# NExScI Interferometry tools: getCal and VMT

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# Overview

- NExScI has maintained tools from PTI and developed tools for KI

- The tools most relevant to other interferometers are:

  - getCal: observation planning and calibrator selection

  - VMT (visibility modeling tool): calculation of visibilities (and other quantities) using real array parameters for geometric and user supplied source configurations
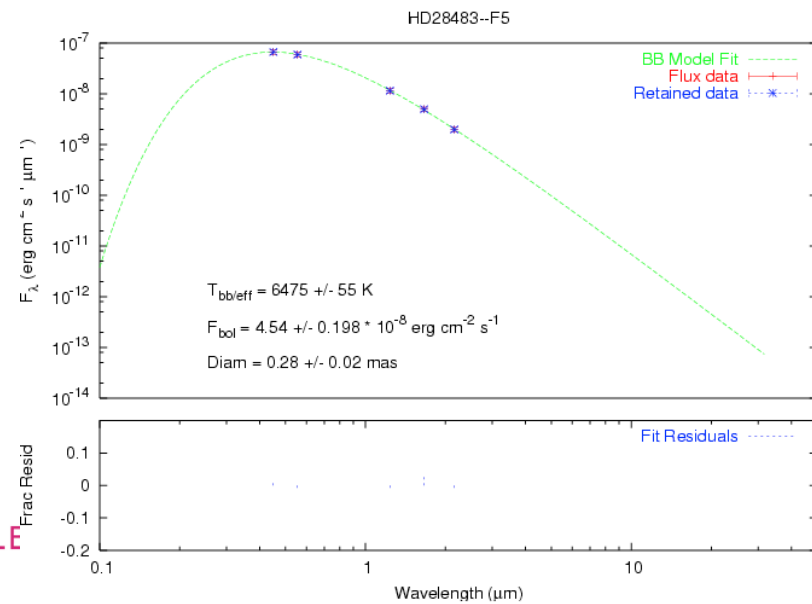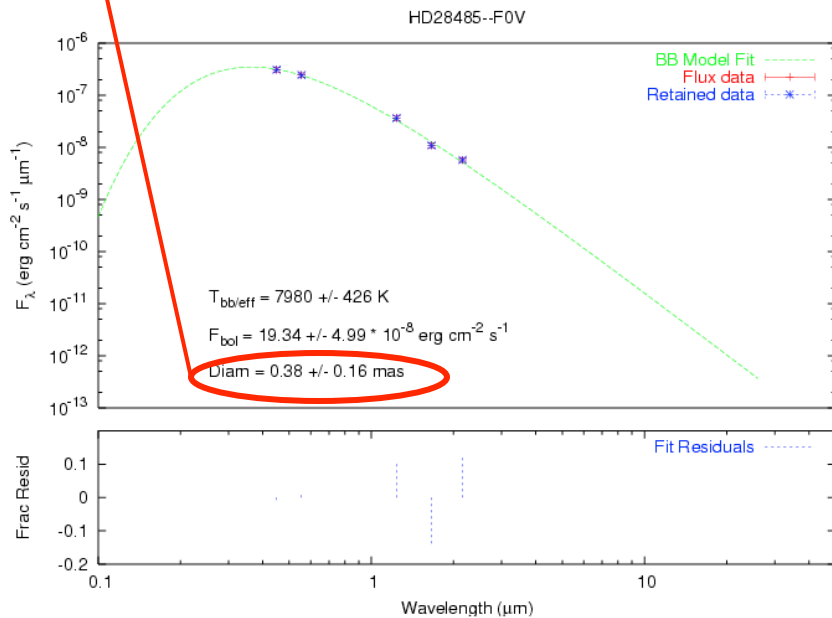
# getCal

- Extracts potential visibility calibrators from Hipparcos according to geometric and astrophysical criteria (e.g. brightness, luminosity class, estimated angular diameter)

- Estimates calibrator angular diameters by a variety of methods, including bolometric flux/ effective temperature methods based on spectrophotometry retrieved from Simbad.

- Computes both temporal and calendar target and calibrator accessibility (zenith angle and delay) restrictions for user-defined observation locations and/or baselines.

- Generates displays of target (list) timings, and runs in real-time against a nightly observing list, displaying LST and sunset/sunrise indicators.

- Generates displays of target (list) calendar accessibilities.

- Displays u-v tracks limited by delay and zenith-angle restrictions on user-selectable target and baselines. Also runs in real time to provide current u-v and relative geometry information.


- Online version: http://nexsciweb.ipac.caltech.edu/gcWeb/gcWeb.jsp

# getCal calibrator searches

- Currently uses Hipparcos catalogs as basis
    - Multiplicity/astrometry annex info automatically returned
    - Can include bolometric flux fitting for all potential calibrators

```
# HIP 20995 (HD 28485) has his multiple component flag set to C
#   the C designation indicates solutions were found for individual components
#     2 components:
#     A component -- V= 5.748
#     B component -- V= 8.265 at sep 1.65 arcsec/PA  18 deg
# Simbad Search HD28485: HD 28485 -- Double or multiple star   F0V V=5.552
HD28485 04 30 08.598 +15 38 16.226  0.112 -0.024 5.6 4.9  0.32 SPECTYP=F0V... DIAM=0.4 DIAMERR=0.2 ROLE=CAL CALFOR=t_tau D=4.4
# Simbad Search HD28483: HD 28483 -- High proper-motion Star   F5 V=7.10
HD28483 04 30 17.972 +19 50 26.073  0.101 -0.028 7.1 5.9  0.47 SPECTYP=F6V DIAM=0.2 DIAMERR=0.1 ROLE=CAL CALFOR=t_tau D=2.0
```

# Current getCal Development

- ## getCal 2.11:
  - ### Access to NOMAD catalog for installed version
    - Catalog compiled by USNO with astrometric and photometric data for about 1.1 billion stars derived from the Hipparcos, Tycho-2, UCAC2, Yellow-Blue 6, and USNO-B catalogs for astrometry and optical photometry, supplemented by 2MASS near-infrared photometry.
    - We have constructed a subset catalog of sources with good VJHK photometry
      - No external queries needed
    - 45M objects with histogram peaking at K=13-14
    - Available late spring
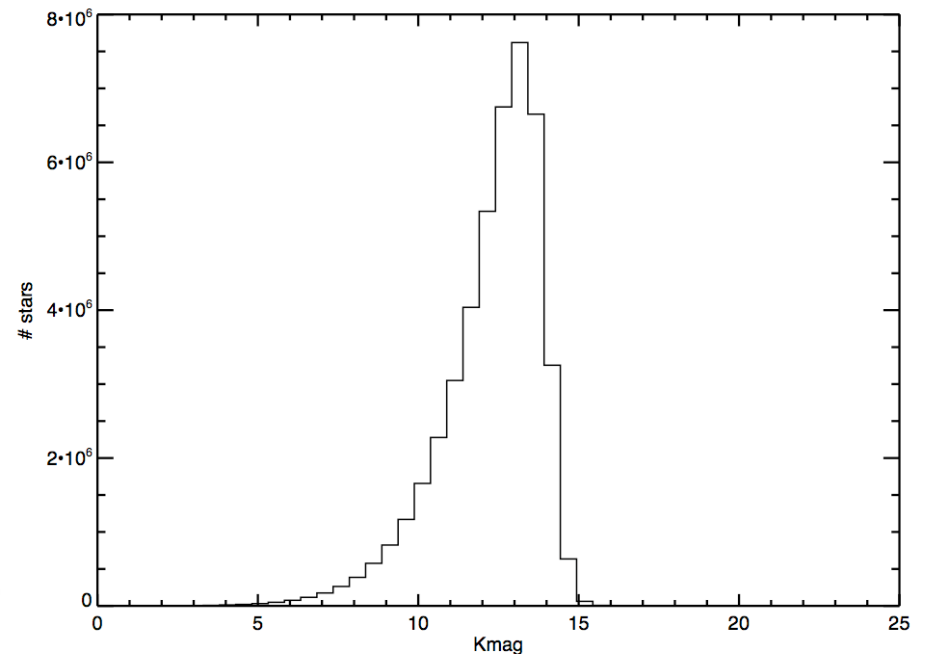
# VMT

- VMT performs visibility amplitude predictions
  - Geometrical models constructed as combinations of elementary morphologies (point source, uniform disk or ring, and Gaussian)
  - Arbitrary brightness uploaded as a FITS image.
- Data in the OI-FITS standard can be uploaded and plotted alongside the VMT simulations.
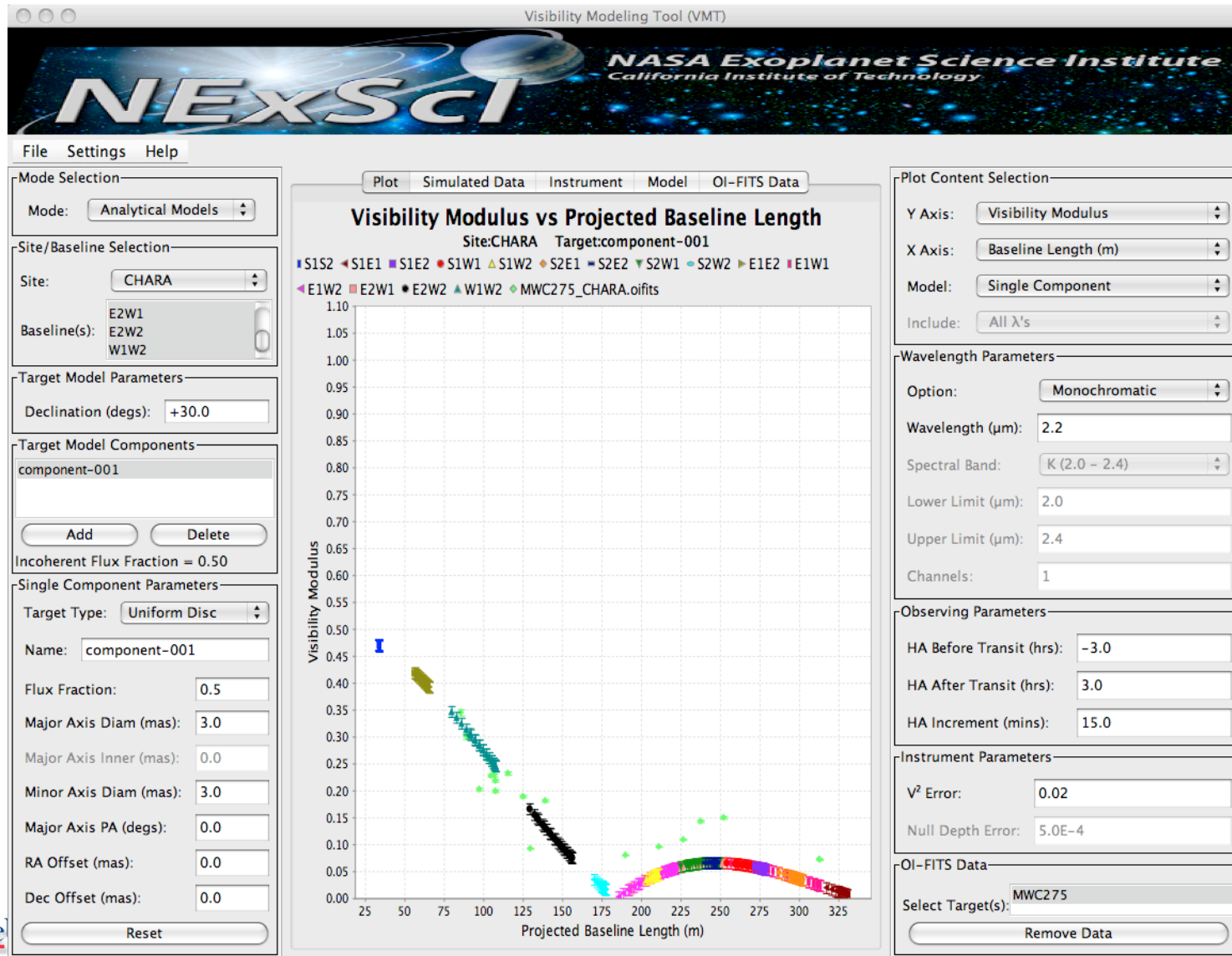- Can run online or download java file
  - http://nexsciweb.ipac.caltech.edu/vmt/vmtWeb/
  - http://nexsciweb.ipac.caltech.edu/software/

# VMT example: resolved source
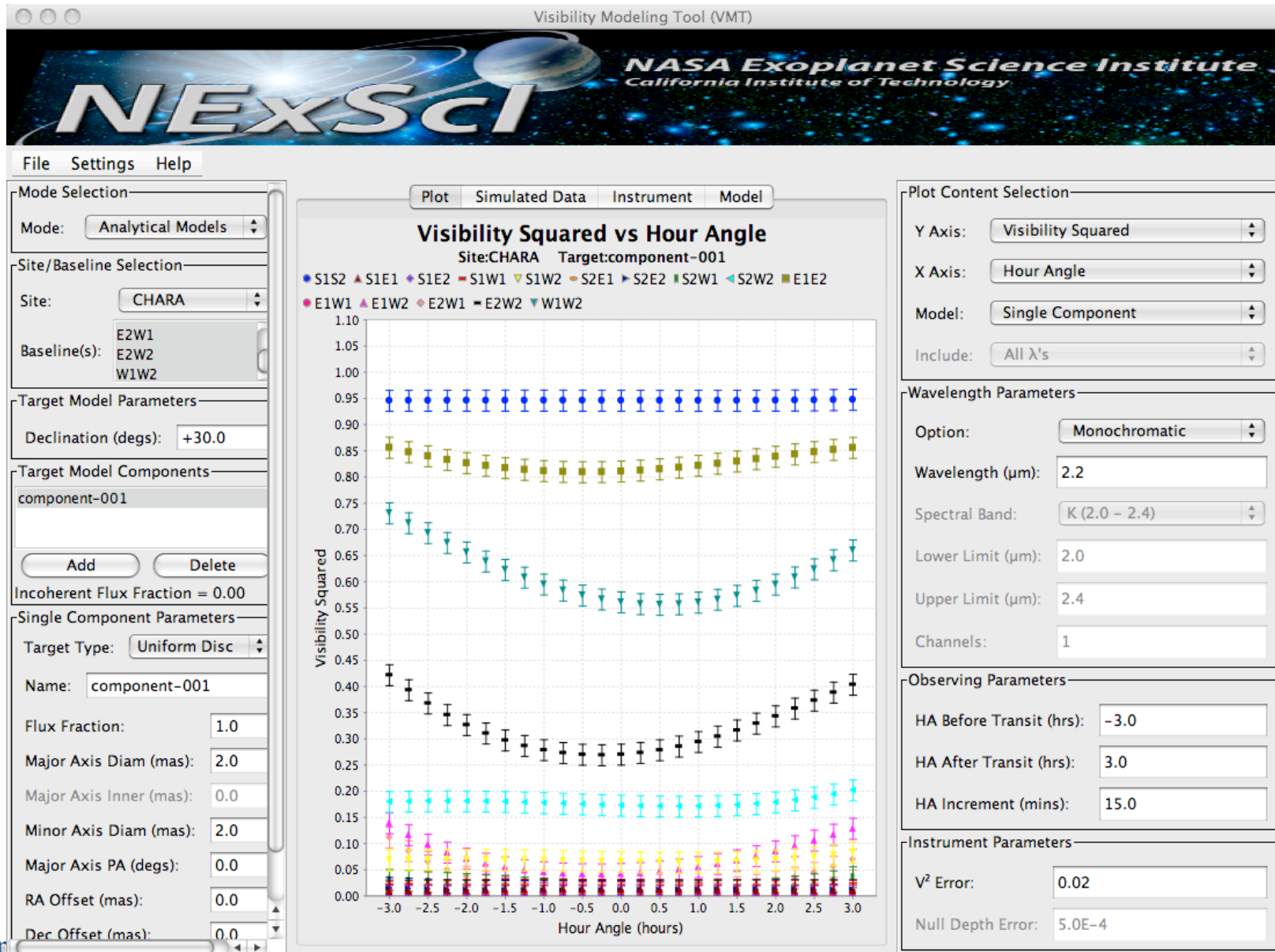
# VMT Example: input data

# VMT example: input image

# Future Development

- getCal 2.12/gcWeb 2.0:
    - Access to NOMAD in web version of getCal, uniform treatment of all stars i.e. implement SB relations for ang. Diameter estimates.
    - Available by late summer

- VMT
    - Add support for phases
        - Requested by several users.
    - Considering various options for funding support