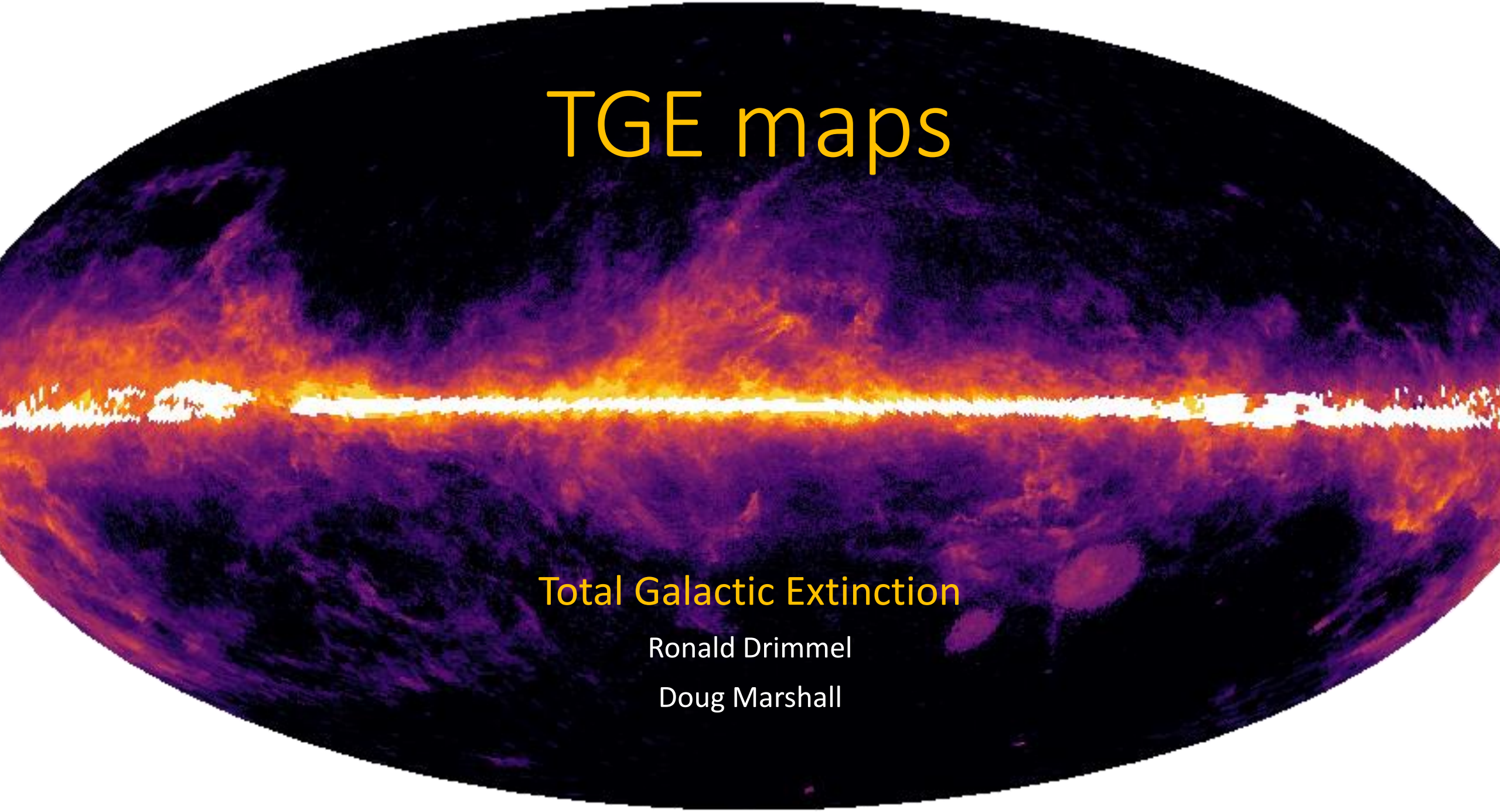
TGE maps



Total Galactic Extinction

Ronald Drimmel

Doug Marshall

Total Galactic Extinction map

- 2D extinction HEALPix map of A_0
- Tracers: giants outside the ISM layer (|Z| > 300 pc)
- A_0:
  - monochromatic extinction at 541.4 nm.
  - is a parameter in the adopted extinction law (Fitzpatrick 1999).
  - A_0 measures taken from GSP-Phot 'best' (*azero_gspphot*)
- TGE A_0 = Median A_0 of selected extinction tracers

Details: *link to paper*

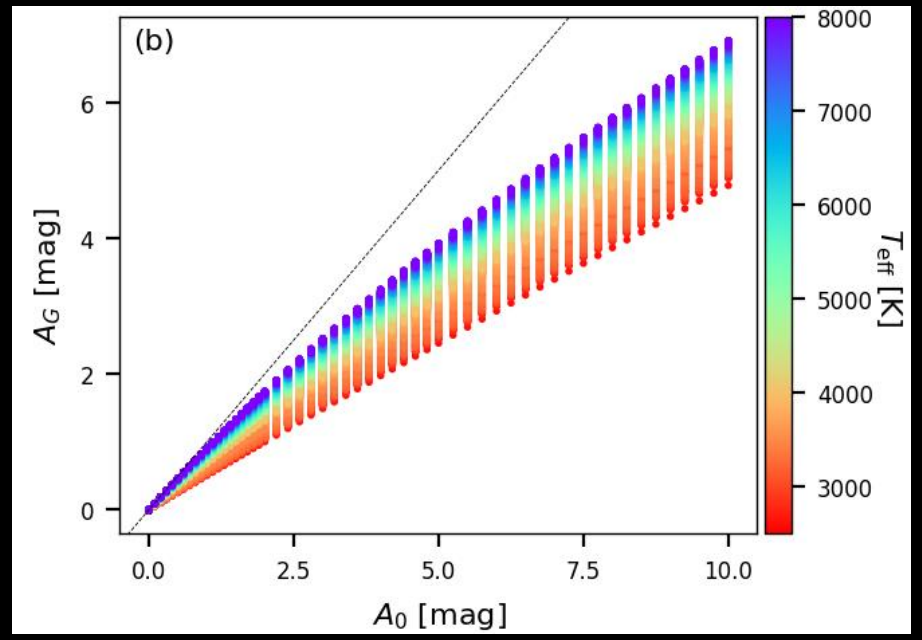
link to online documentation

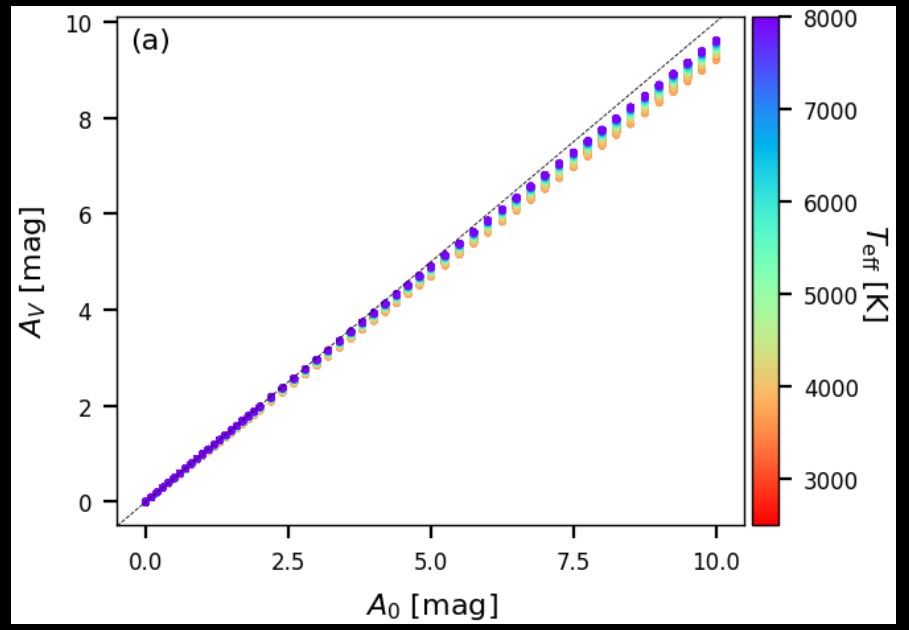
Why A_0

$$f(\lambda) = F(\lambda) \cdot 10^{-0.4A(\lambda)}$$

$$f_G = \int T_G(\lambda)\, f(\lambda)\, d\lambda$$

$$A_G = 2.5 \cdot \log(F_G / f_G)$$





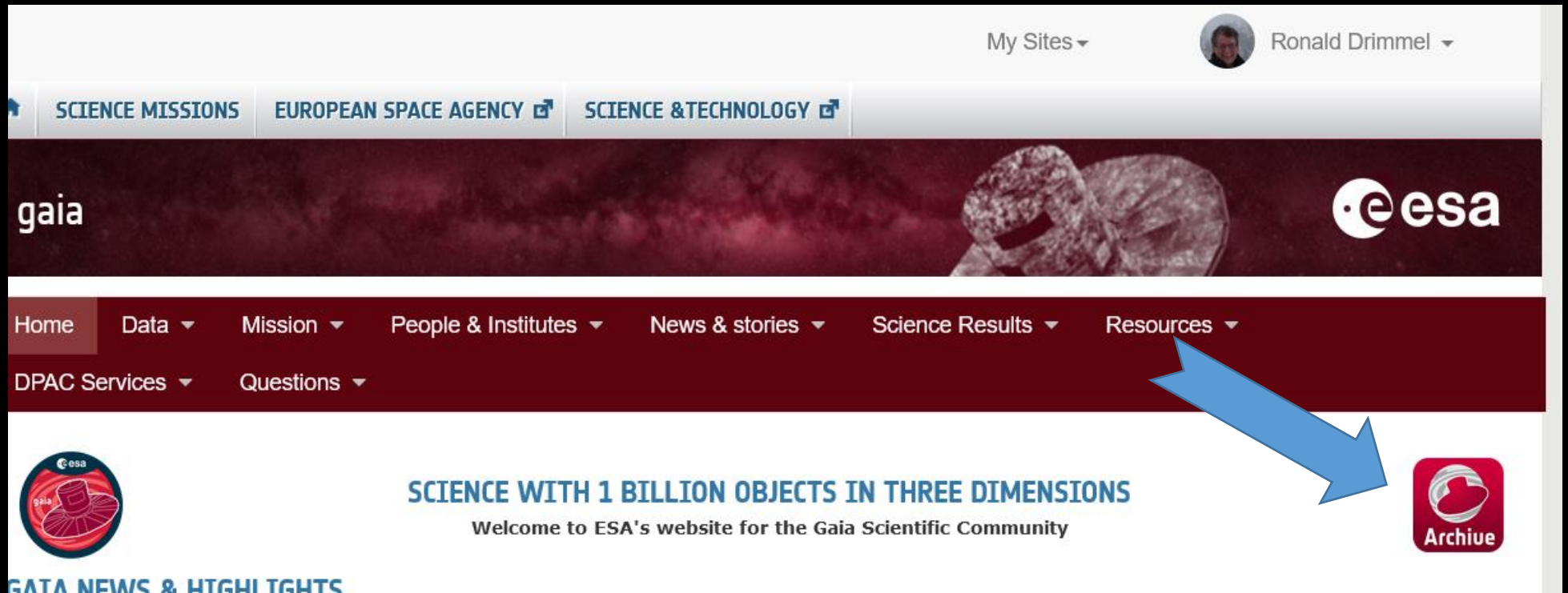
More info on extinction law is here.

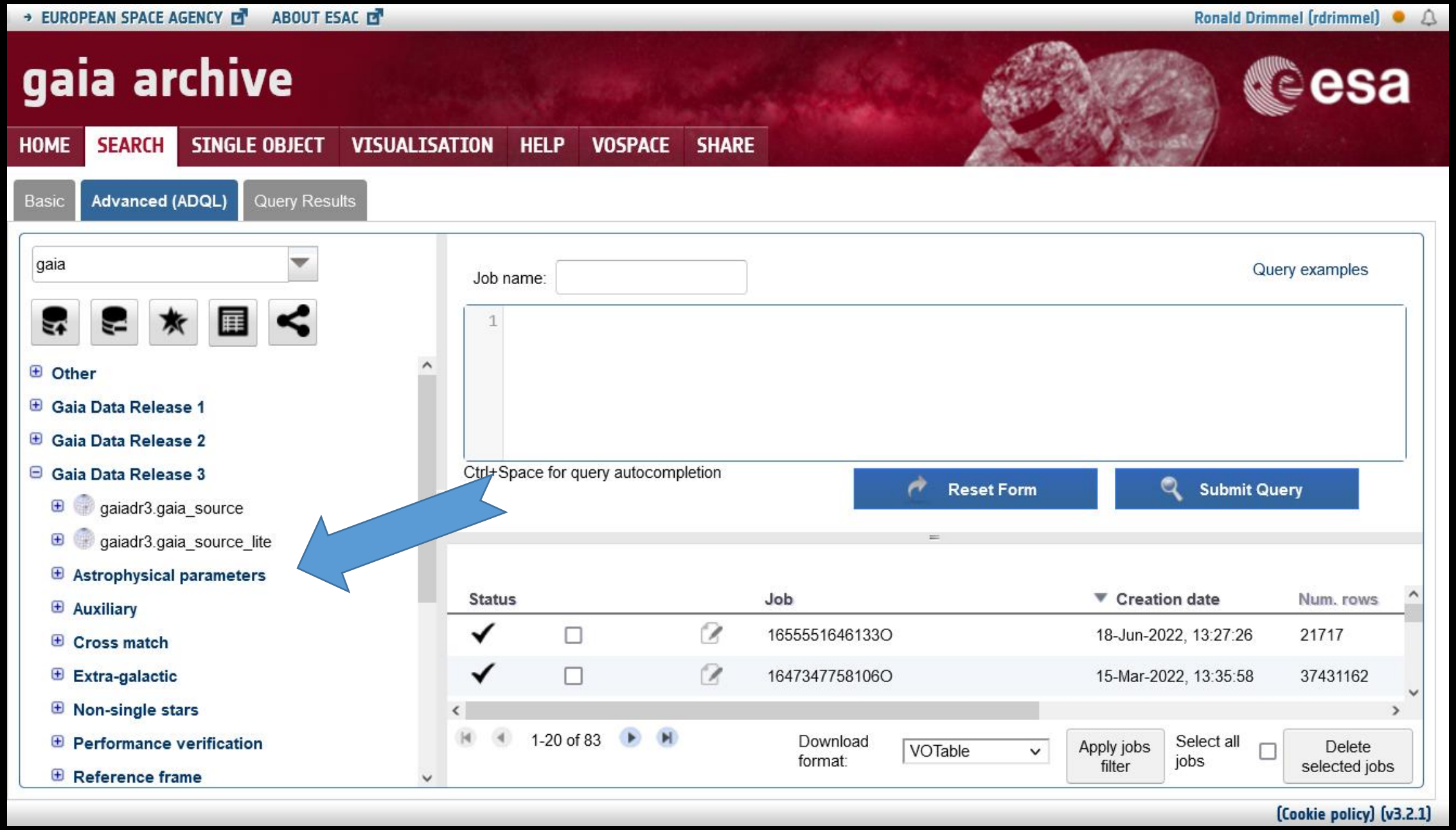
Where's the data?

Two tables:

1. total_galactic_extinction_map: map at four different resolutions
2. total_galactic_extinction_map_opt : map at HEALPix level 9 based on 'optimum' resolution

Archive…




EUROPEAN SPACE AGENCY
ABOUT ESAC
Ronald Drimmel (rdrimmel)
gaia archive
esa
HOME
SEARCH
SINGLE OBJECT
VISUALISATION
HELP
VOSPACE
SHARE
Basic
Advanced (ADQL)
Query Results
gaia
Other
Gaia Data Release 1
Gaia Data Release 2
Gaia Data Release 3
gaiadr3.gaia_source
gaiadr3.gaia_source_lite
Astrophysical parameters
Auxiliary
Cross match
Extra-galactic
Non-single stars
Performance verification
Reference frame
Job name:
Query examples
1
Ctrl+Space for query autocompletion
Reset Form
Submit Query
Status
Job
Creation date
Num. rows
1655551646133O
18-Jun-2022, 13:27:26
21717
1647347758106O
15-Mar-2022, 13:35:58
37431162
1-20 of 83
Download format:
VOTable
Apply jobs filter
Select all jobs
Delete selected jobs
(Cookie policy) (v3.2.1)

gaia archive

gaia

gaiadr3.gaia_source

gaiadr3.gaia_source_lite

Astrophysical parameters

gaiadr3.astrophysical_parameters

gaiadr3.astrophysical_parameters_supp

gaiadr3.oa_neuron_information

gaiadr3.oa_neuron_xp_spectra

gaiadr3.total_galactic_extinction_map

gaiadr3.total_galactic_extinction_map_opt

Auxiliary

Cross match

Extra-galactic

Non-single stars

Performance verification

Reference frame

Job name:

Query examples

```
1
```

Ctrl+Space for query autocompletion

Reset Form Submit Query

Status	Job	Creation date	Num. rows
✓	1655551646133O	18-Jun-2022, 13:27:26	21717
✓	1647347758106O	15-Mar-2022, 13:35:58	37431162
✓	Upload for job results: 1647339271662O	15-Mar-2022, 12:25:20	0
✓	1647339271662O	15-Mar-2022, 11:14:31	37738236

1-20 of 83

Download format: VOTable

Apply jobs filter

Select all jobs

Delete selected jobs

gaia archive

gaia

- gaiadr3.oa_neuron_information
- gaiadr3.oa_neuron_xp_spectra
- gaiadr3.total_galactic_extinction_map
  - solution_id
  - **healpix_id**
  - **healpix_level**
  - a0
  - a0_uncertainty
  - a0_min
  - a0_max
  - num_tracers_used
  - optimum_hpx_flag
  - status
- gaiadr3.total_galactic_extinction_map_opt

Auxiliary

Cross match

Job name:

Query examples

```
1
```

Ctrl+Space for query autocompletion

Reset Form Submit Query

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✓	1647339271662O	15-Mar-2022, 11:14:31	37738236

1-20 of 83

Download format: VOTable

Apply jobs filter

Select all jobs

Delete selected jobs

total_galactic_extinction_map

4 maps at 4 different resolutions: HEALPix levels 6 – 9.

One line per HEALPix:

Columns:

healpix_id : HEALPix index

healpix_level : which HEALPix level the HEALPix

a0 : median A0 of the extenction tracers

a0_uncertainty : uncertainty of the mean A0

a0_min, a0_max: min/max A0 values of tracers

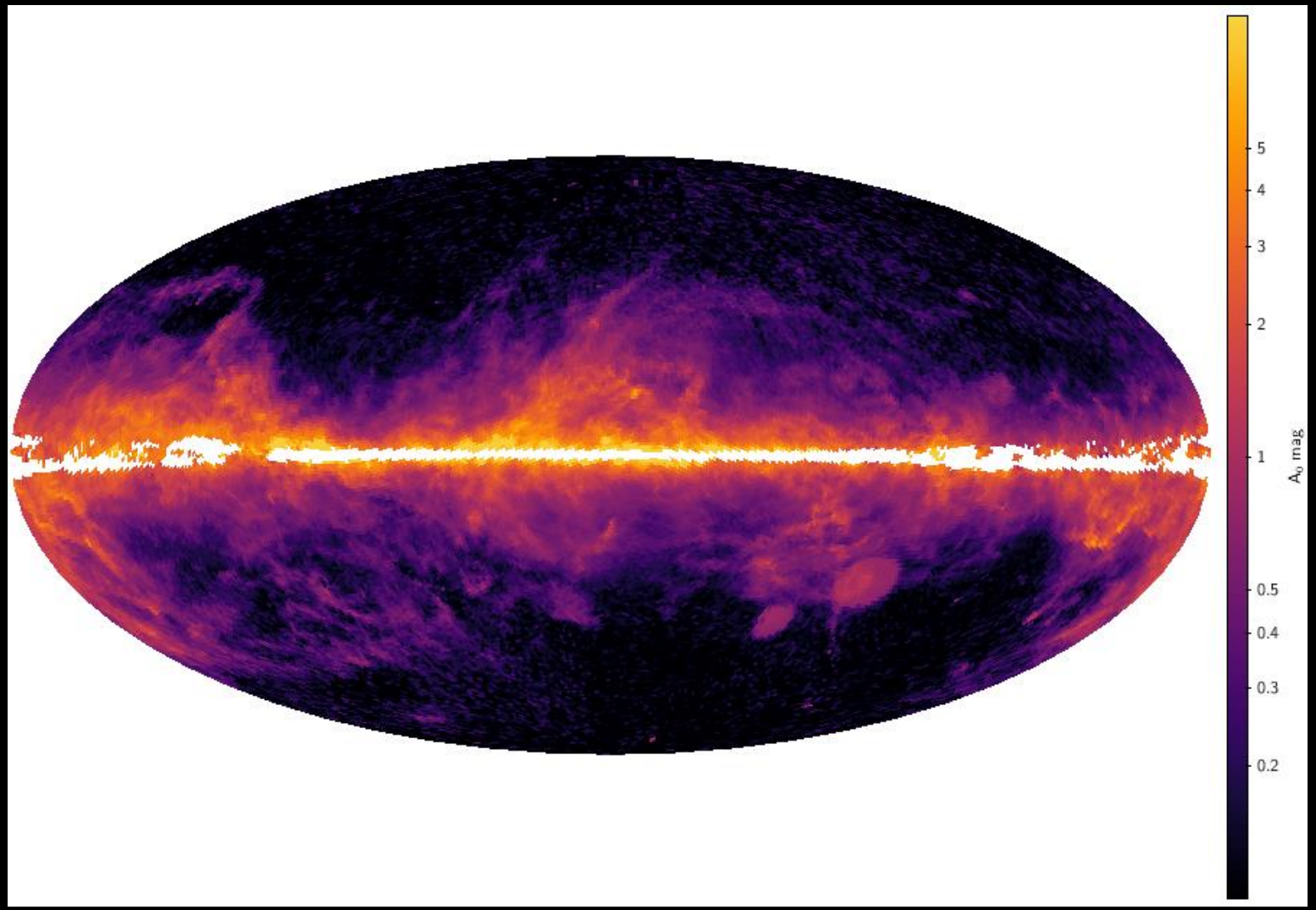
num_tracers_used: number of tracers used

optimum_hpx_flag: Healpix is optimum (highest resolution with at least 10 tracers)

status: flag = 0 if there is an a0, > 0 if a0 is null.

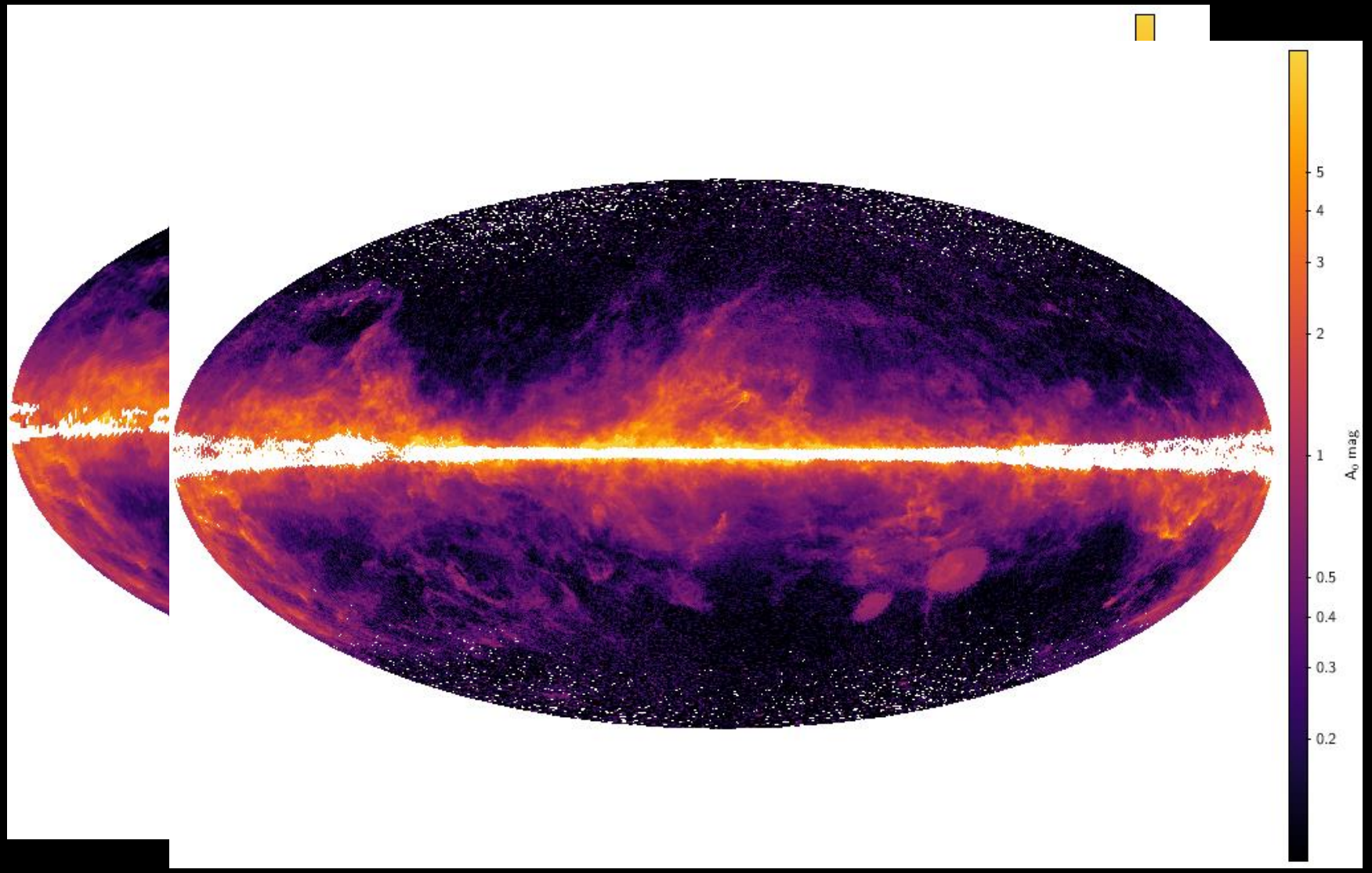
TGE maps at different resolutions

Level 6



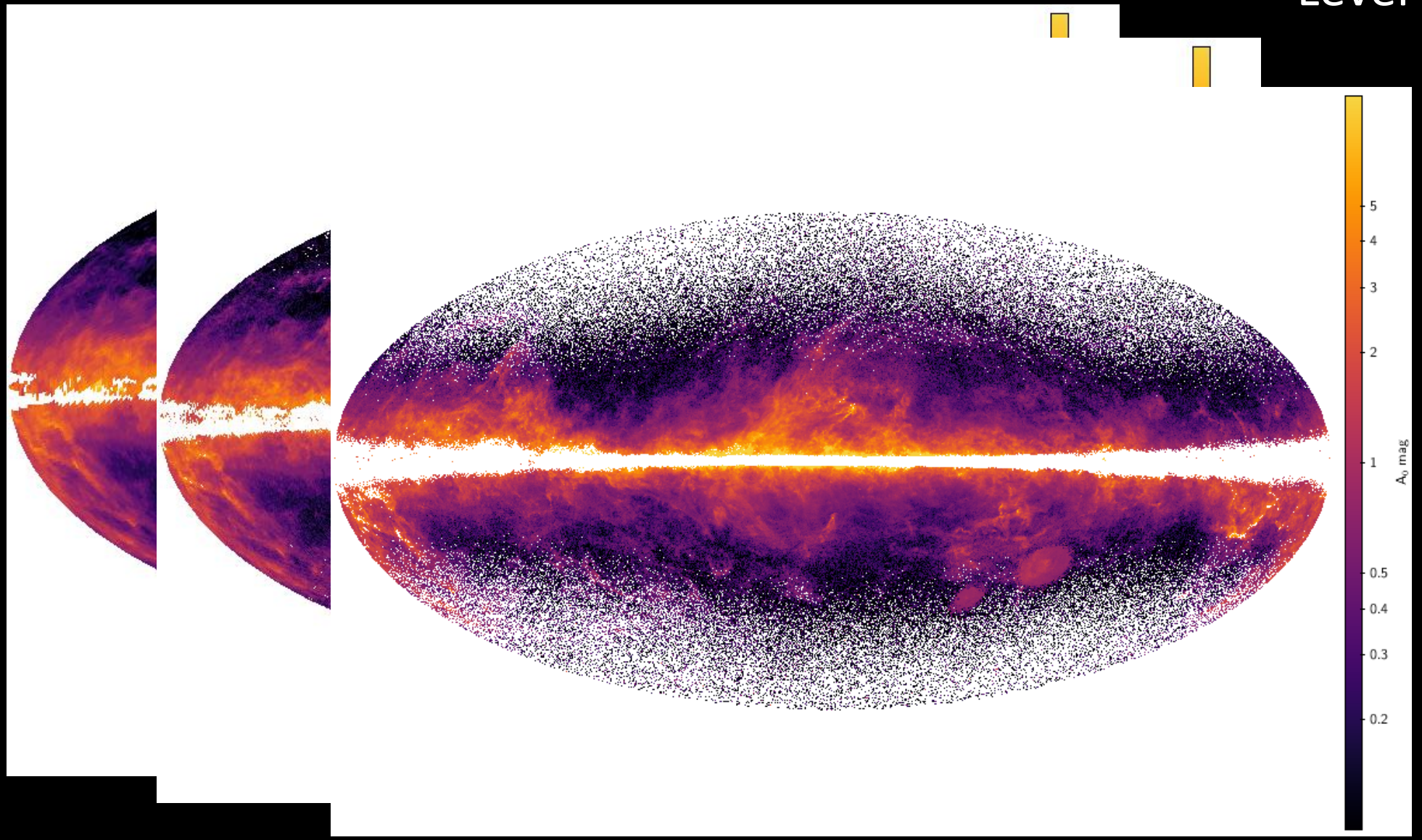
TGE maps at different resolutions

Level 7



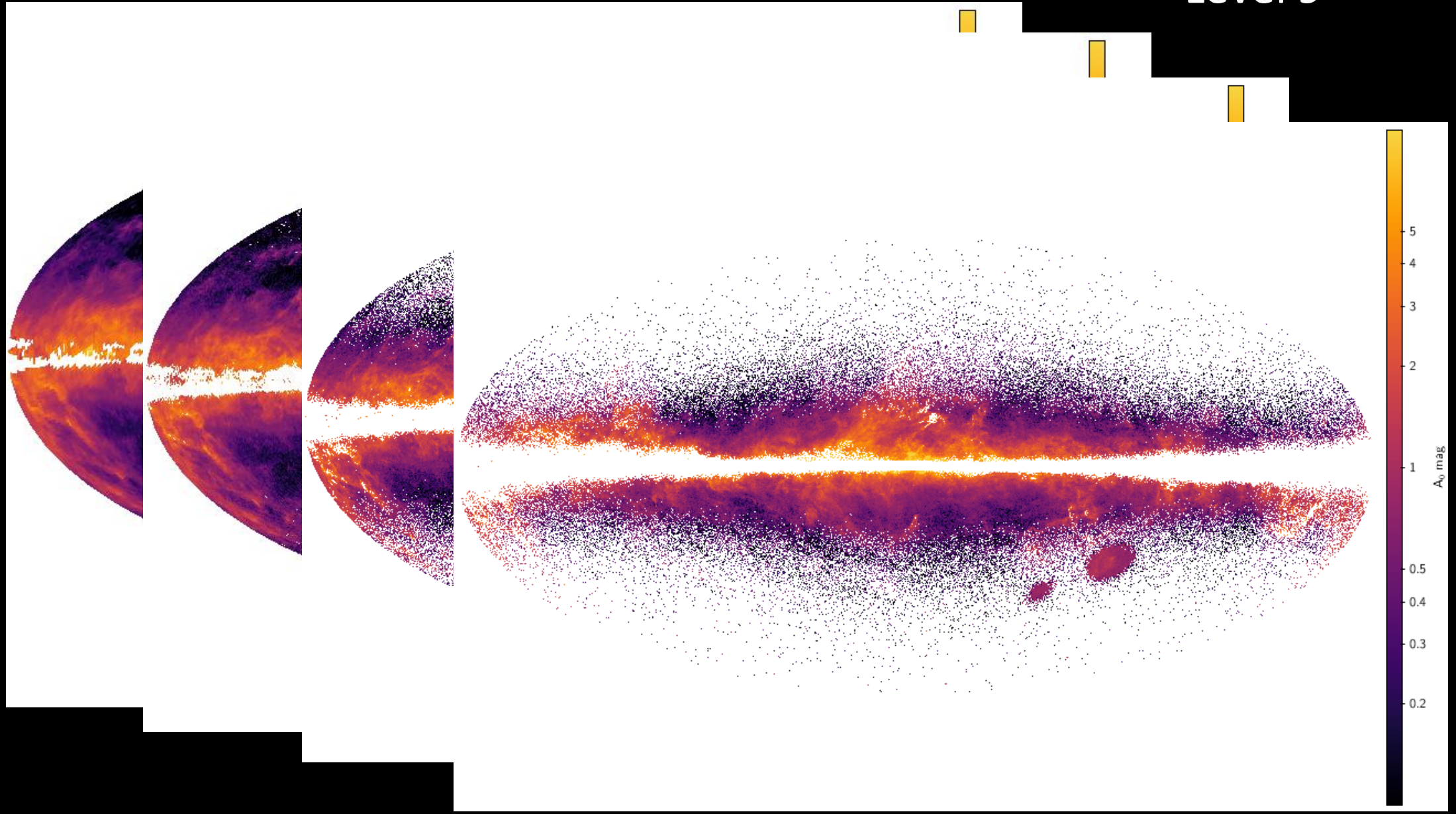
TGE maps at different resolutions

Level 8



TGE maps at different resolutions

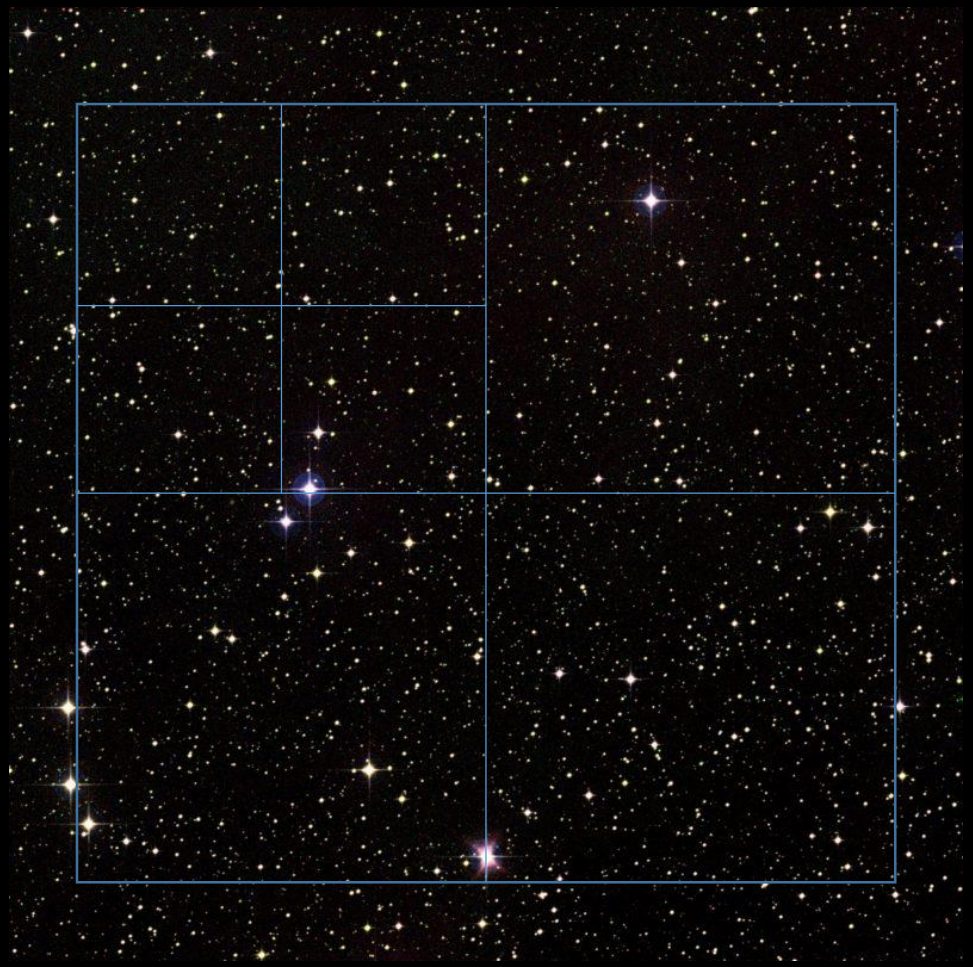
Level 9



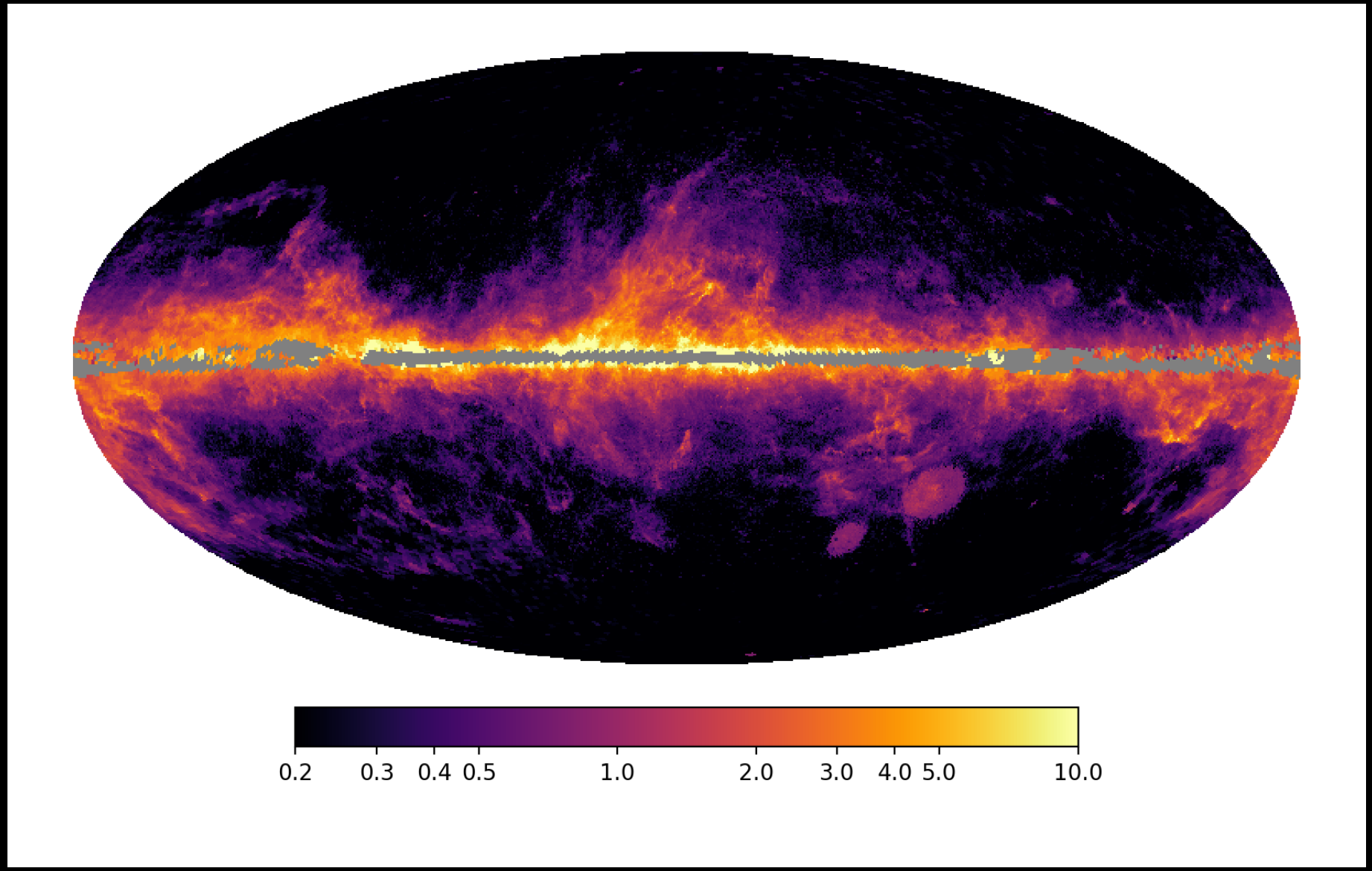
total_galactic_extinction_map_opt

Map at ‘optimum’ resolution: smallest pixel with at least 10 tracers.

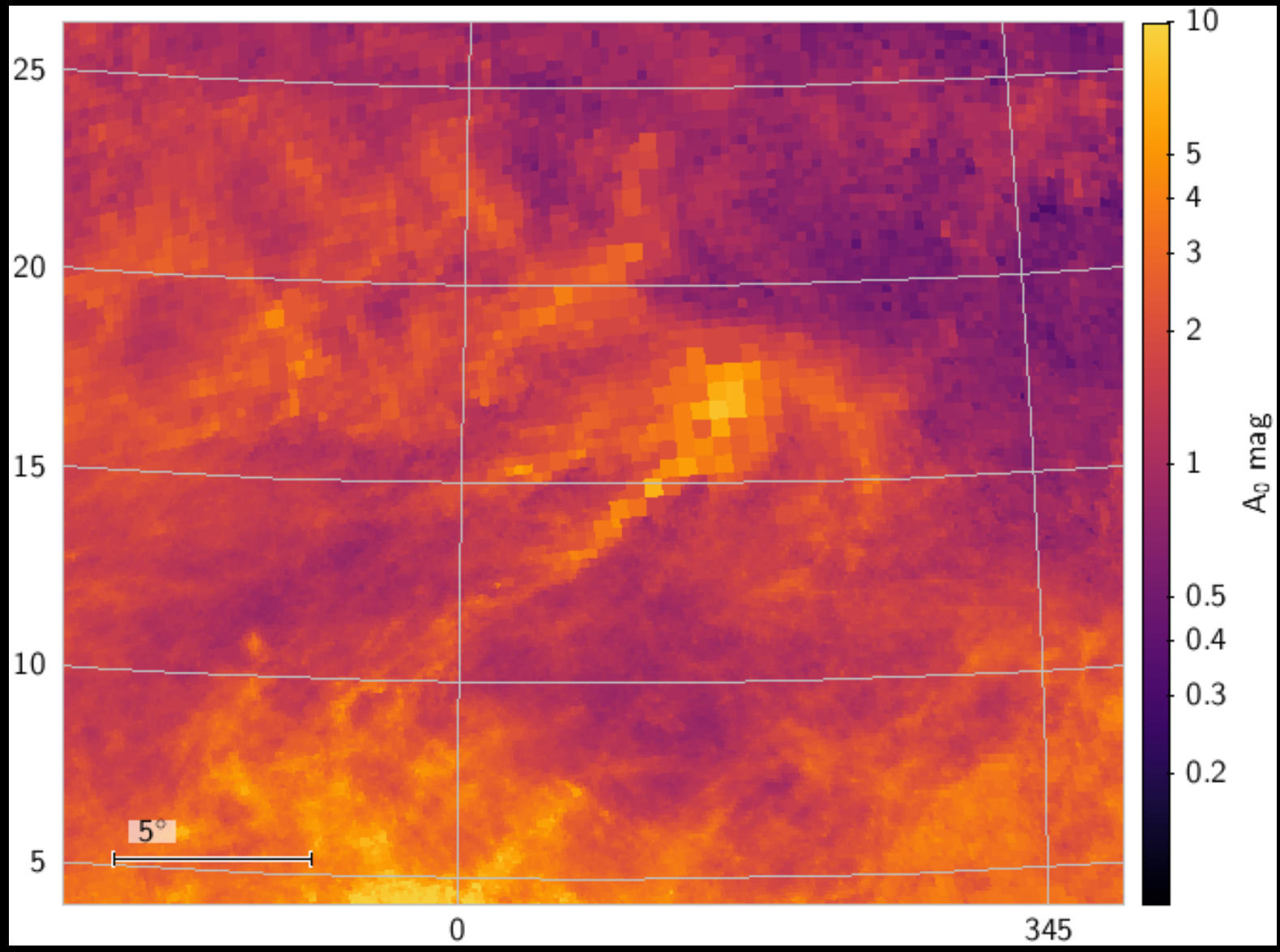
Healpix level 9: each pixel populated with values from the subset of optimum HEALPixes.



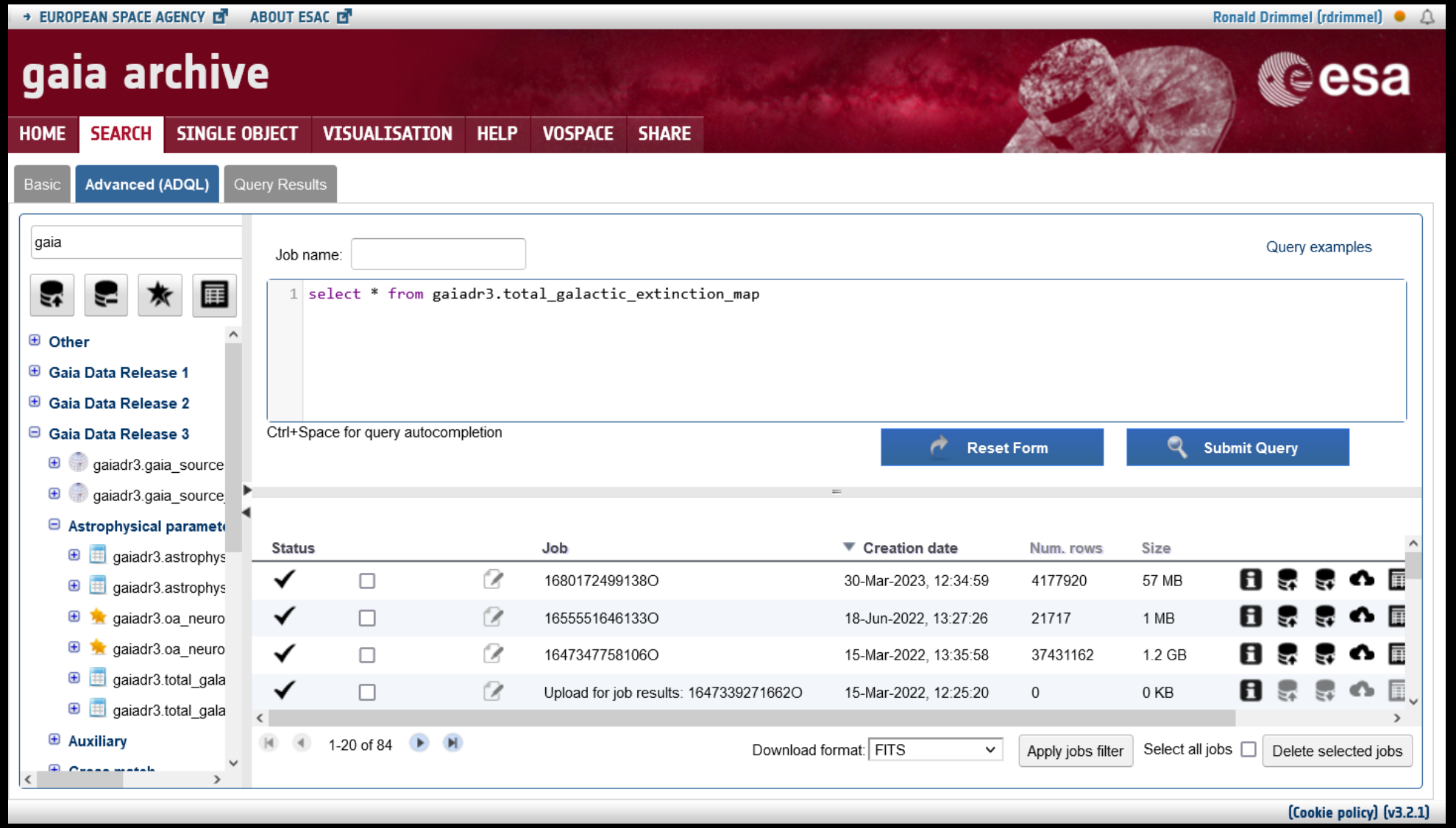
total_galactic_extinction_map_opt



Zoom in of optimum map

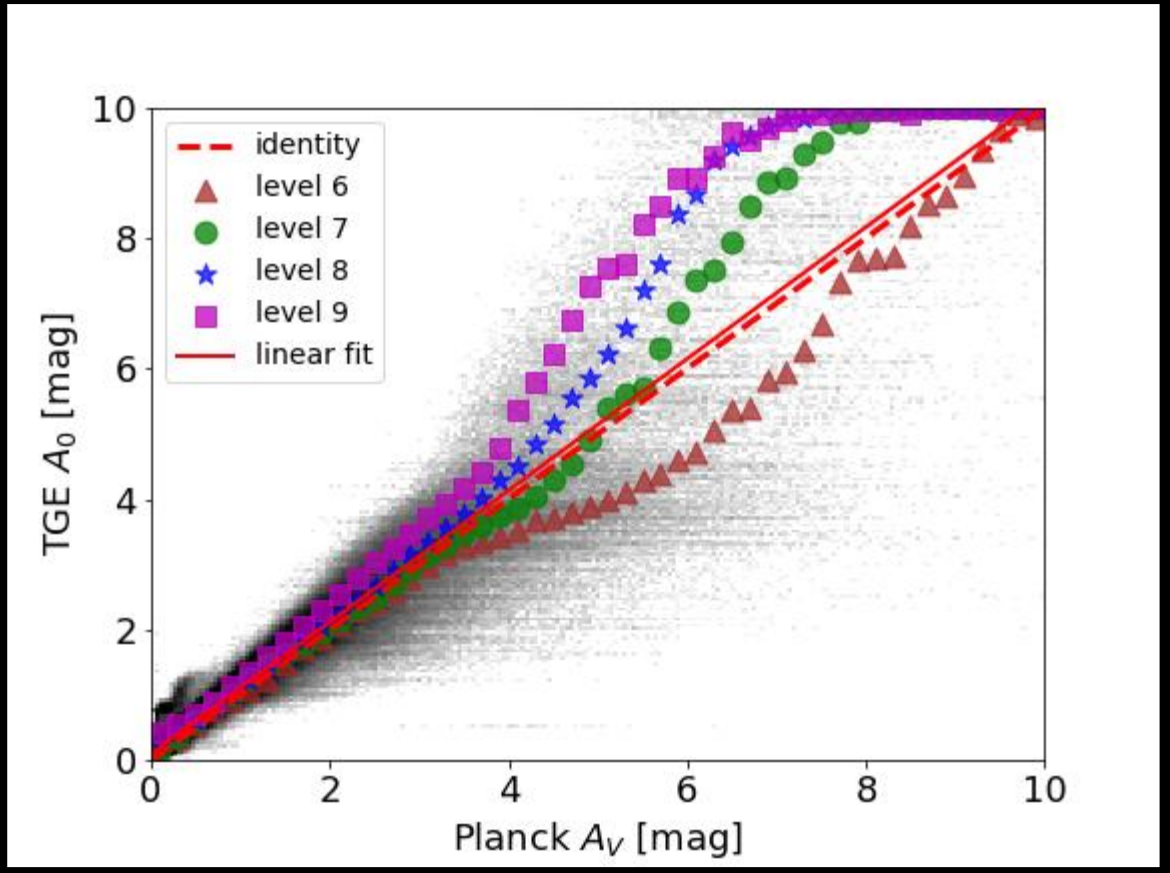


How to download



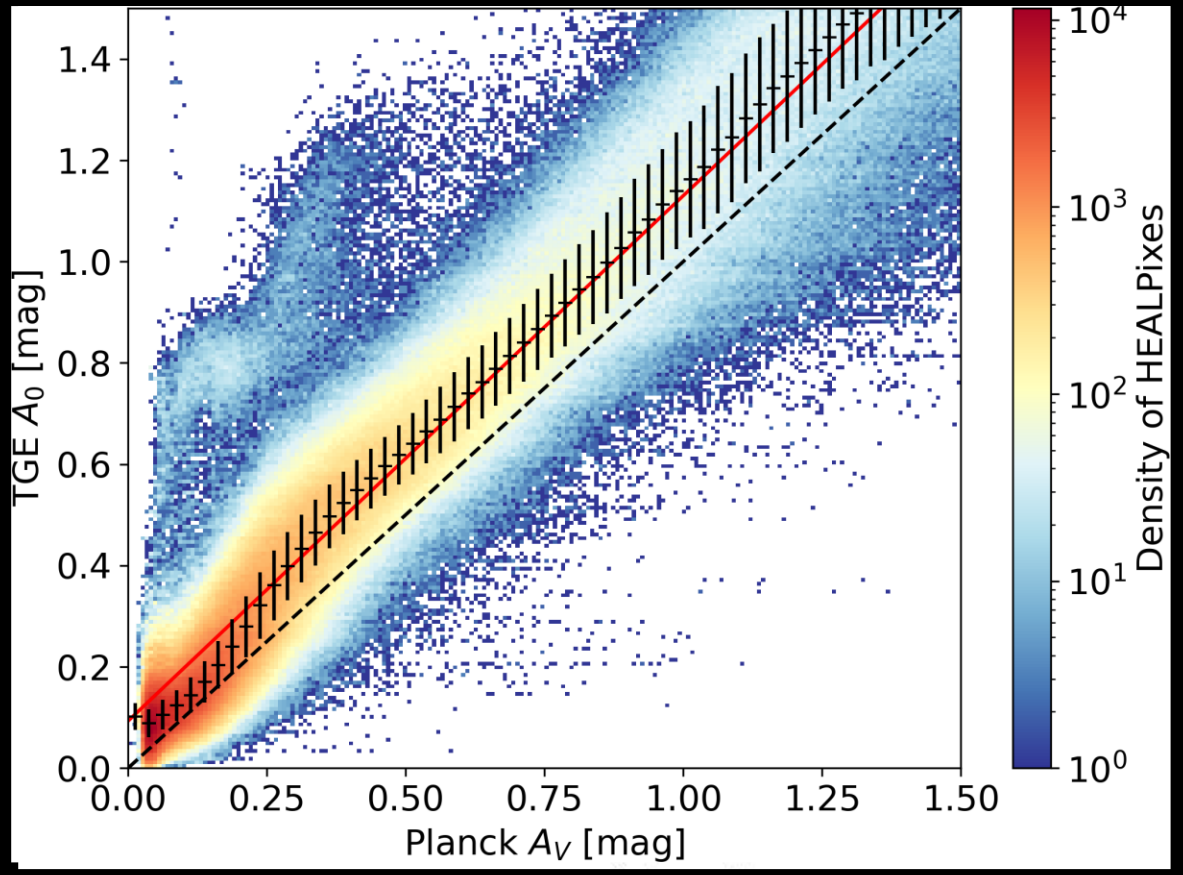
Caveats..

- Small offset of 0.09 mag with respect to Planck A_V .



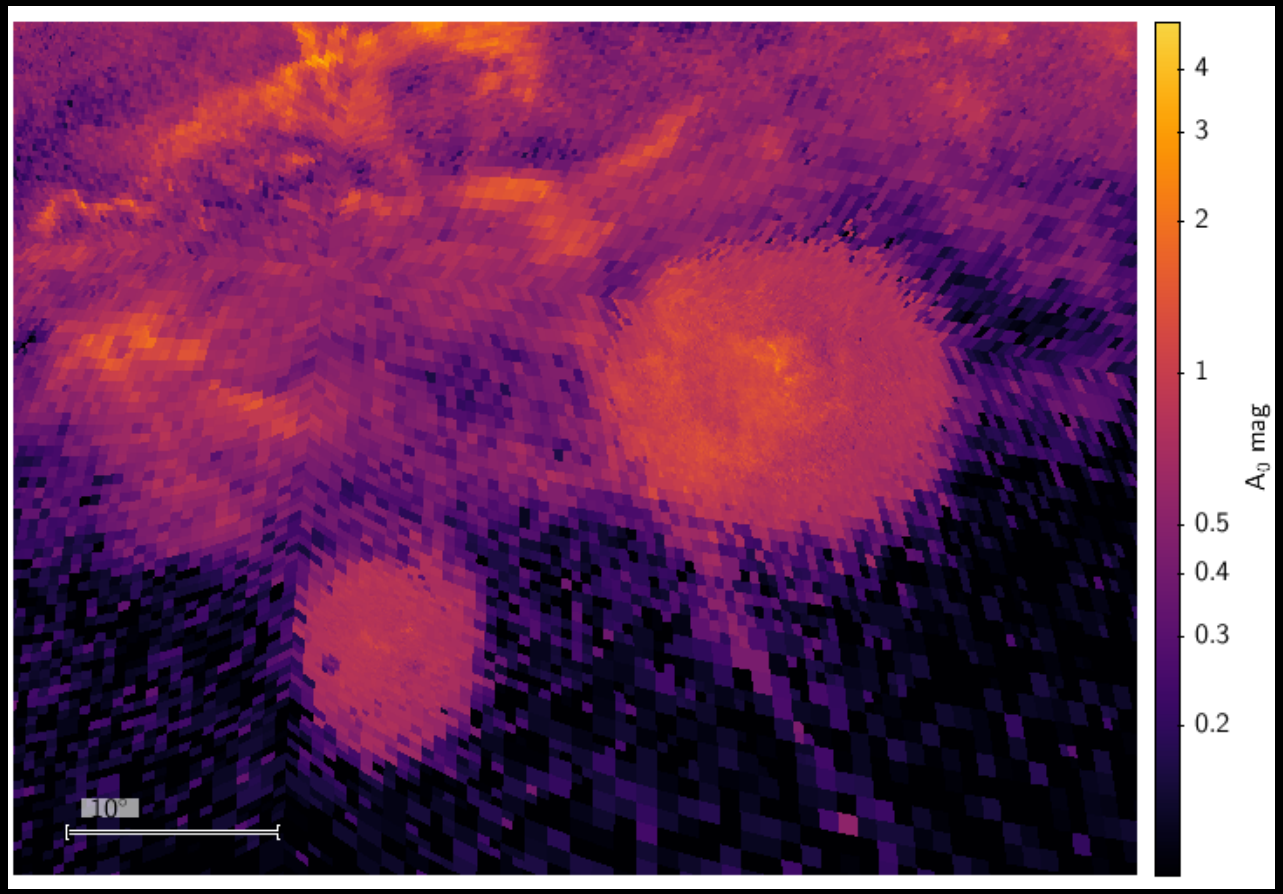
Caveats..

- Small offset of 0.09 mag with respect to Planck A_V .



Caveats..

- Small offset of 0.09 mag with respect to Planck A_V .
- A_0 values biased toward LMC and SMC on order of 0.6mag.
- TGE map should not be used for $|b| < 5°$
- $A_0 < 10$ mag



Online tools..

- Presented by Doug Marshall. See accompanying Jupyter notebook.