TOASTing Your Images With The Montage Image Mosaic Engine

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http://montage.ipac.caltech.edu

https://github.com/Caltech-IPAC/Montage

What Is Montage?

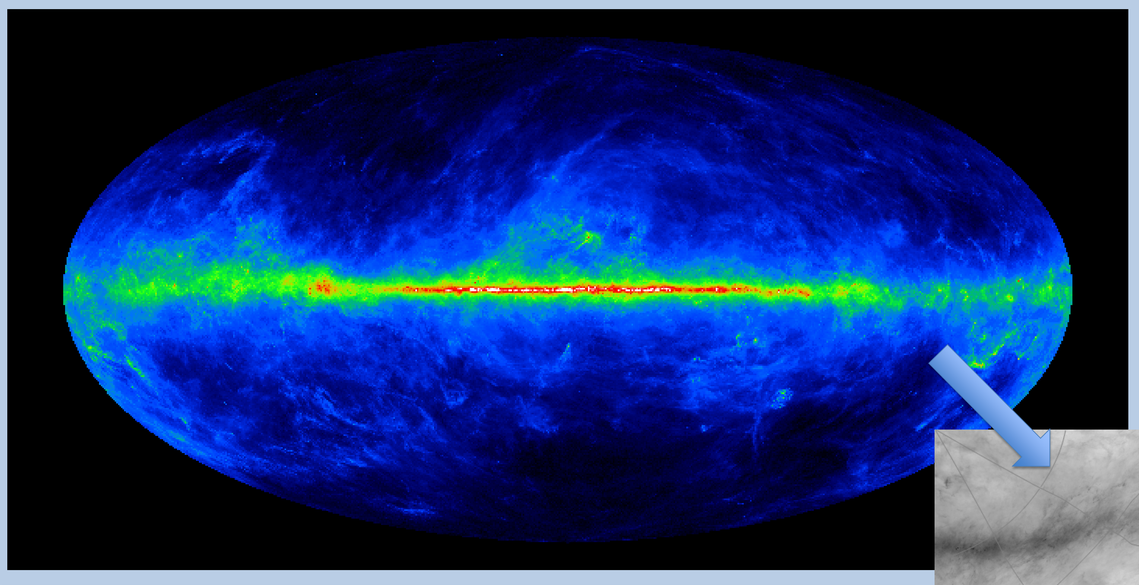
Portable and Sustainable Image Mosaic Toolkit

- Science-grade toolkit written in ANSI-C for portability.
- Scalable: runs on desktops and high-performance platforms.
- Cited in 38 published peer-reviewed papers (2016).
- Version 5.0 released in December 2016, with BSD 3-clause license.
- Version 5.0 provides support for HEALPIX data and for consumption of images by the WorldWide Telescope (WWT).

Displaying Images in the WWT with Montage

- WWT consumes PNG or JPEG files organized and named to conform to the TOAST sky-tessellation scheme, but astronomers work with FITS files in WCS-supported projections.
- Montage treats TOAST as another FITS projection; users need not know the details .
- Montage transforms FITS files to the TOAST projection, and has custom routines to organize TOAST files for display in the WWT.

Displaying An All-Sky Planck Map in the WorldWide Telescope



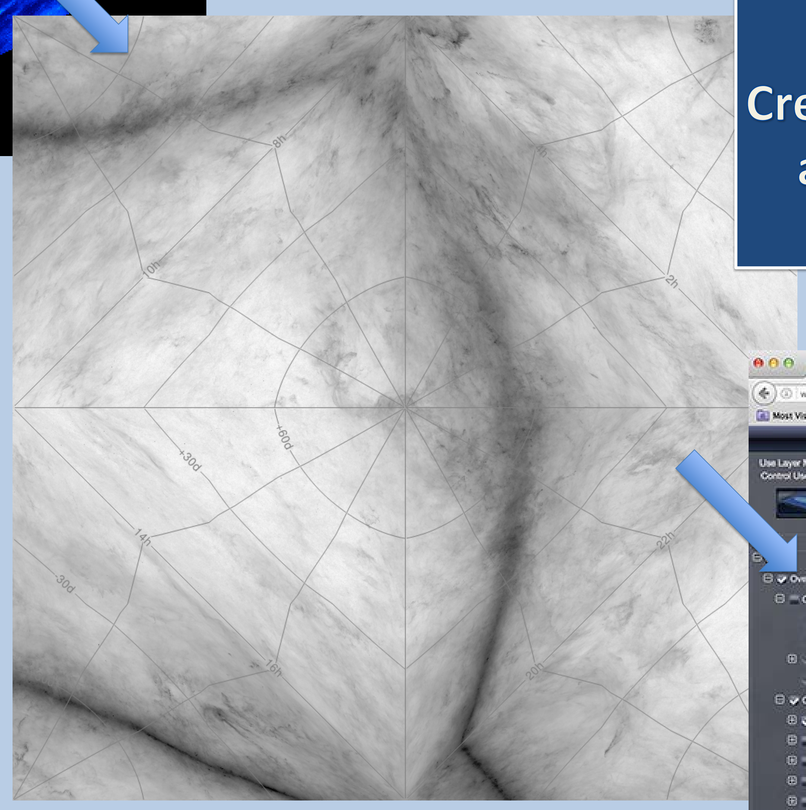
Step 1: Start with a Planck image at 857 GHz in Aitoff projection, transformed from HEALPix with Montage. Transform the Aitoff image to the TOAST sky-tessellation scheme used by WWT.

During step 1, Montage automatically creates FITS headers to manage the TOAST projection.

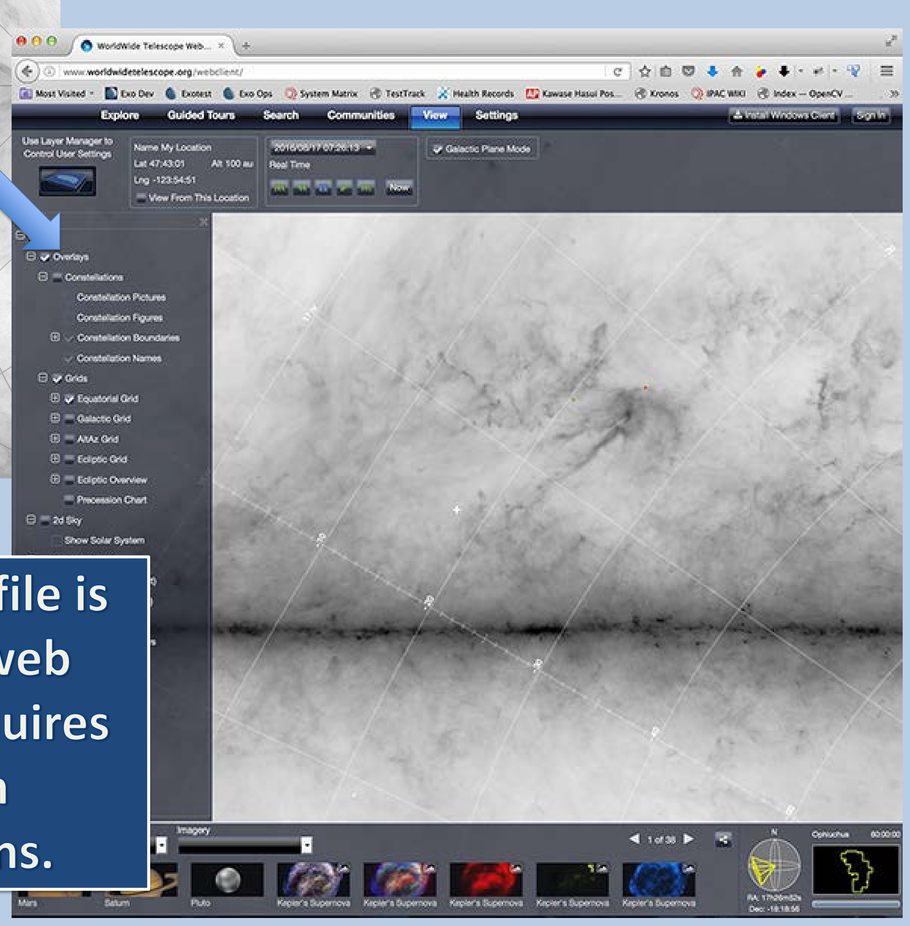
TOAST Files are always 256x256 pixels

```
SIMPLE  =                    T
BITPIX  =                  -64
NAXIS   =                    2
NAXIS1  =                  256 / All WWT tiles are
NAXIS2  =                  256 / 256x256 pixels.
CTYPE1  = 'RA---TOA'
CTYPE2  = 'DEC--TOA'
CRPIX1  =             -3072.50
CRPIX2  =             -1536.50
PV2_1   =                    5 / HTM level for this tile.
XTILE   =                   12 / X and Y tile indices
YTILE   =                    6
CDELT1  =                 1.00 / The rest of the header
CDELT2  =                 1.00 / is really just boilerplate.
CRVAL1  =                   0. / Don't let the values get
CRVAL2  =                   0. / modified as it might affect
PC1_1   =                 1.00 / proper processing.
PC1_2   =                 0.00
PC2_1   =                 0.00
PC2_2   =                 1.00
END
```

CRPIX values represent pixel offset from first pixel in file and edge of untiled image at indexing level



Step 2: Prepare the TOAST file for WWT consumption: Create PNG files that are organized and named according to WWT specifications.



Step 3: The Planck input file is rendered in the WWT web viewer. Consumption requires that input files are in URL-accessible locations.

Try the WWT tutorial at http://montage.ipac.caltech.edu/docs/WWT/

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