

THREE DIMENSIONAL MAPS OF LOCAL INTERSTELLAR MEDIUM

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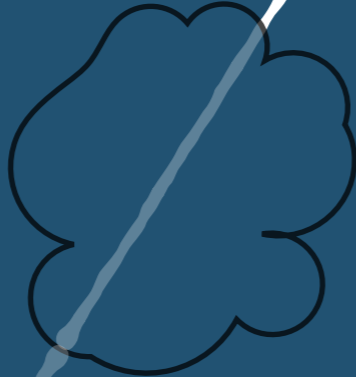
3D inversion maps

Last year progresses

Future



EXTINCTION

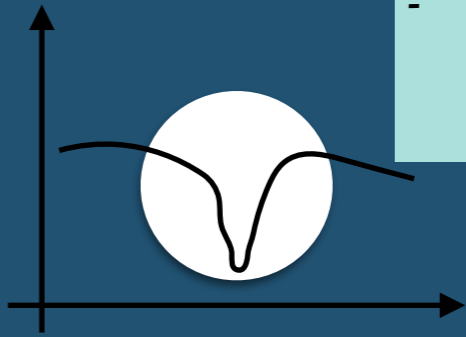


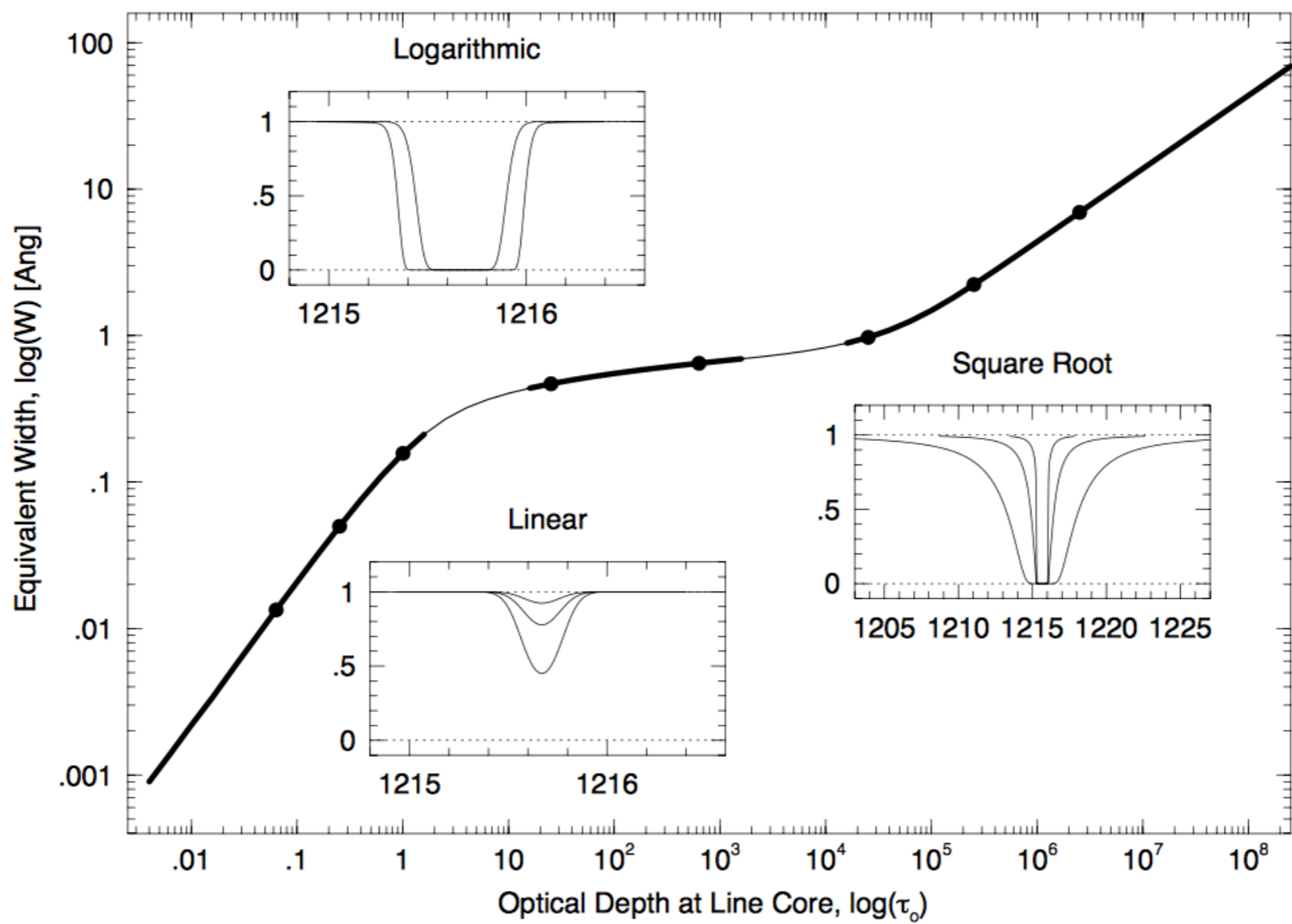
REDDENING



ABSORPTION LINES:

- gas lines
- diffuse interstellar bands





ION LINES:
s lines
interstellar
ands



RECONSTRUCTION SIGHTLINE BY SIGHTLINE

TARGET STARS IN
A NARROW SOLID
ANGLE

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

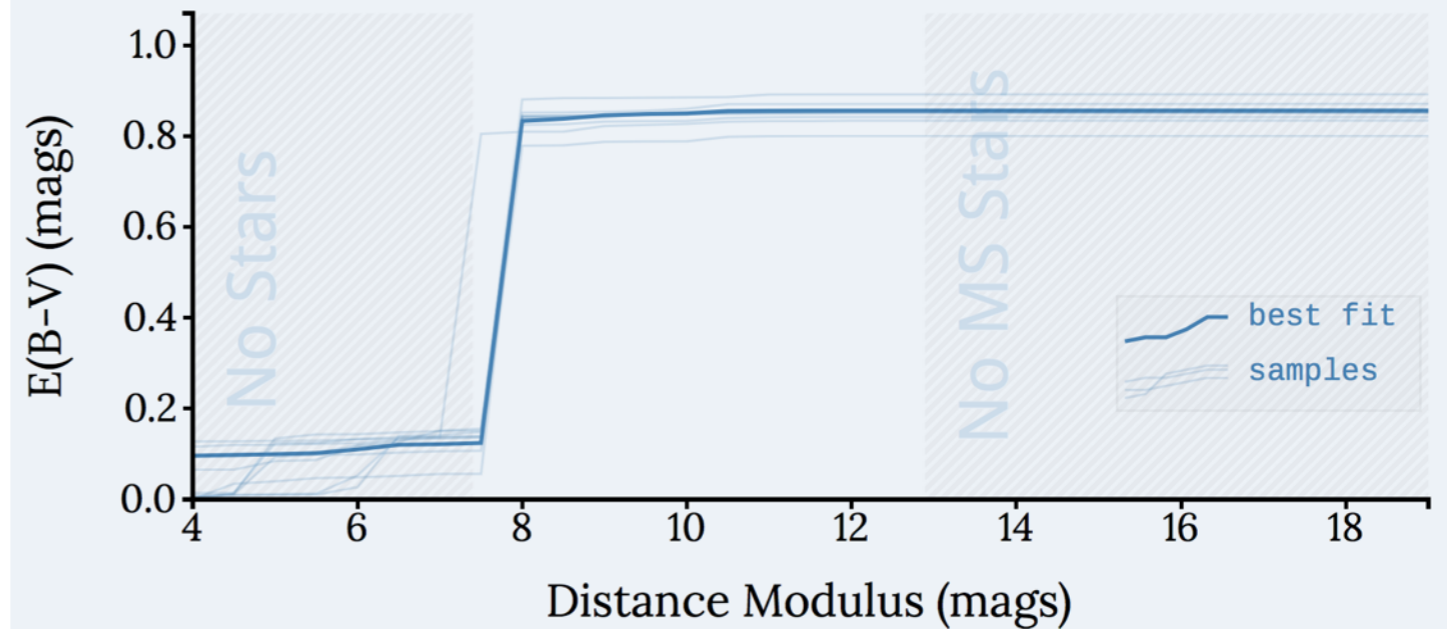


PAN-STARRS MAP - Green15

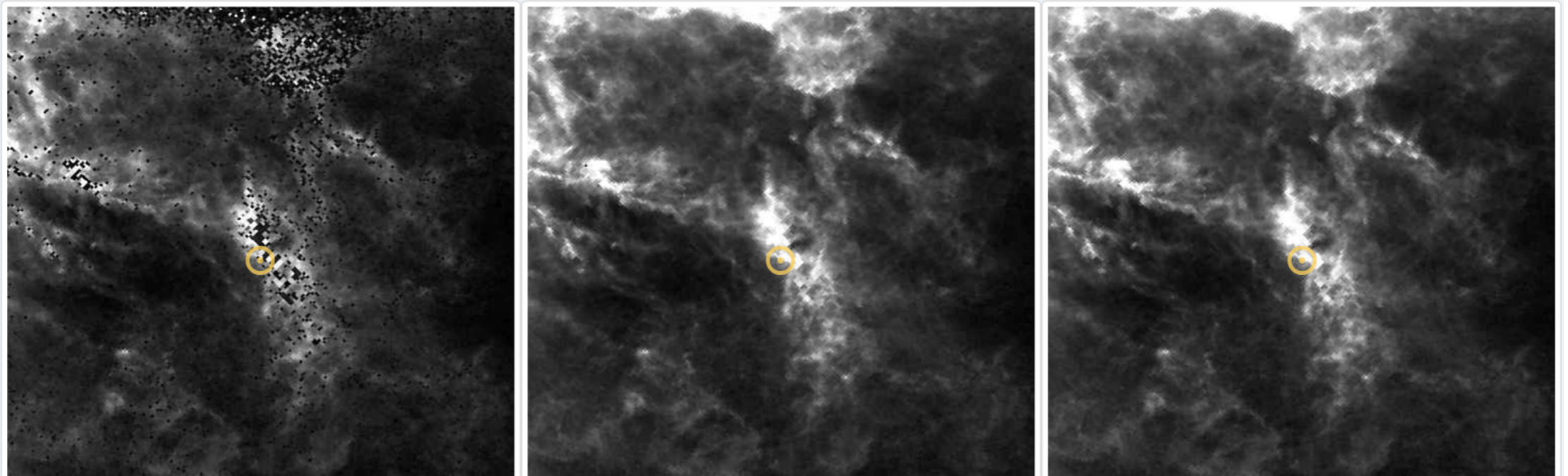
$l = 160$ $b = -15$

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

Reddening vs. Distance

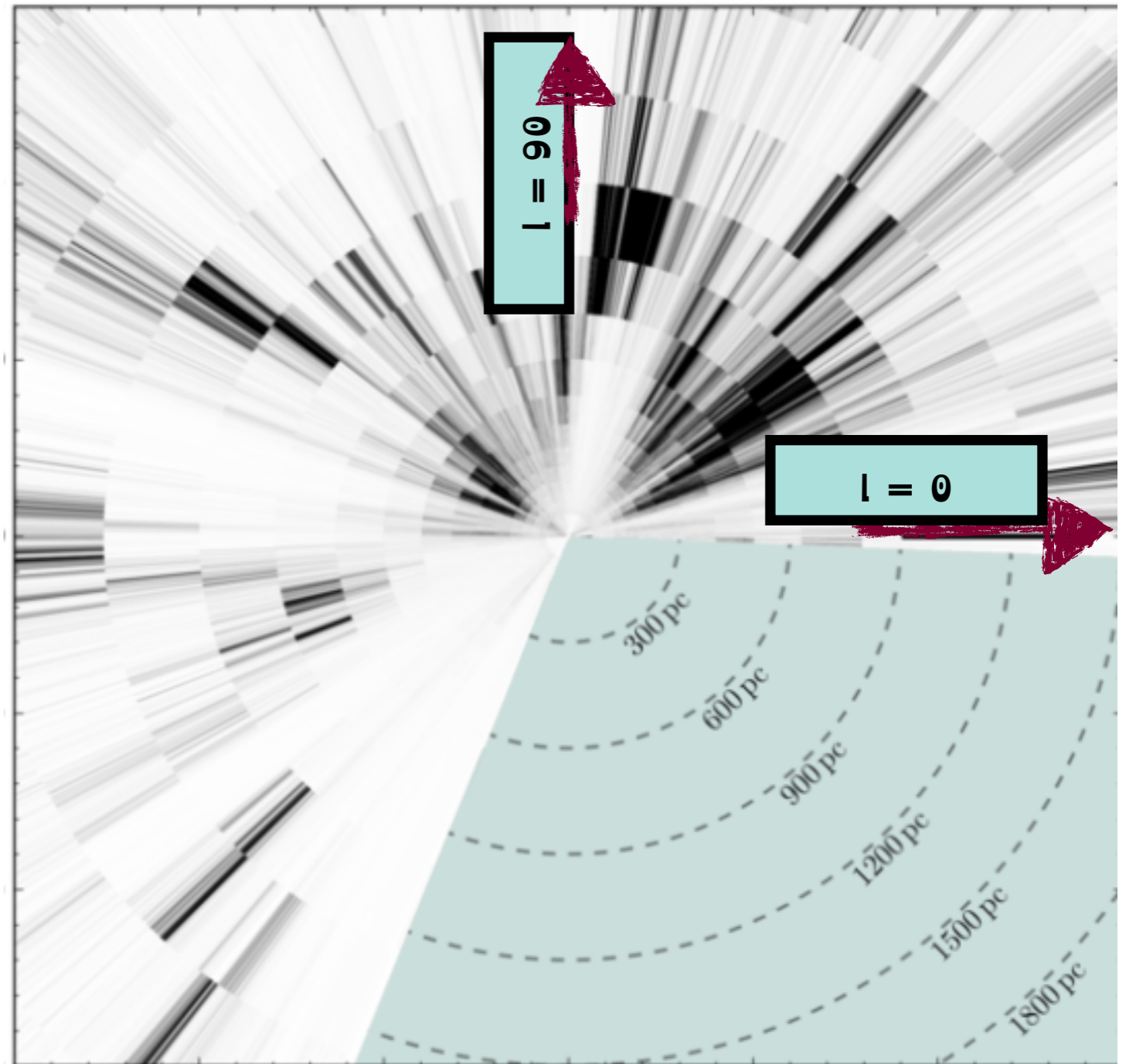


Postage Stamps



PAN-STARRS MAP

- Lower distance resolution
- No local values
- Only north hemisphere (south hemisphere in preparation)



FULL 3D INVERSION

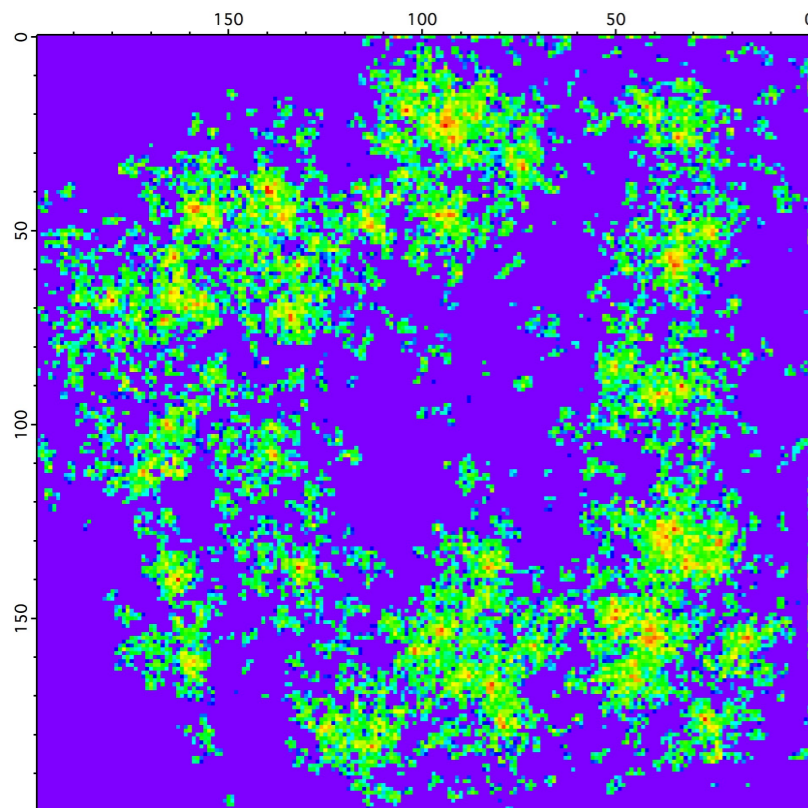


3D DUST OPACITY DISTRIBUTION

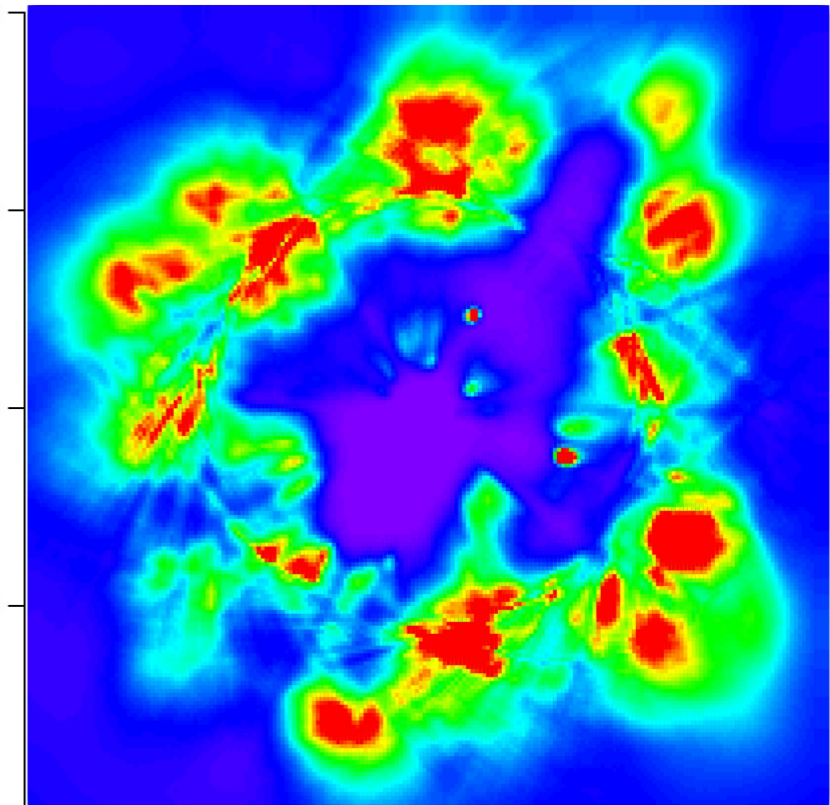
- $E(B-V)$: COLUMN DENSITY
- $\rho(P)$ $\rho(P')$: 3D INFORMATION
- PRIOR

SIMULATED 3D DISTRIBUTION (~23000 STELLAR TARGETS)

INPUT DISTRIBUTION



OUTPUT MAP

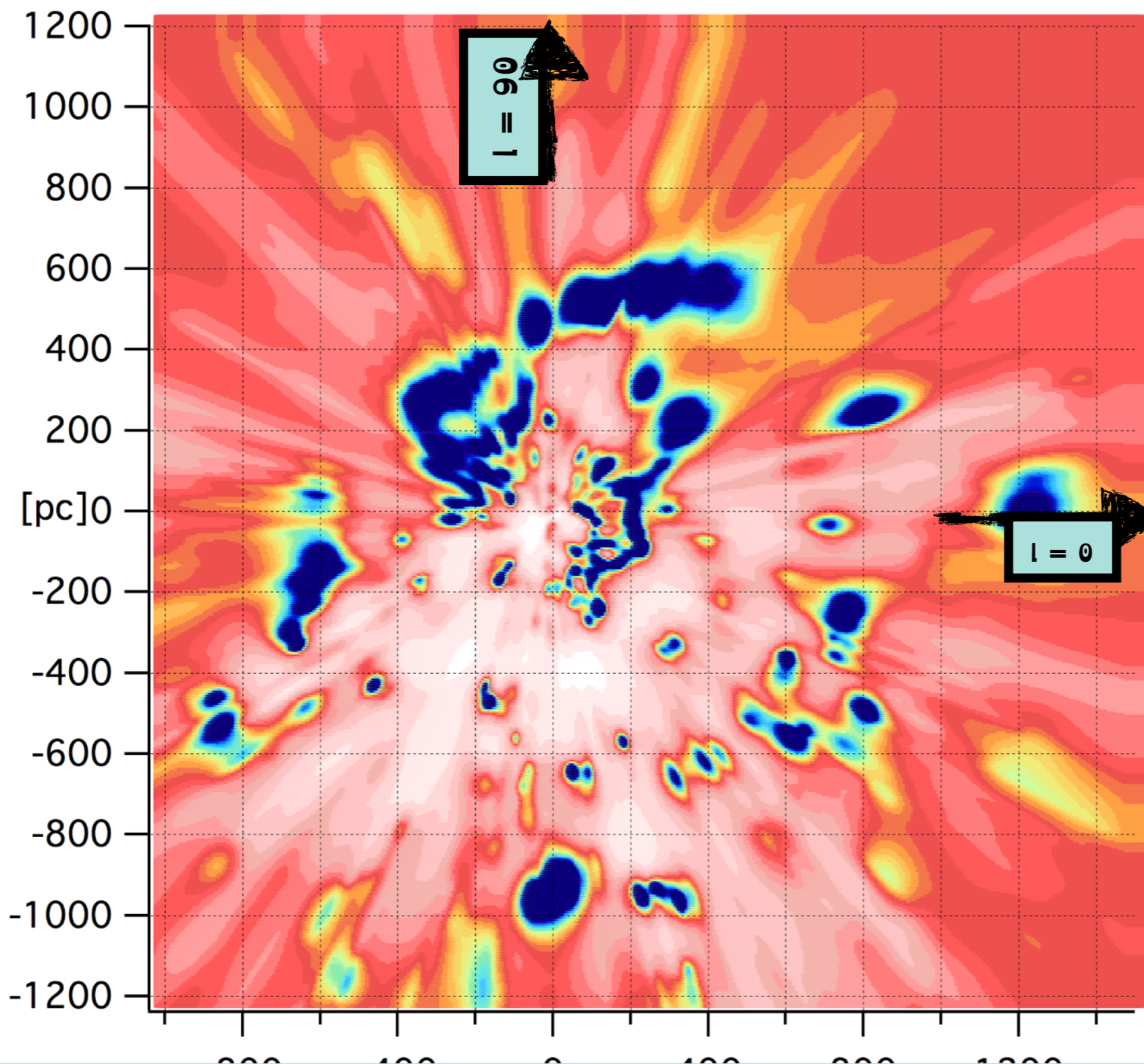


- low spatial resolution
- spreading of opacities in large volumes

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



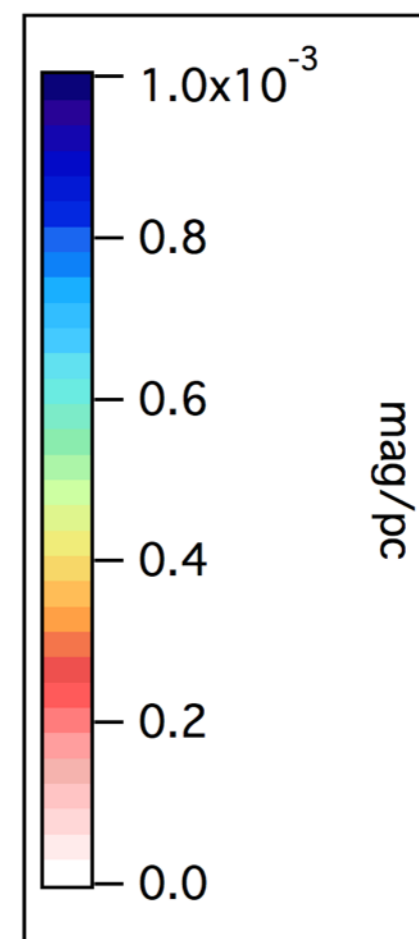
OLD MAPS - LALLEMENT2014



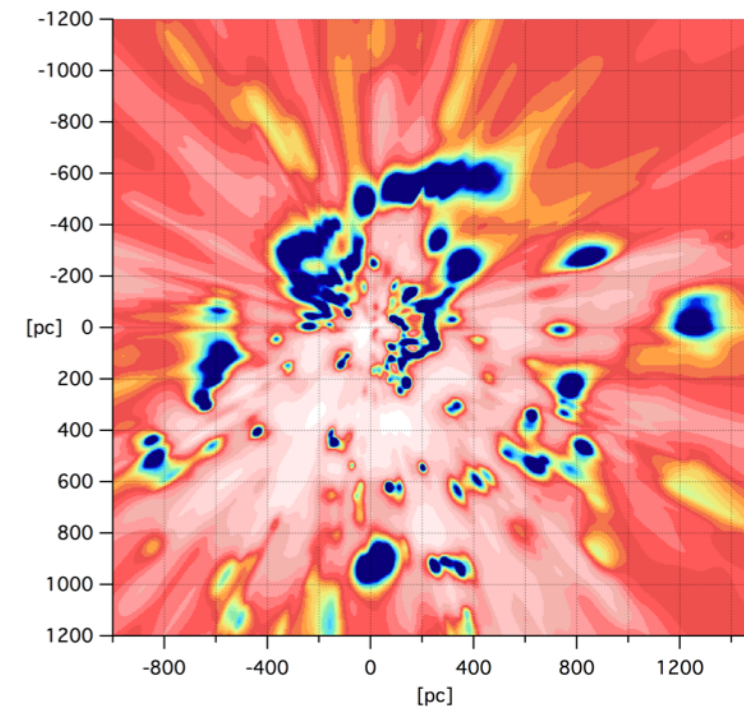
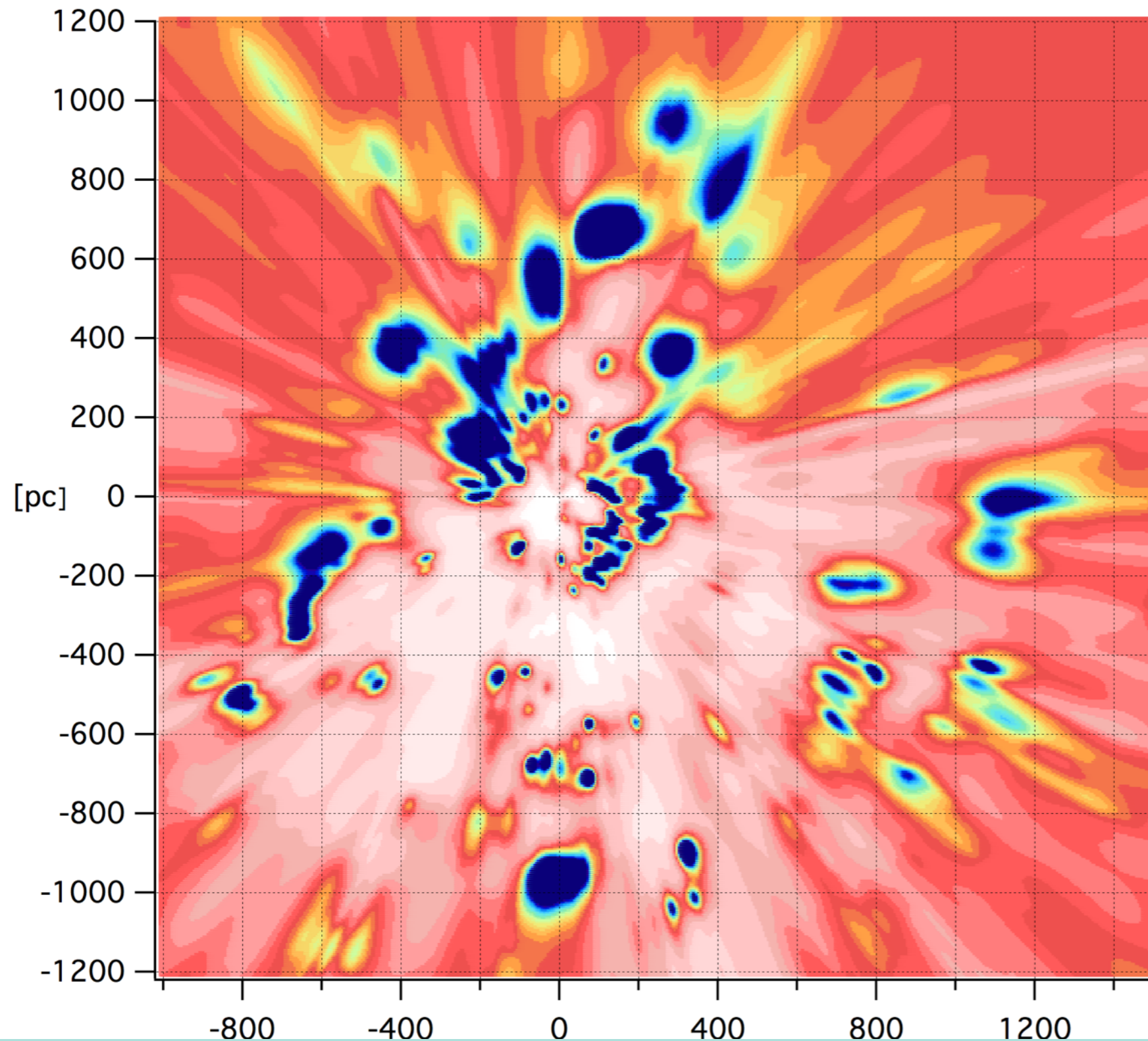
22467 targets

22 % Hipparcos distances

78% photometric



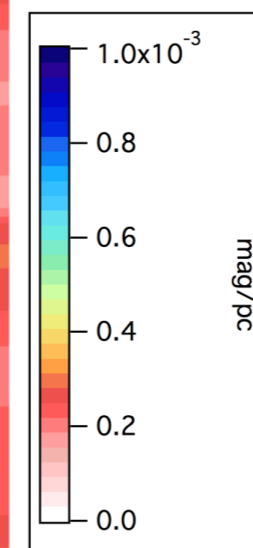
DR1 GAIA PARALLAXES!



23444 targets

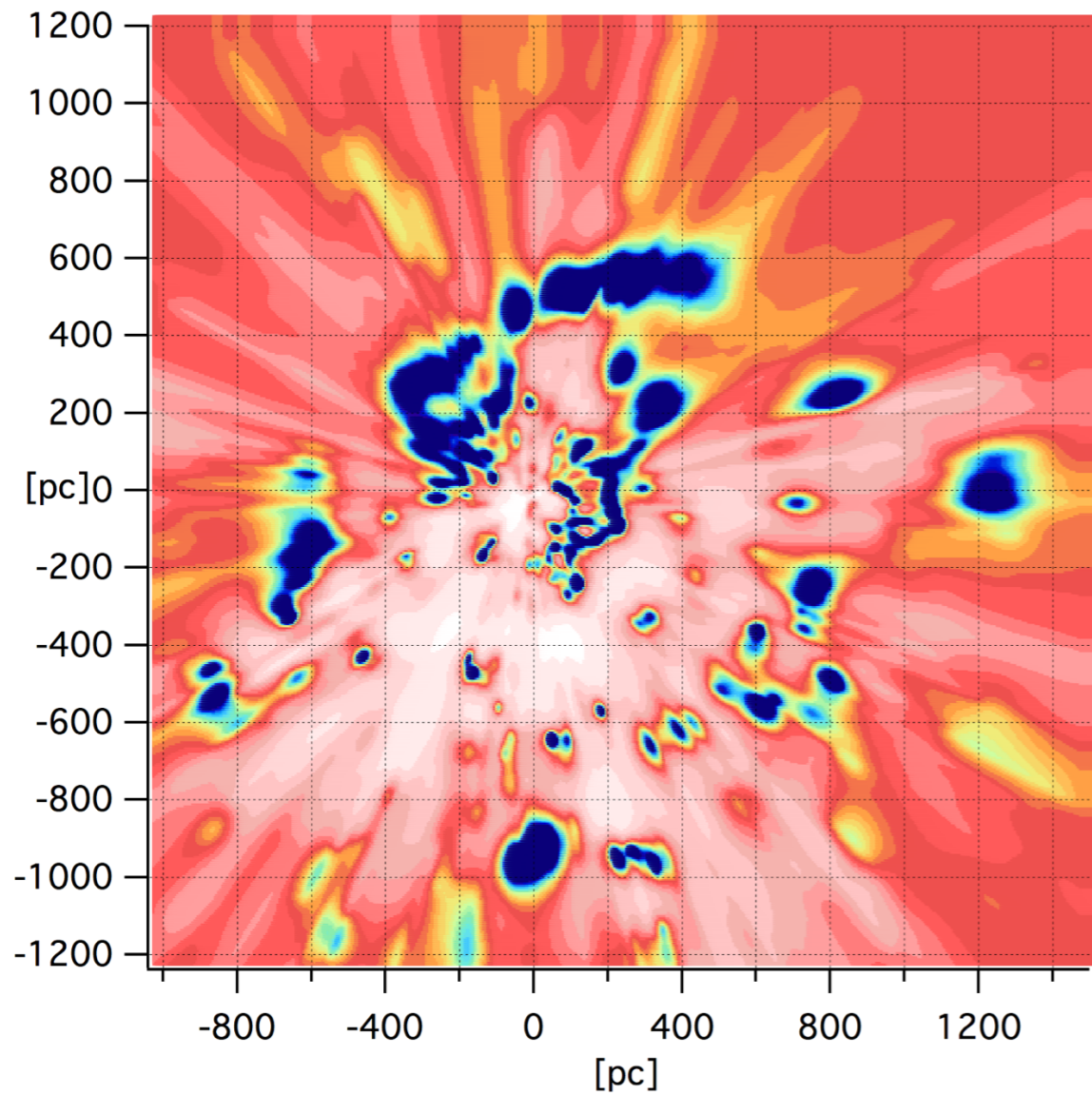
~80% Gaia TGAS distances

20% photometric

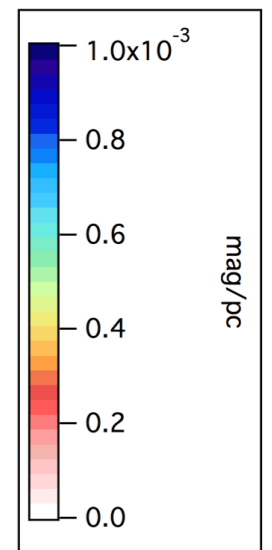
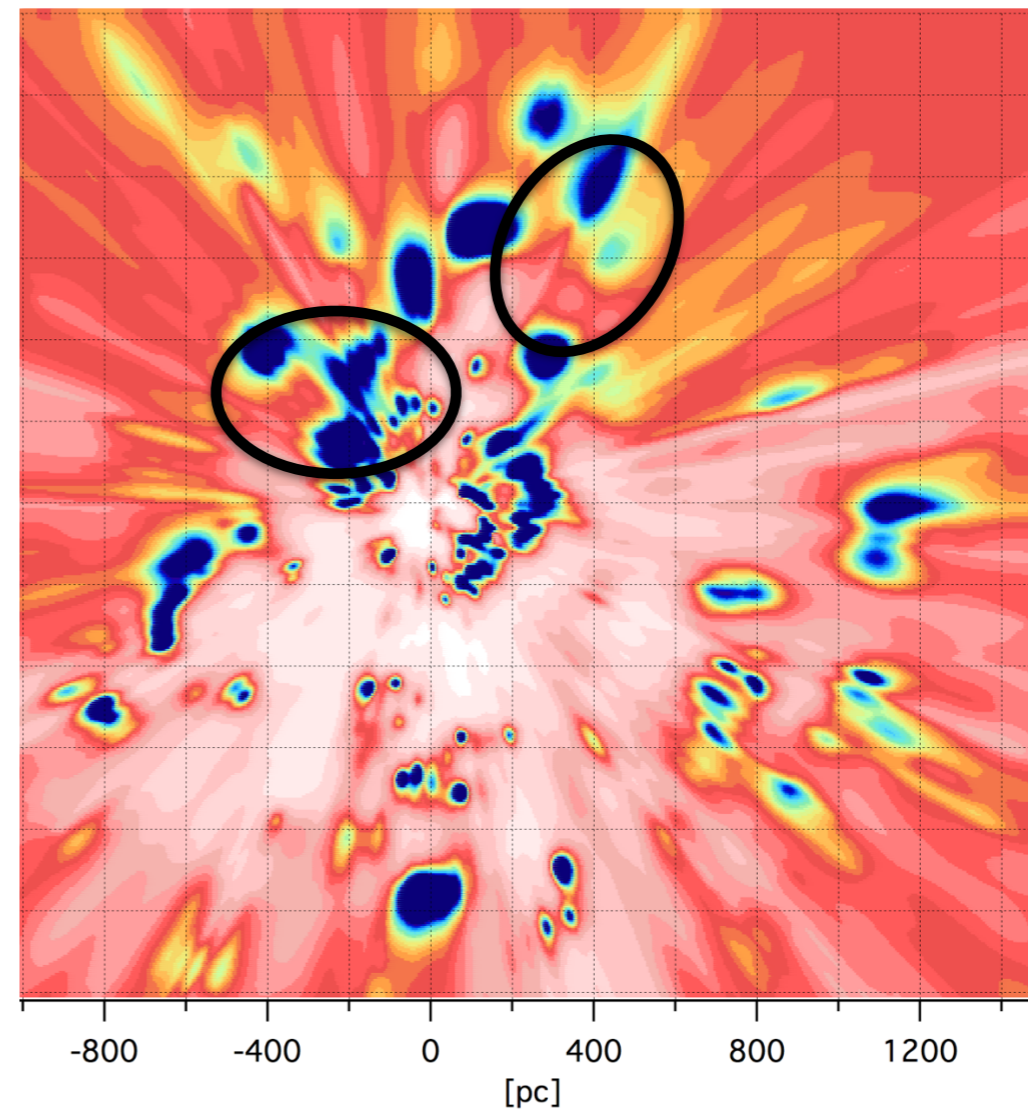


COMPARISON : OLD DISTANCES VS DR1 DISTANCES

PRE-Gaia

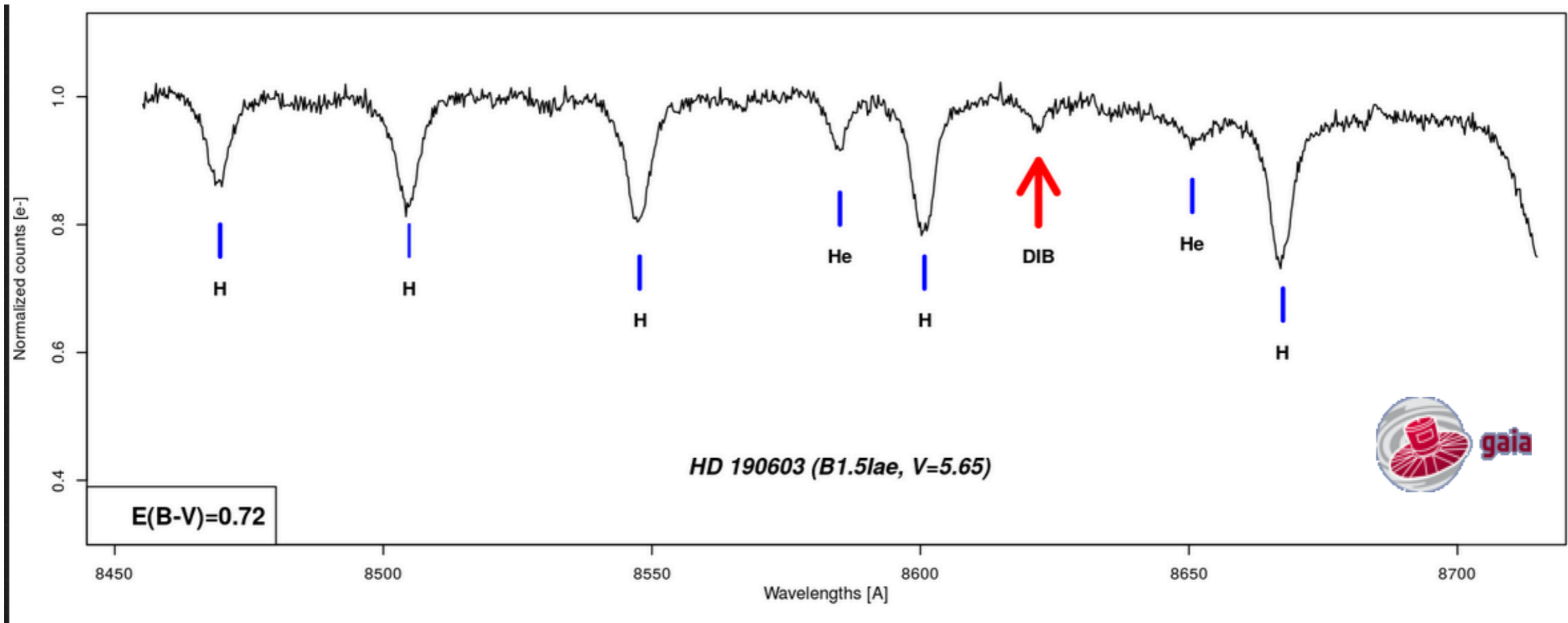


POST-Gaia

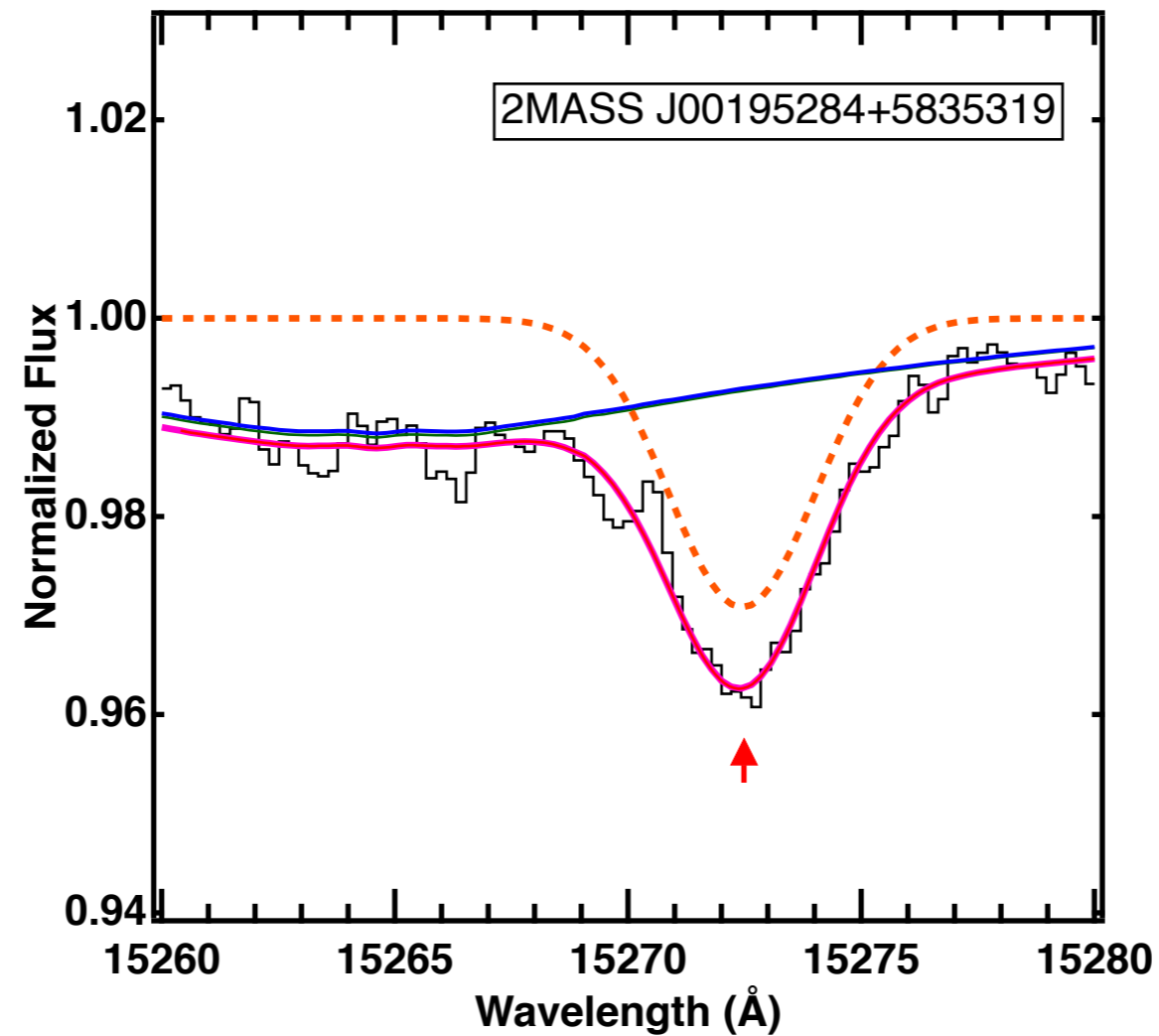


HOW TRACE MATTER:

DIBs?



DIBs AS MATTER TRACER?

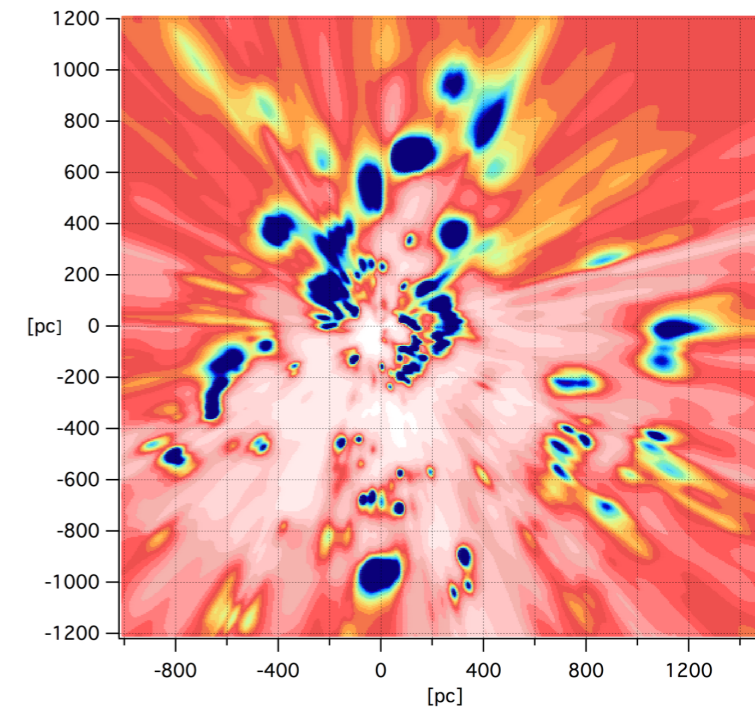
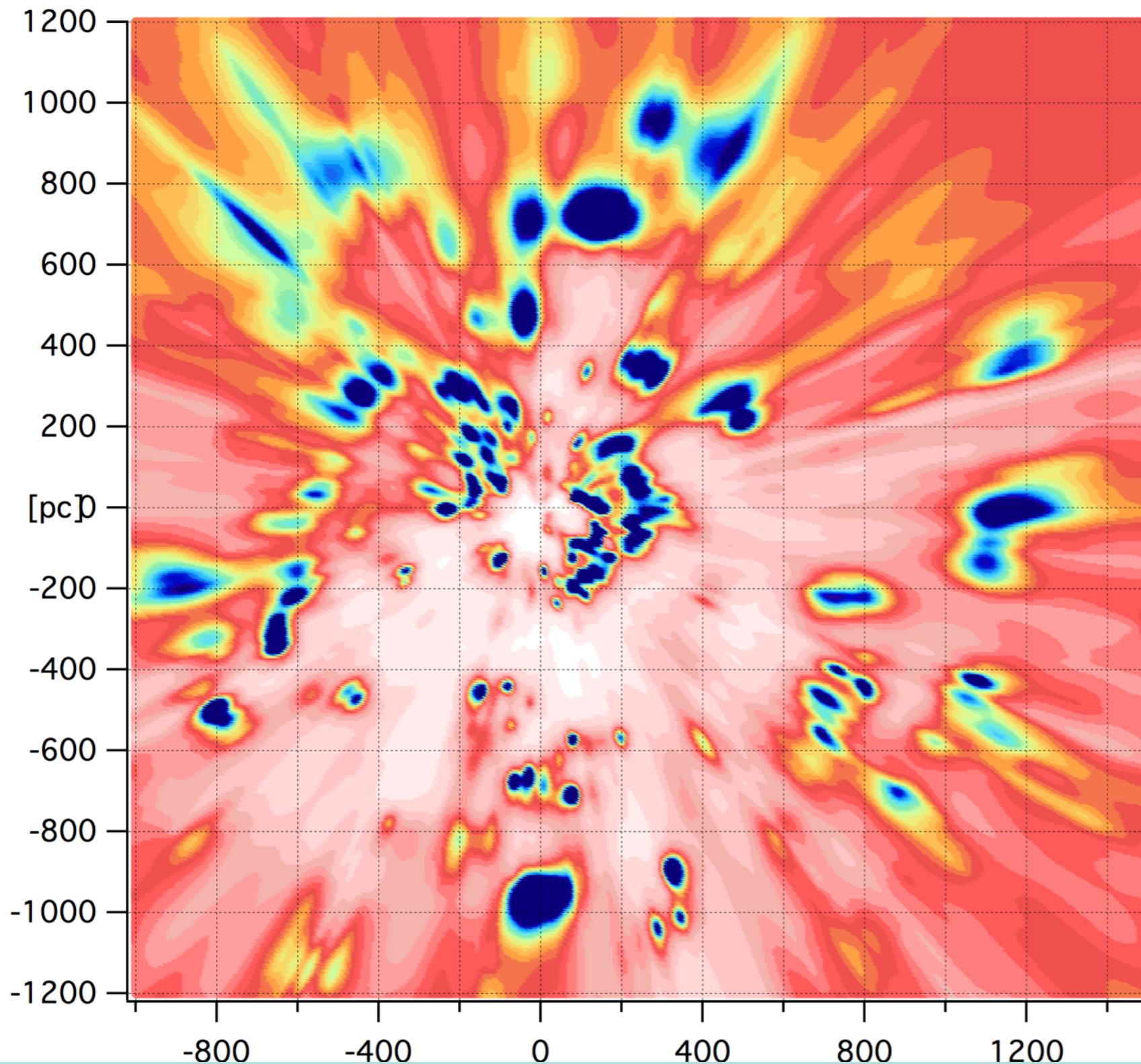


Elyajouri et al., 2017

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

Zasowski et al, 2015

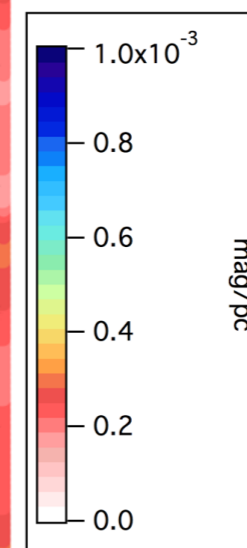
WAITING FOR GAIA DR3



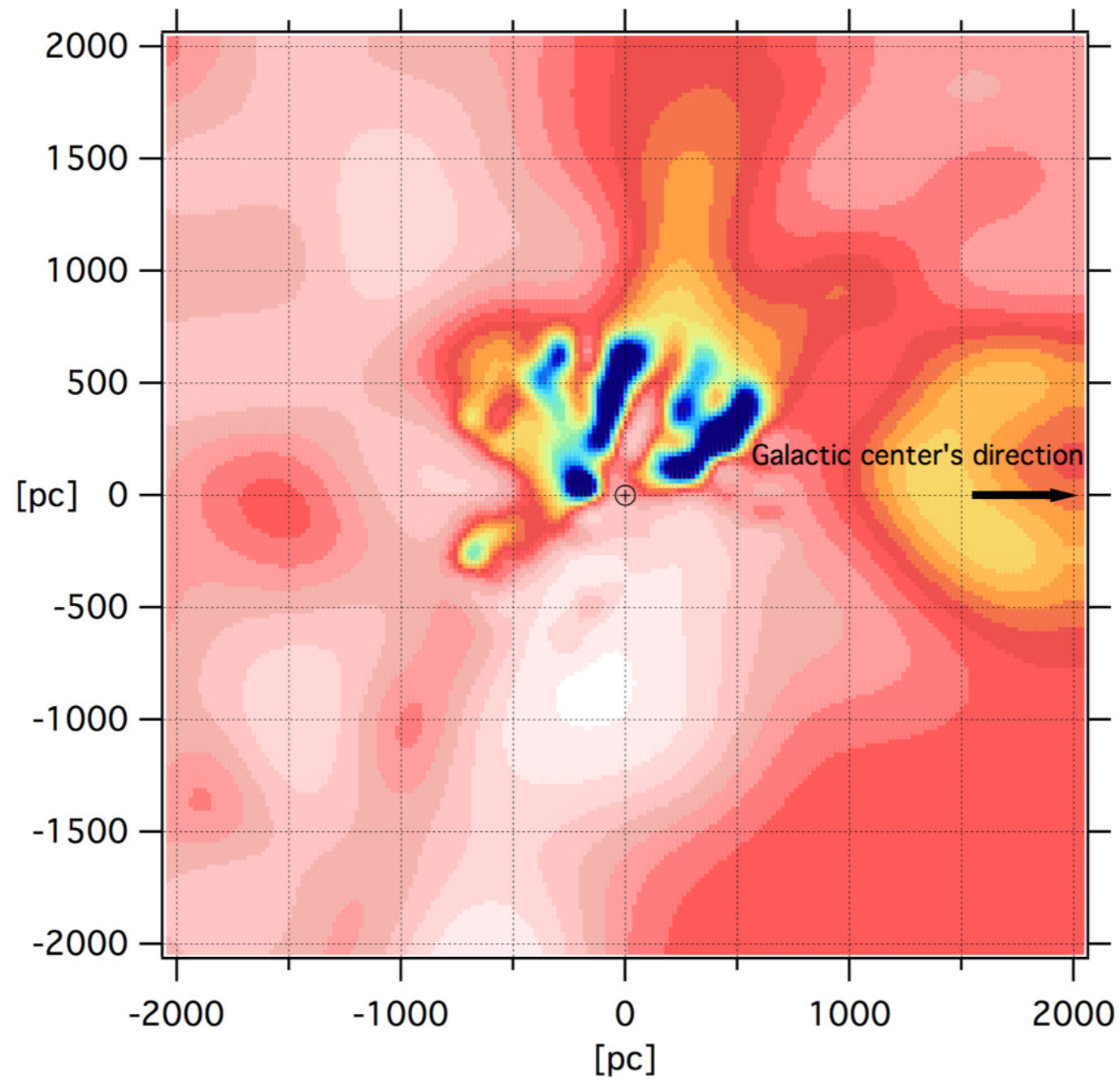
~ 28000 targets

~ 5000 DIB-BASED

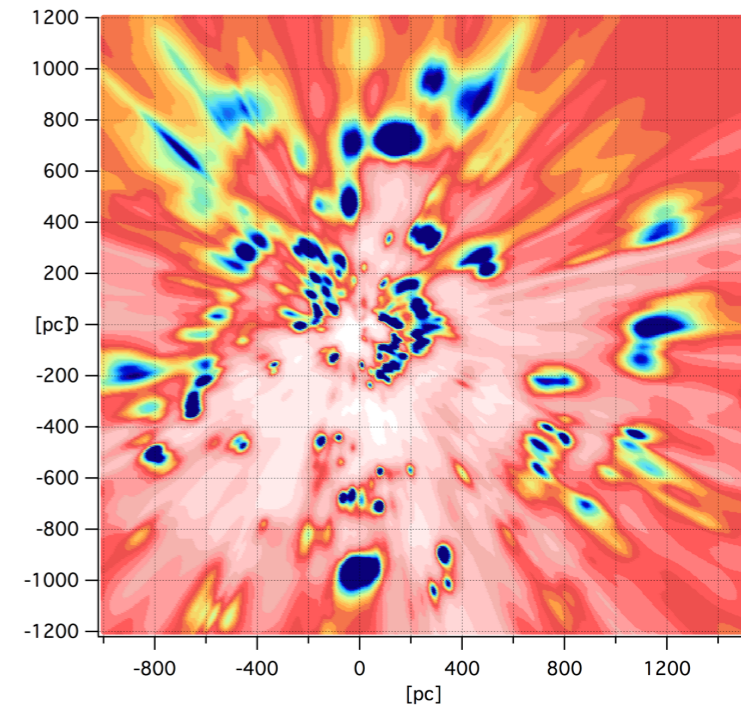
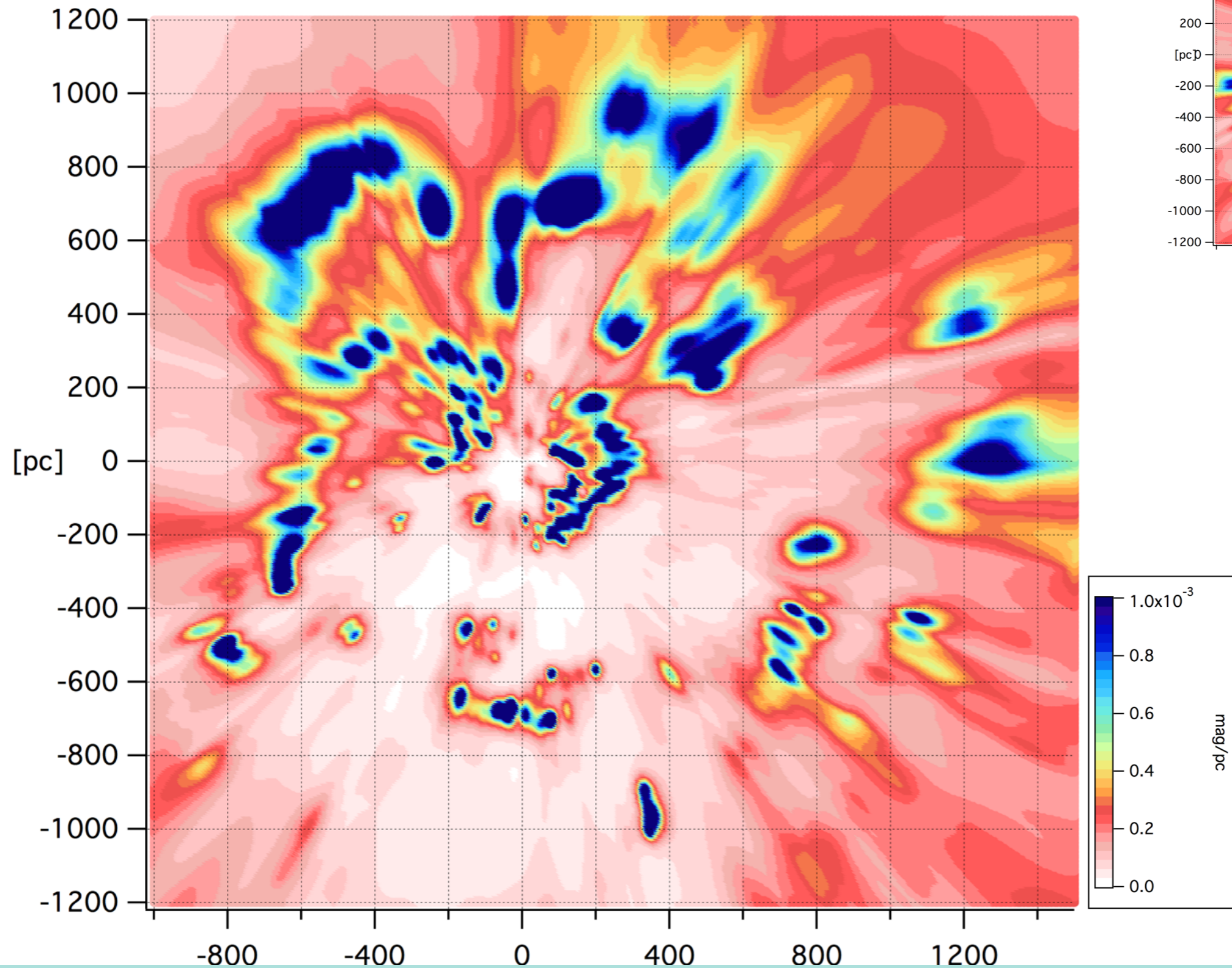
EXCESS OF COLOUR



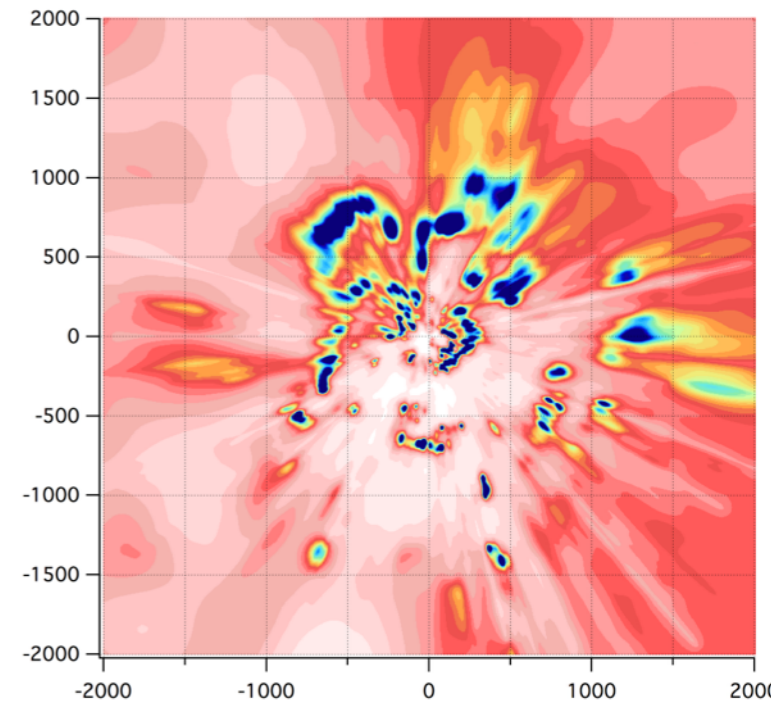
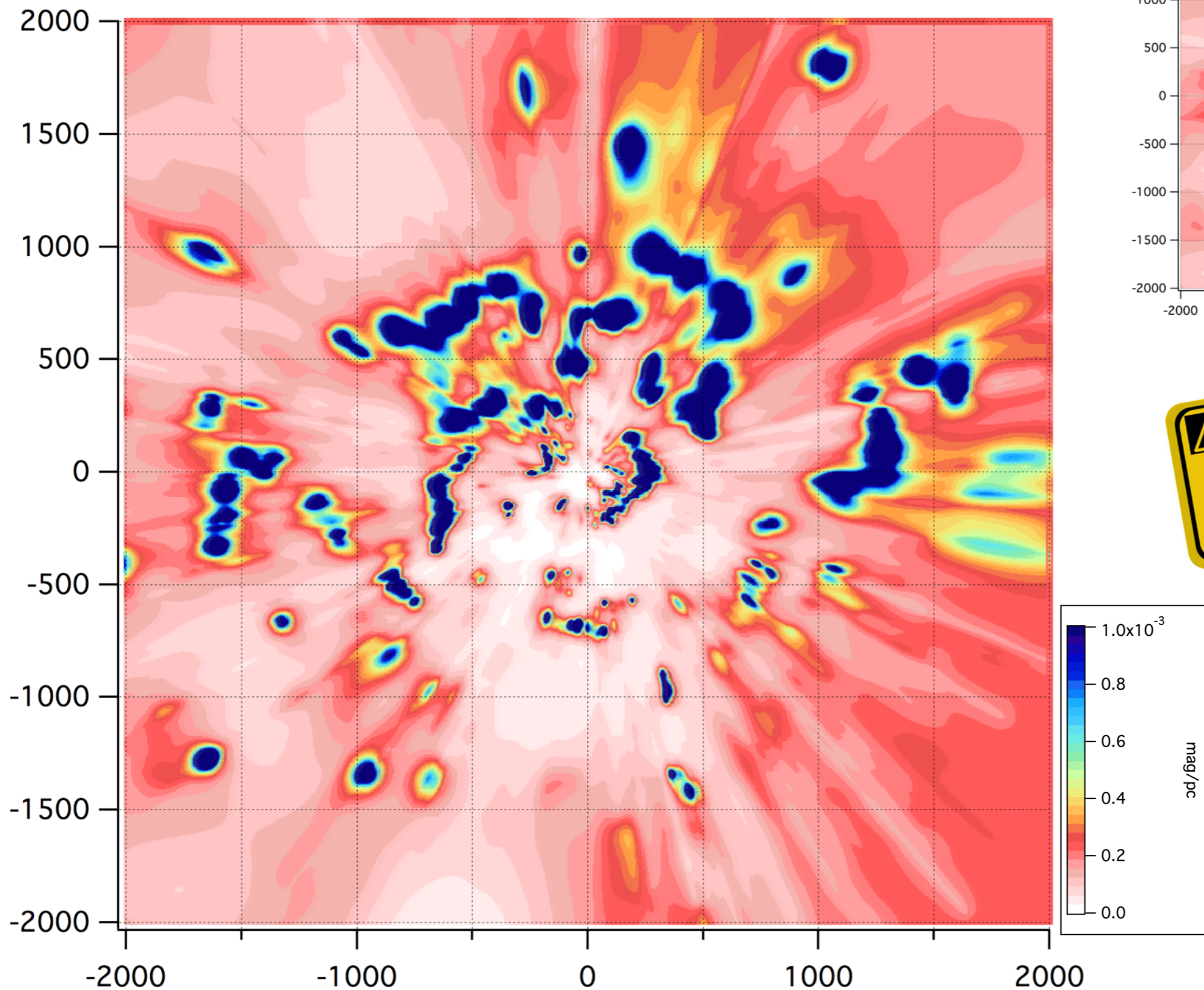
NON-LOCAL ISM: PAN-STARRS MAP



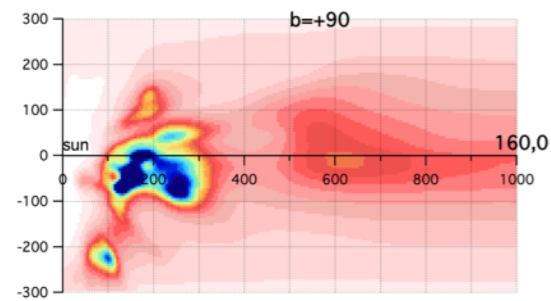
MAP with PAN-STARRS PRIOR



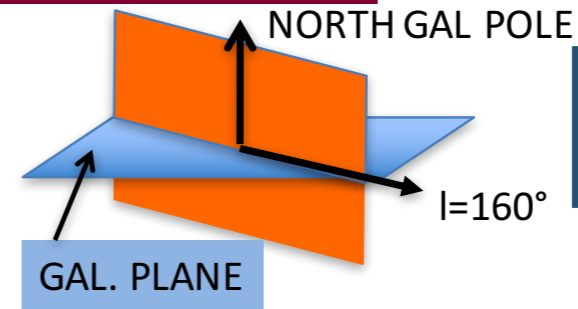
NEW APOGEE CALIBRATION



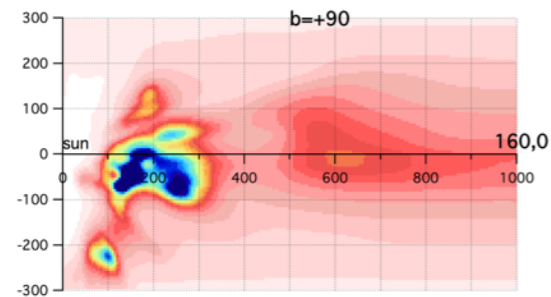
FROM 10^4 TO 10^6



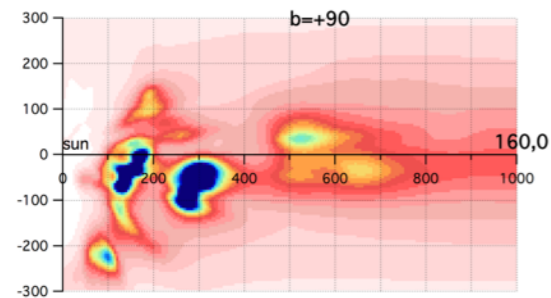
PRE-GAIA



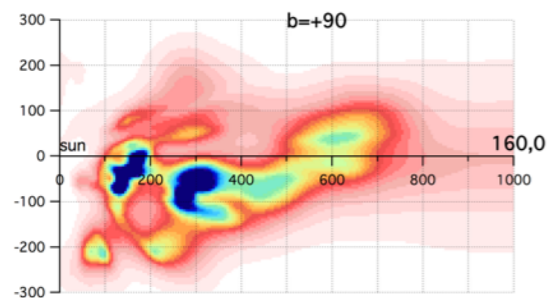
~23 000



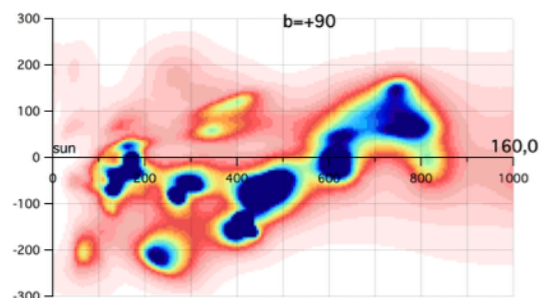
POST-GAIA



DIB APOGEE



PANSTARRS

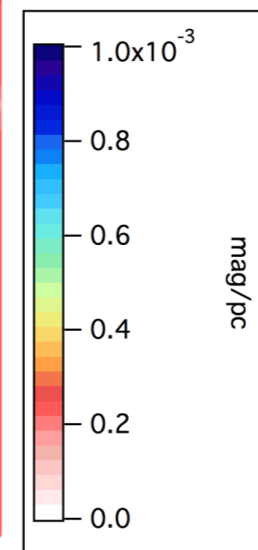
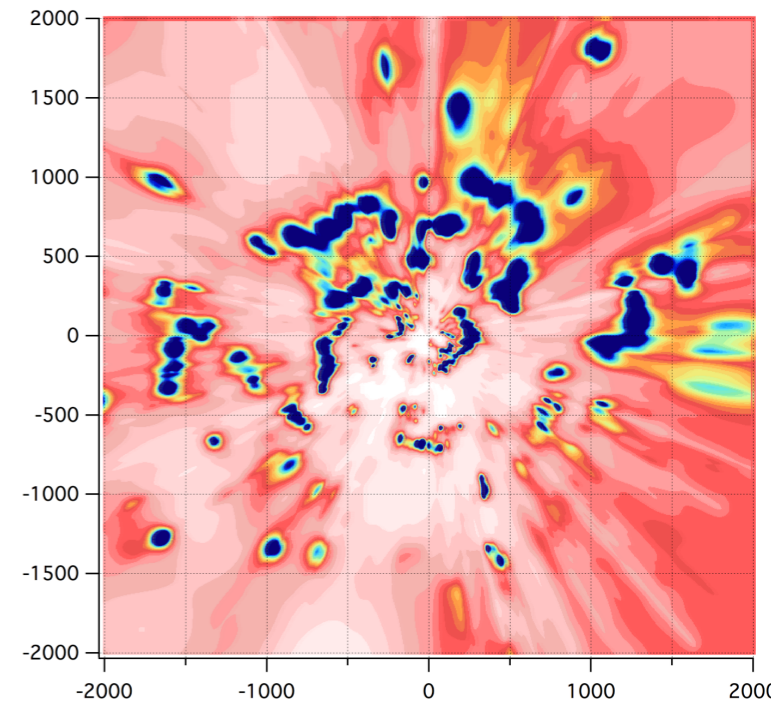
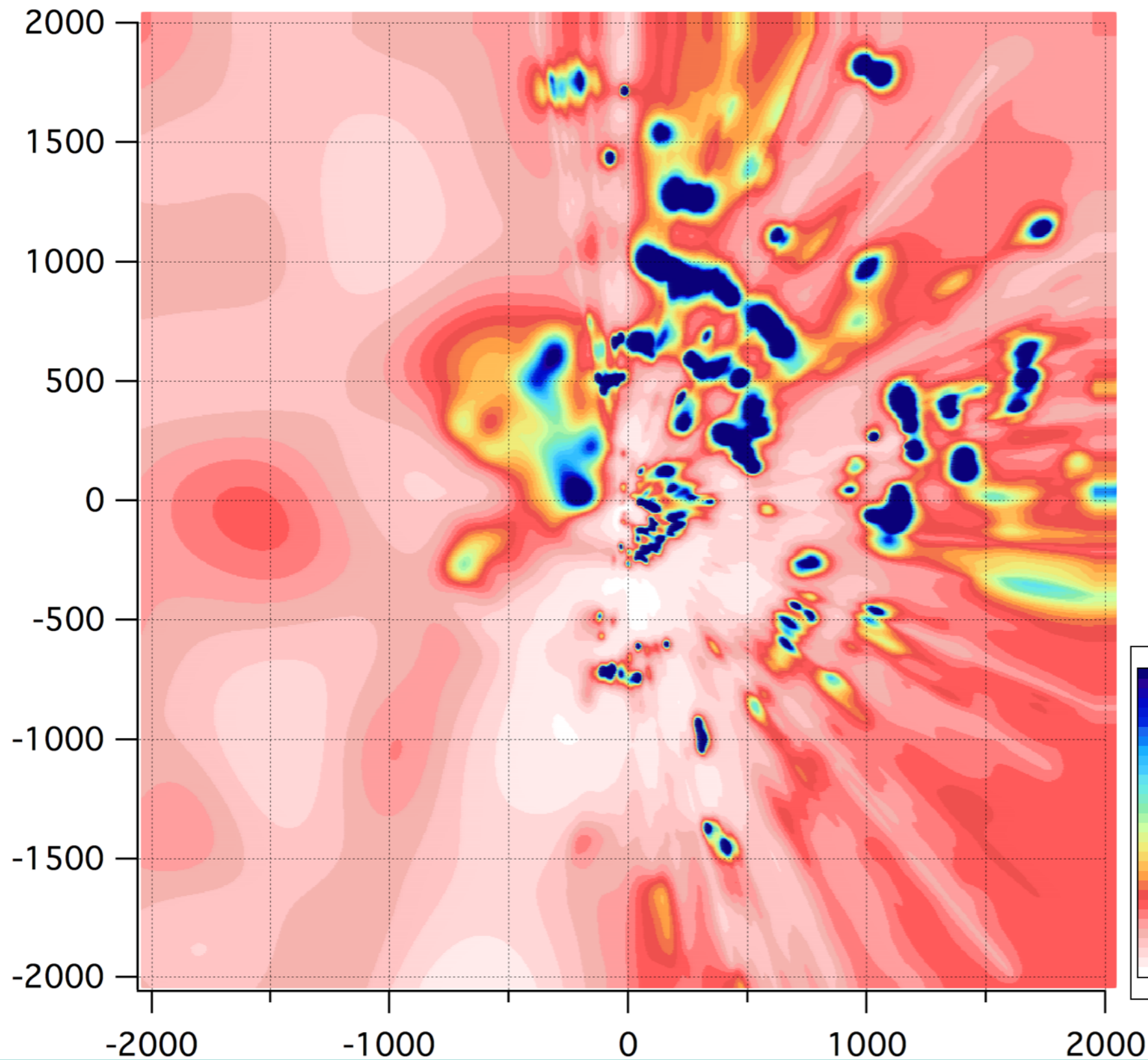


APOGEE SPECTROPHOTOM



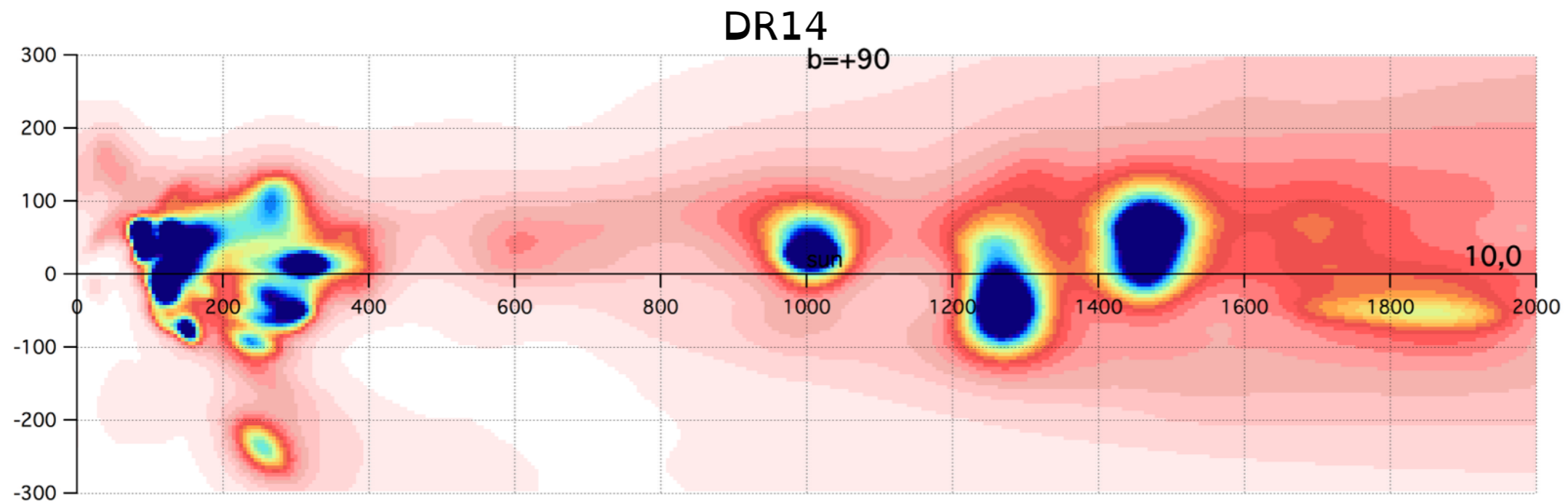
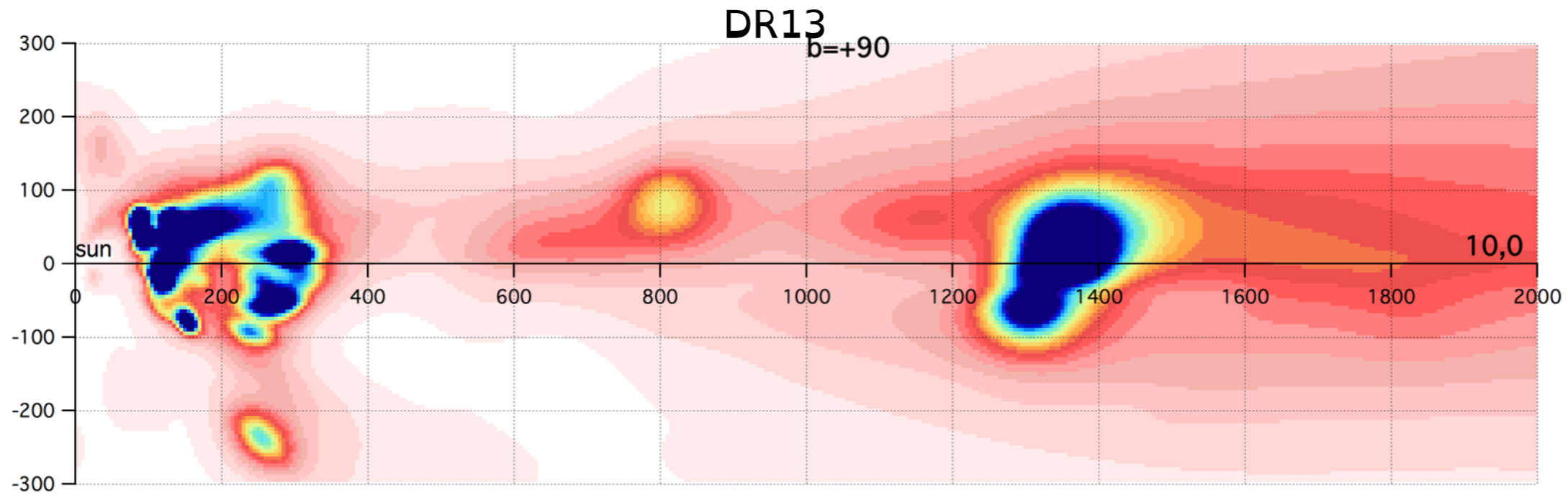
~60 000

DR14 APOGEE - center

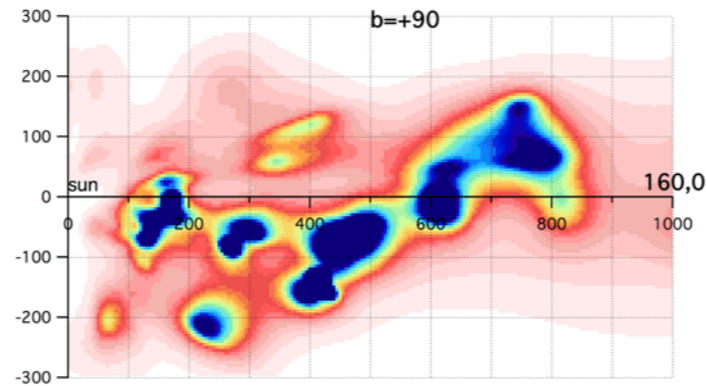


DR14 APOGEE - center

Longitude = 10



FROM 10^4 TO 10^6

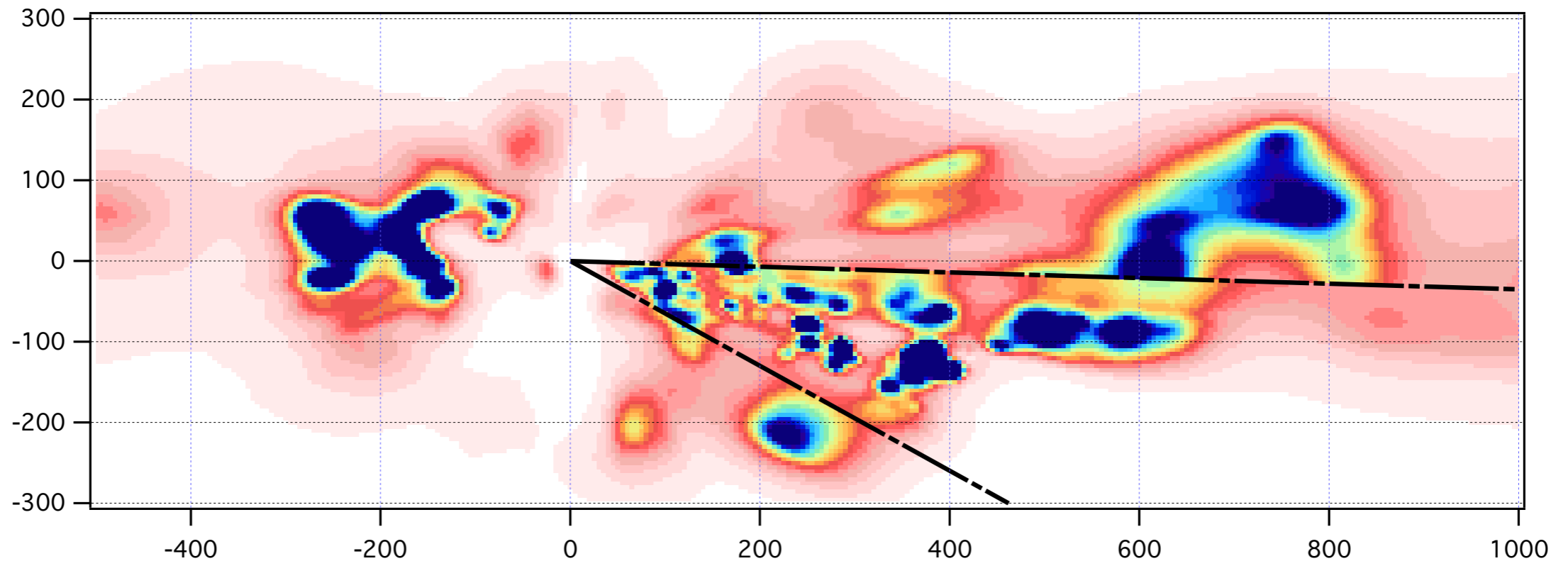


WITH 20 000 LAMOST dist/extinction

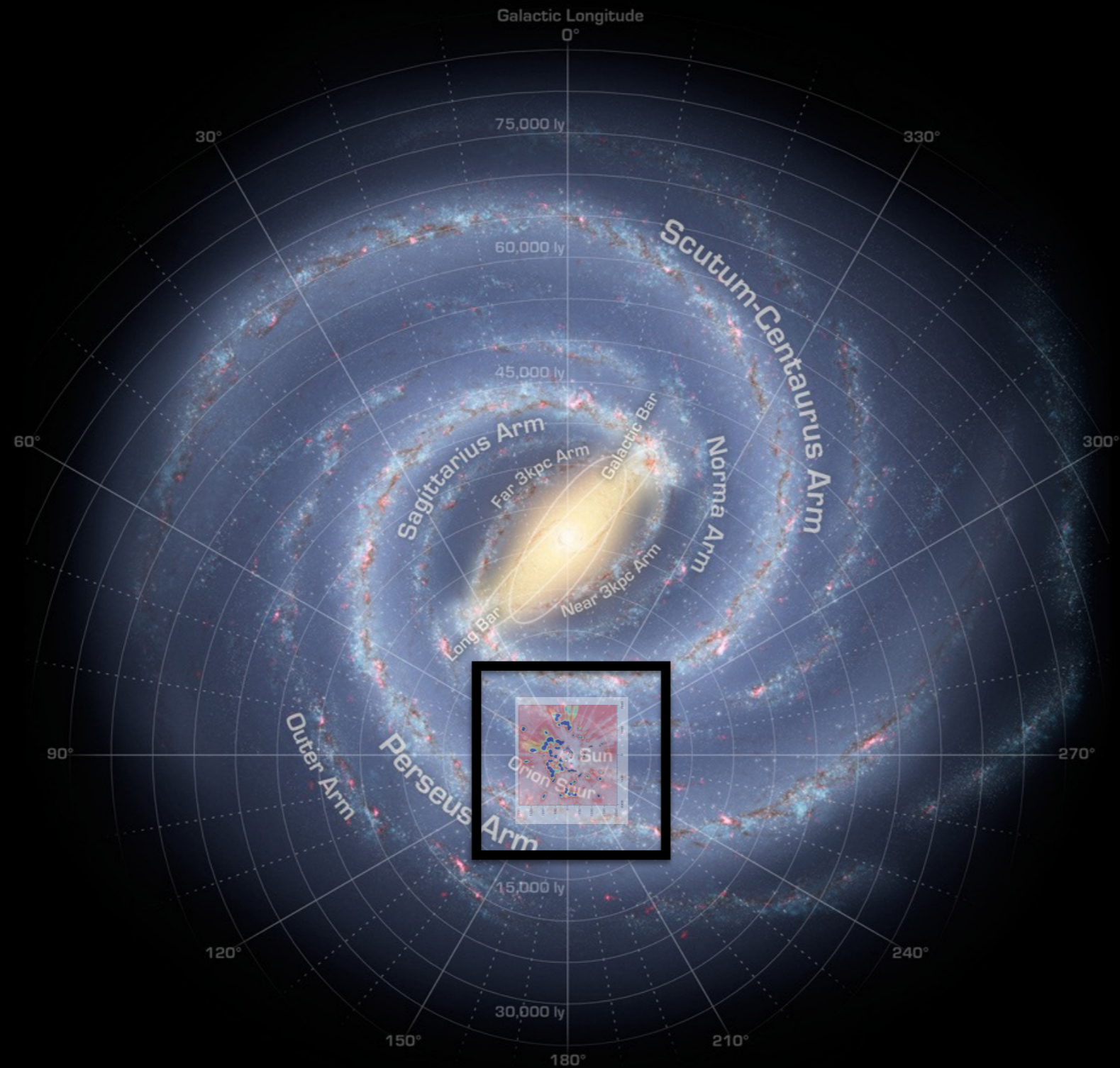
$0^\circ > b > -35^\circ$

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

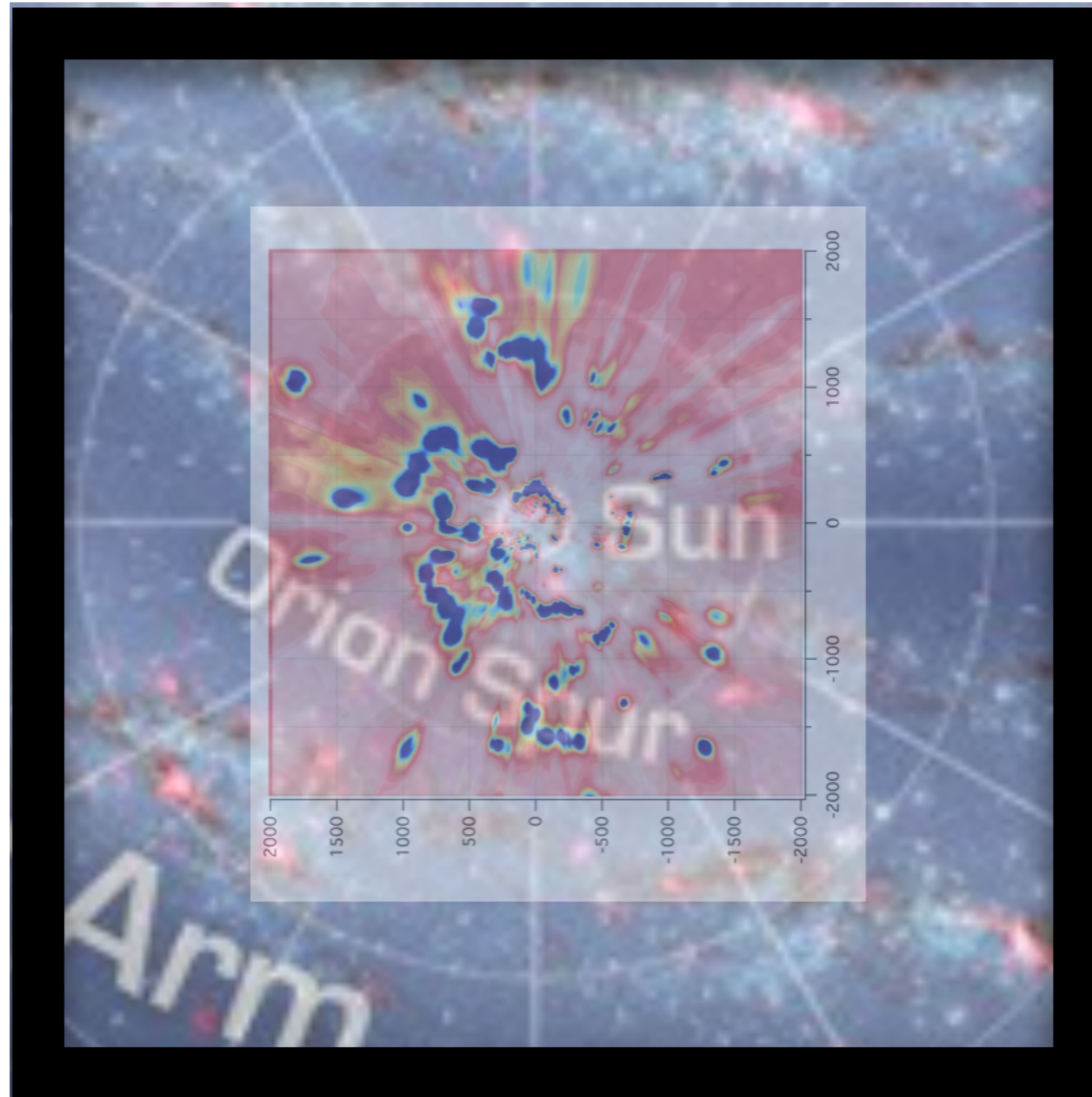
Wang et al, 2016



LOCAL MAPS



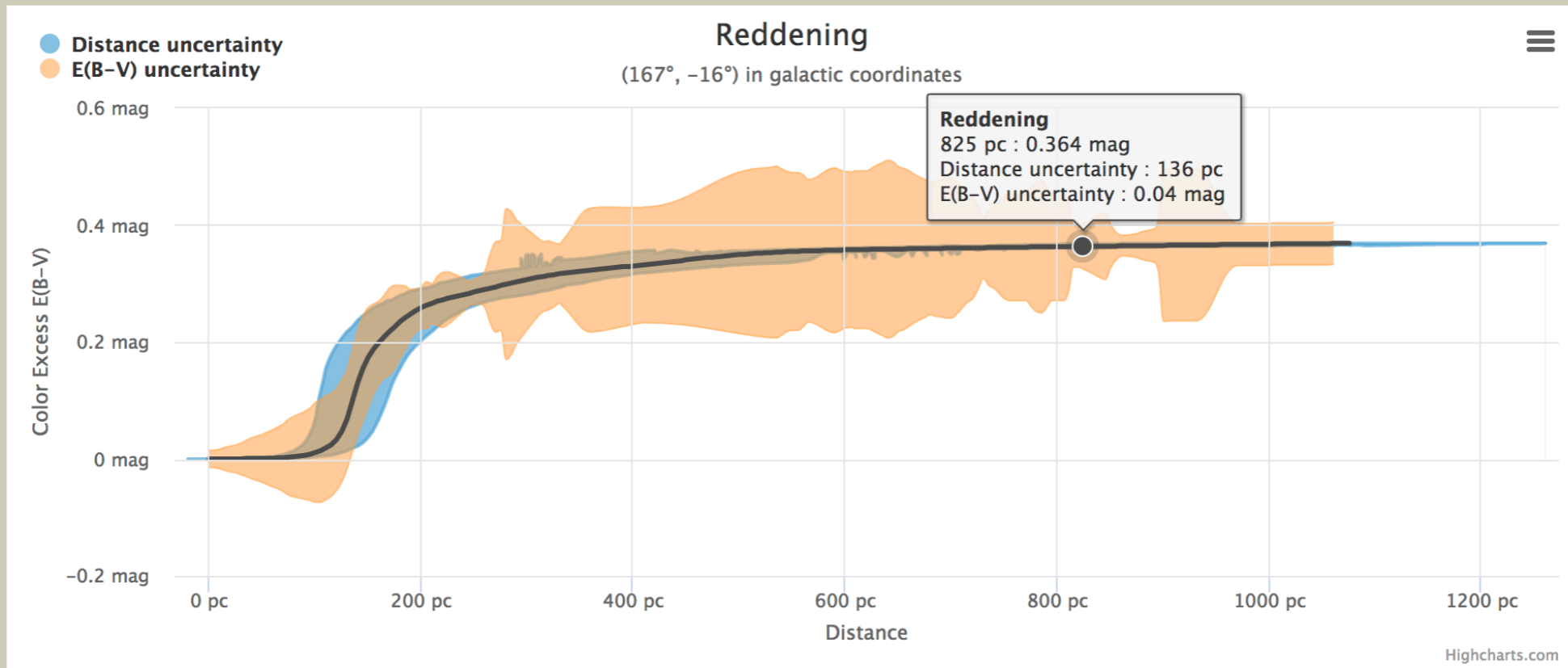
LOCAL MAPS





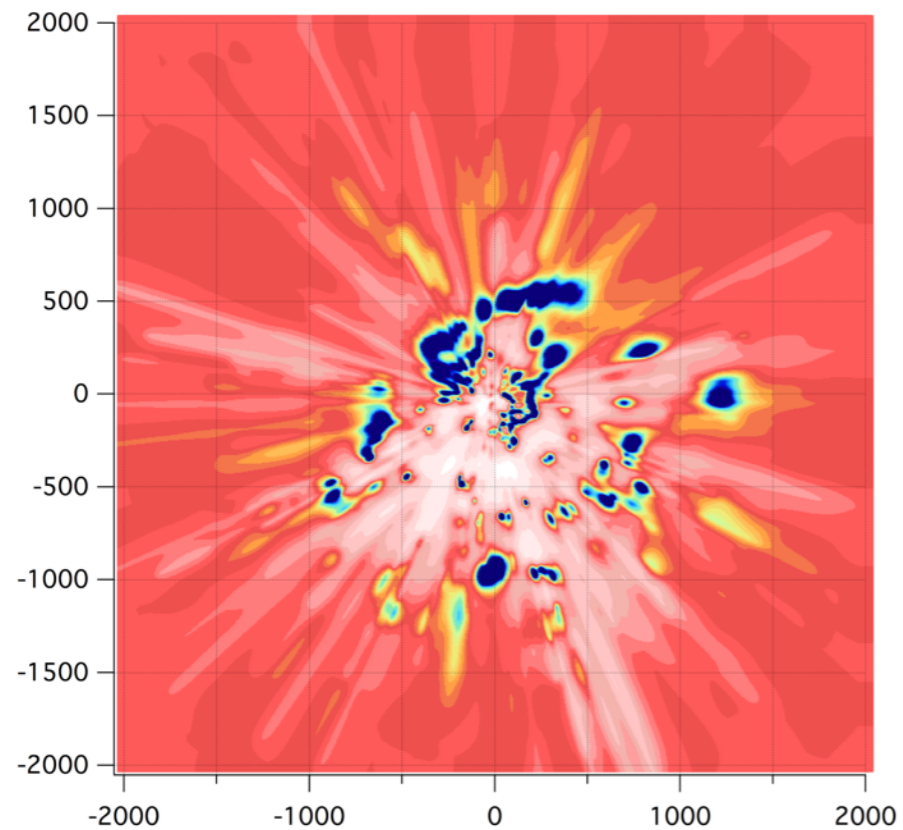
ne / Reddening

You can zoom on a region with the mouse



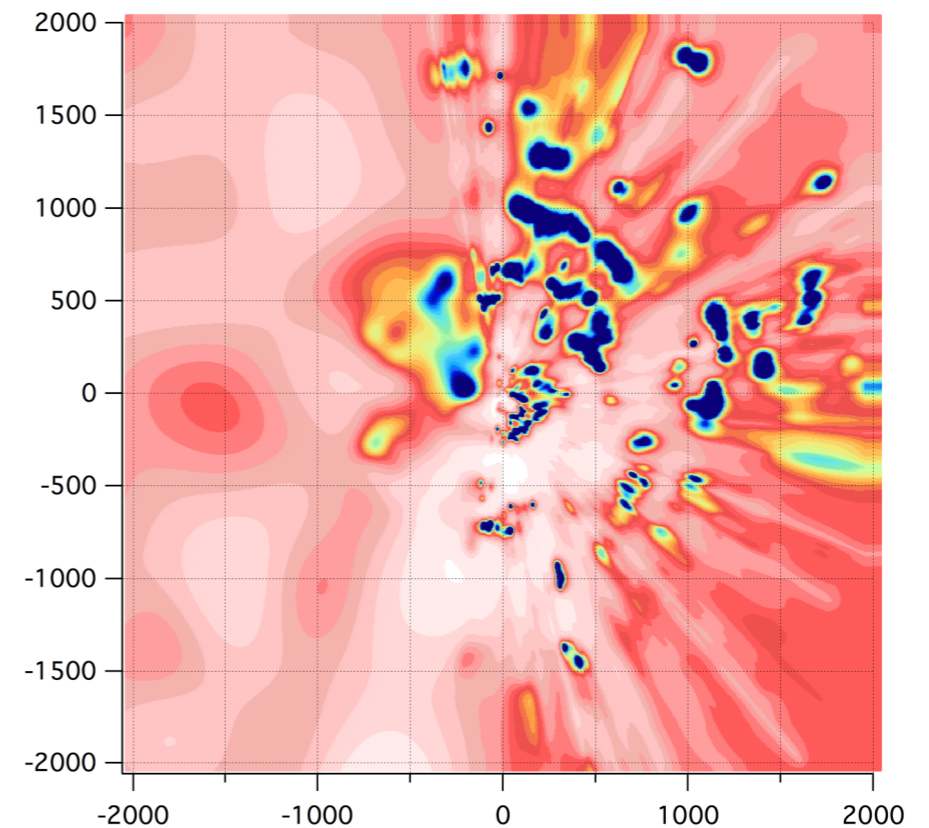
CONCLUSION

PRE-GAIA



POST:

- GAIA DISTANCES
- DIB APOGEE (WITH GAIA DISTANCES)
- PRIOR
- POST-GAIA APOGEE CALIBRATIONS (DR13 and 14)



POST:

- DR3 Gaia
- Control the time costs