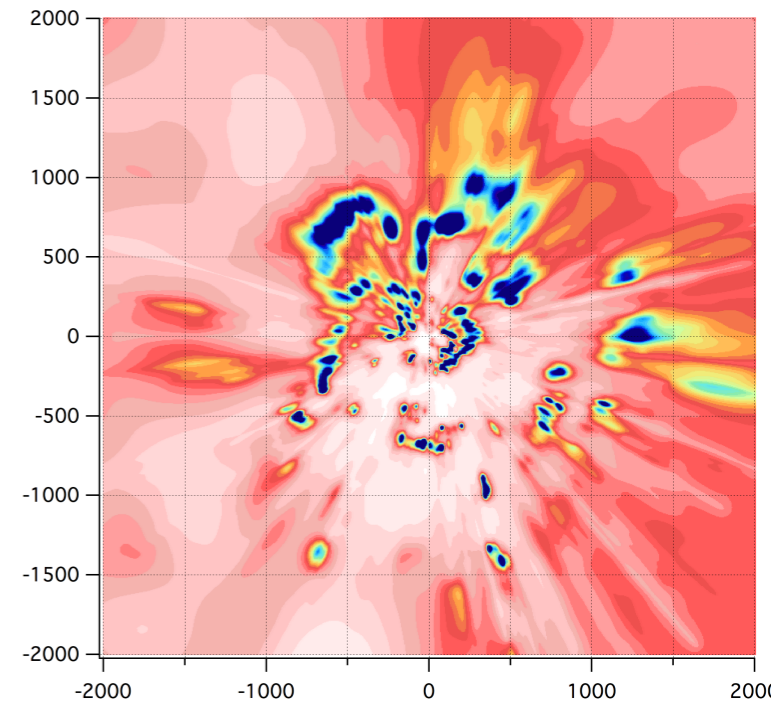
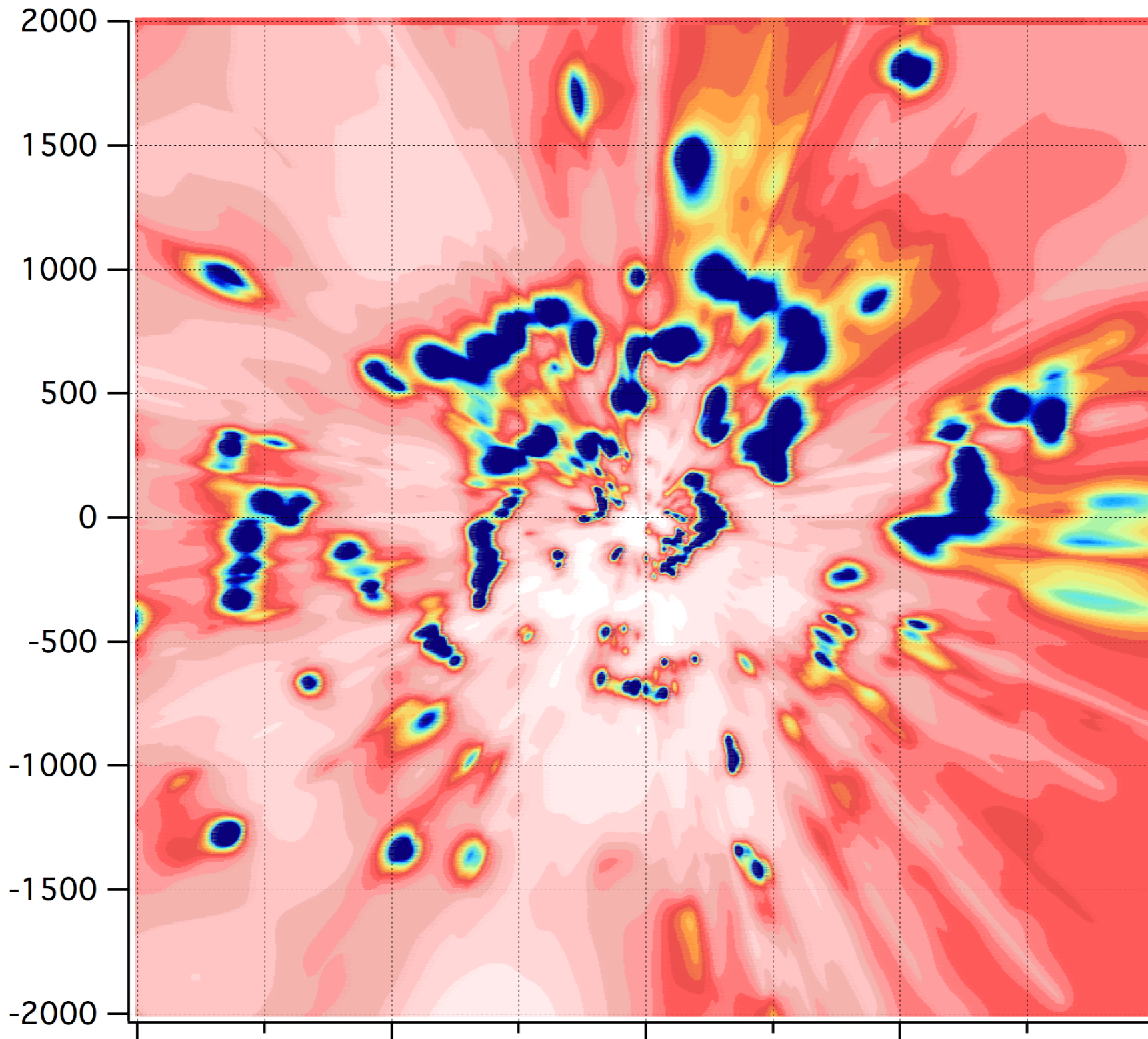
NON-LOCAL ISM: PAN-STARRS MAP



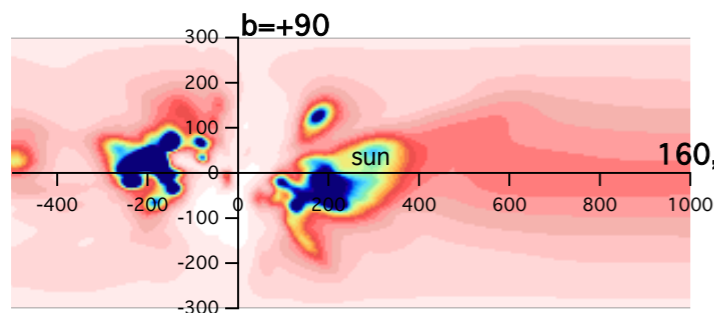
MAP with PAN-STARRS PRIOR



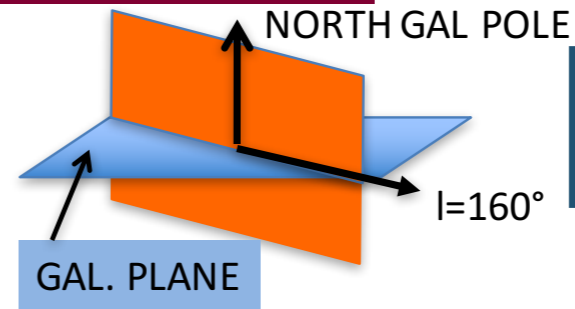
NEW APOGEE CALIBRATION



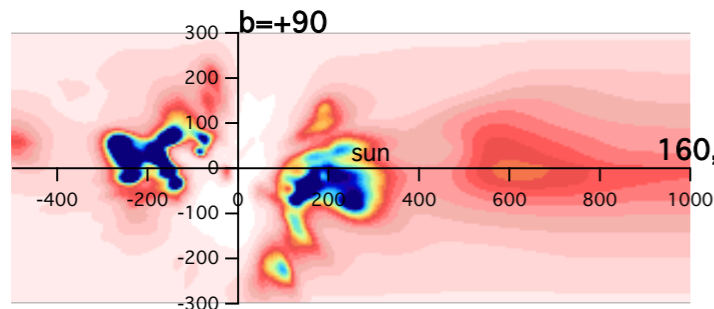
FROM 10^4 TO 10^6



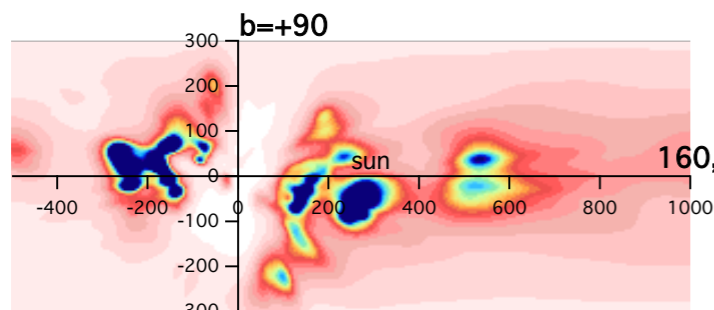
160,0 PRE-GAIA



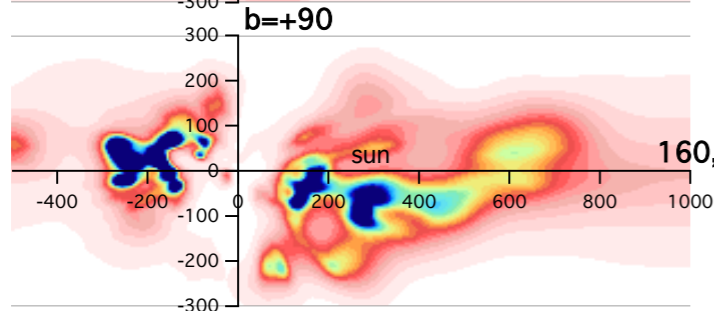
~23 000



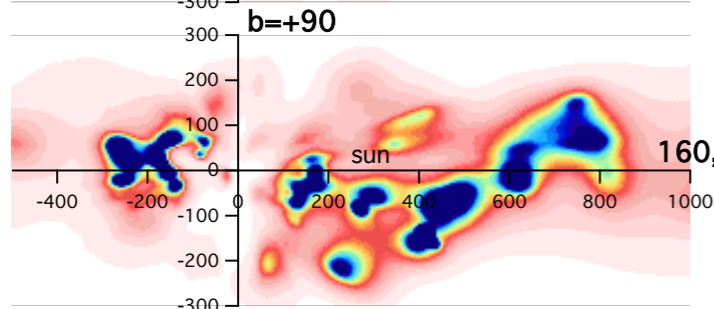
160,0 POST-GAIA



160,0 DIB APOGEE



160,0 PANSTARRS



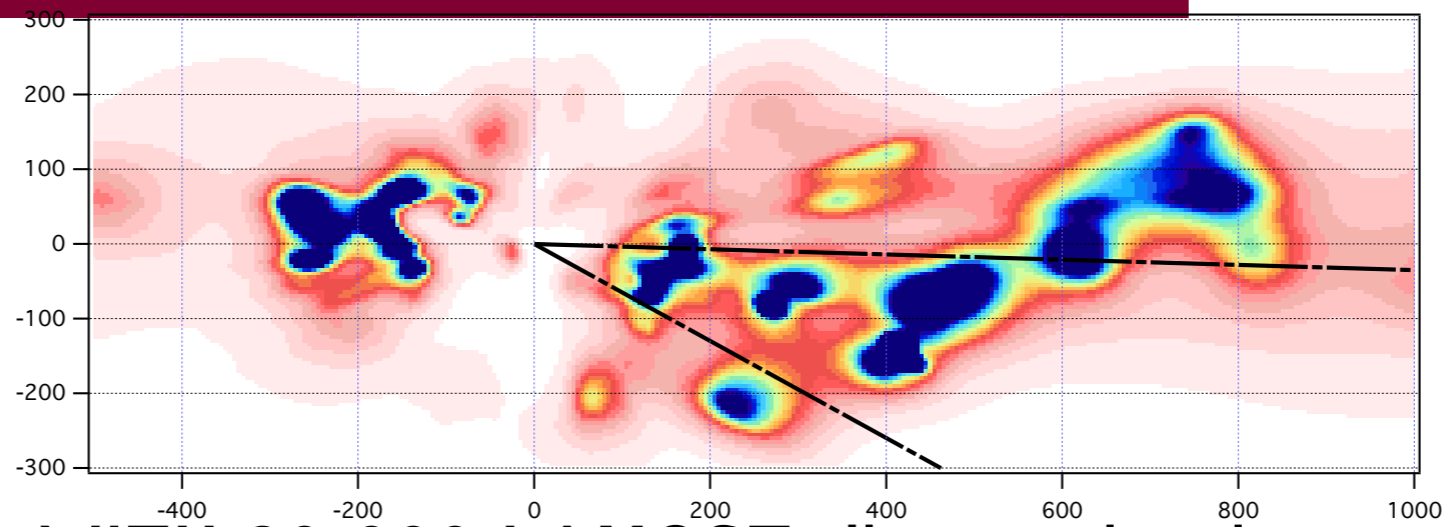
160,0 APOGEE SPECTROPHOM



~60 000



FROM 10^4 TO 10^6

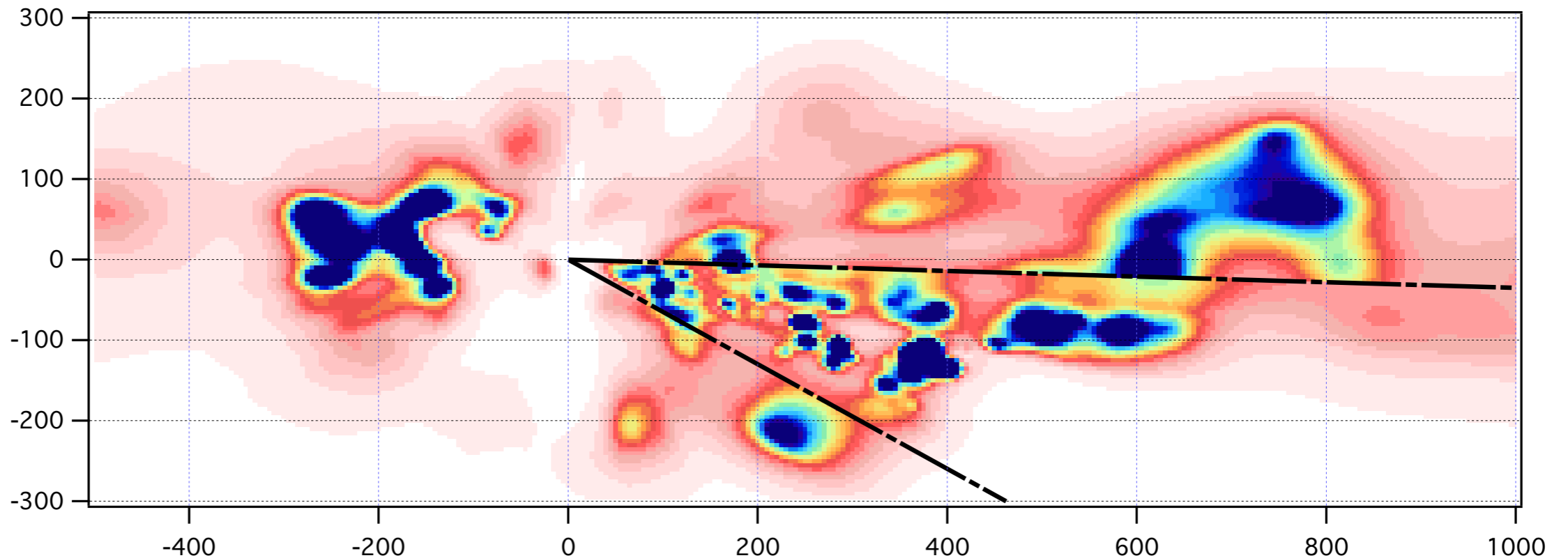


WITH 20 000 LAMOST dist/extinction

$0^\circ > b > -35^\circ$

$155^\circ > l > 180^\circ$

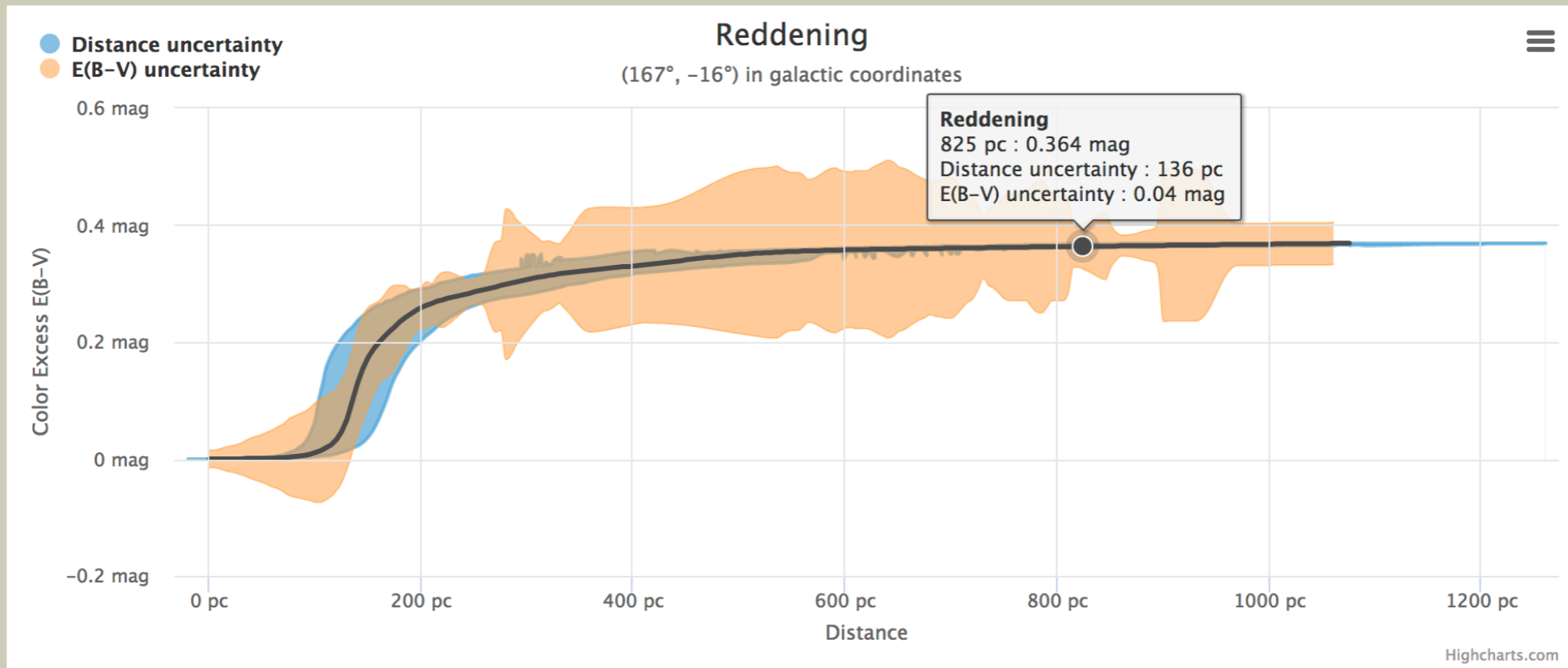
Wang et al, 2016



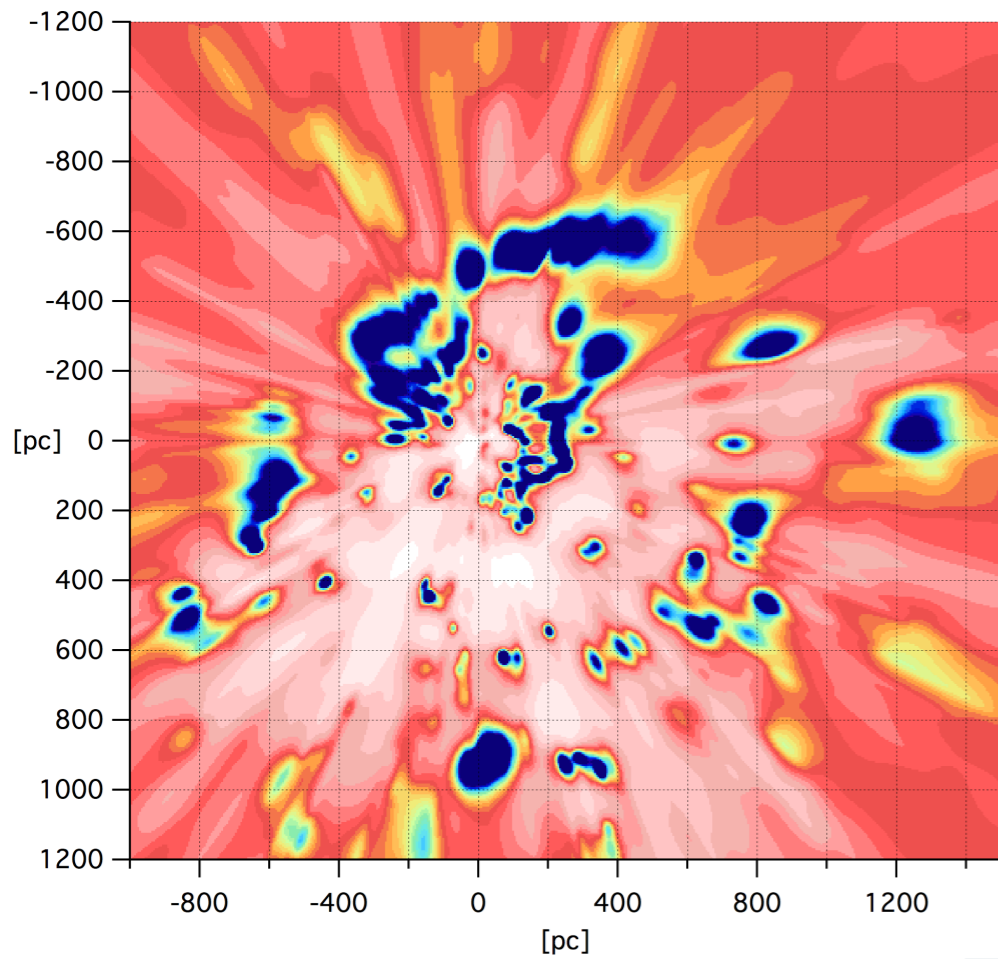


ne / Reddening

You can zoom on a region with the mouse



PRE-GAIA



POST:



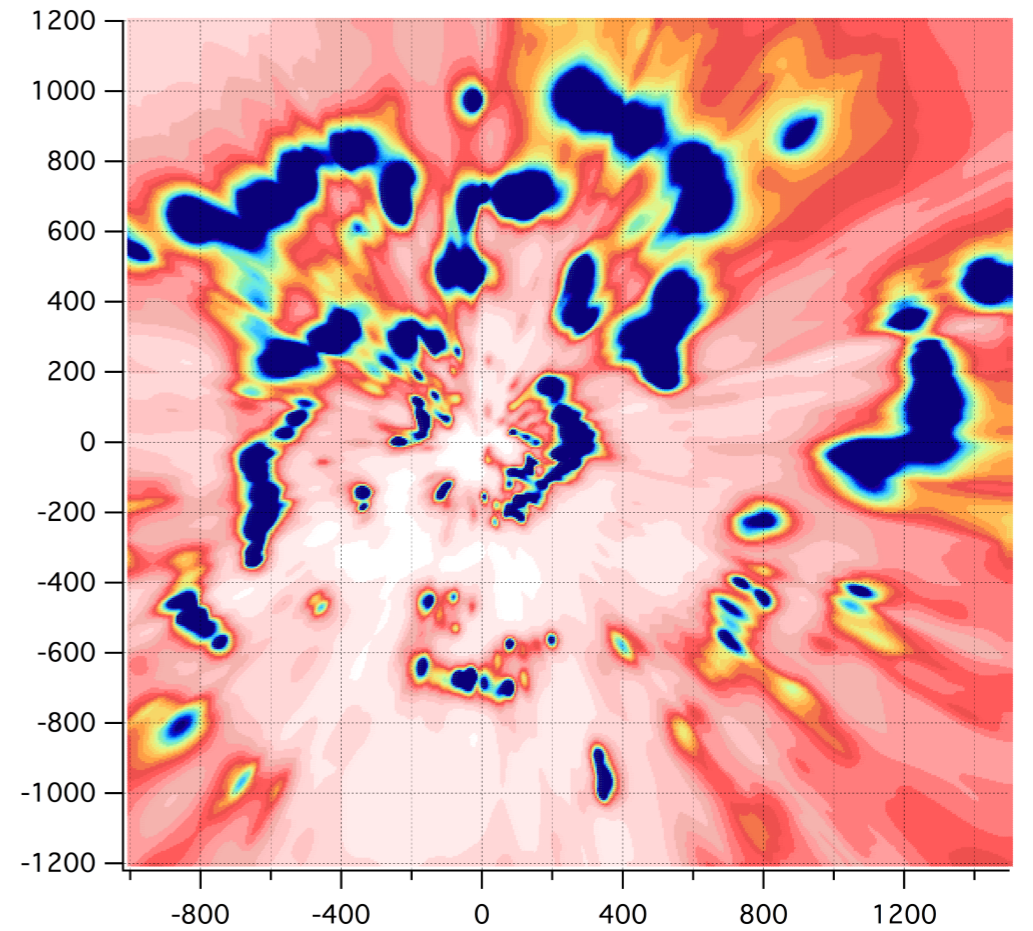
-GAIA DISTANCES

-DIB APOGEE (WITH GAIA DISTANCES)

-PRIOR



-POST-GAIA APOGEE CALIBRATION



FUTURE...

