ESO / VLTI-Expertise Centres meeting
2019/12/04 - Garching

JMMC *Tools & Services*

Gilles Duvert,
Laurent Bourgès, Guillaume Mella

JMMC = MOIO + SUV services

The Jean-Marie Mariotti Center is the French Center for Infrared & Optical Interferometry:

- MOIO service: Software & Service provider
  - R&D network (4 sites ~ 20 scientists)
  - Services are « *VO* » compliant & interoperable
- SUV service: French VLTI Center
  - Support center: face-to-face help to reduce data, perform data analysis
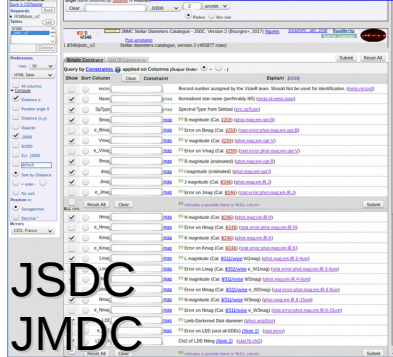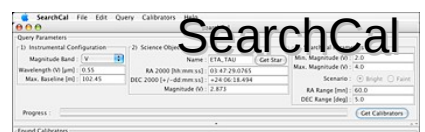 - Training network
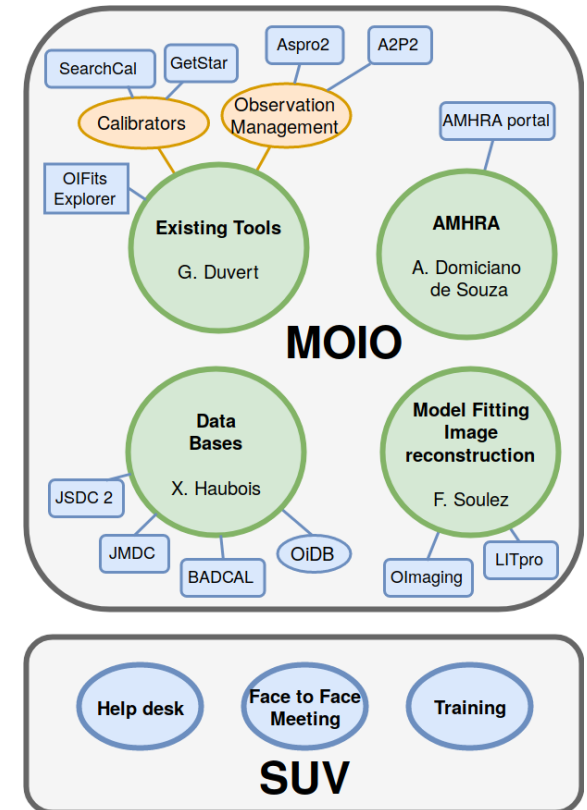
Service overview

VLTI

CHARA
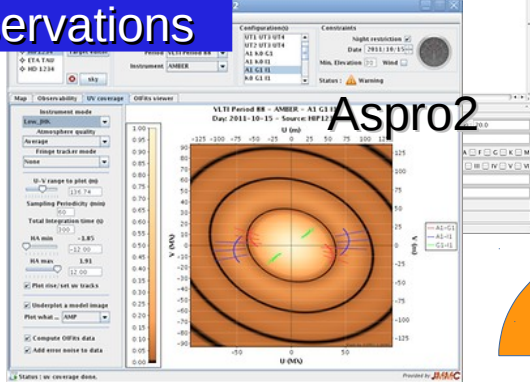
+ Training

+ User Support

SearchCal

Reduce data | amdlib pndrs

JMMC

Prepare Observations

View Data

Aspro2

OIFits Explorer

CDS Catalogs
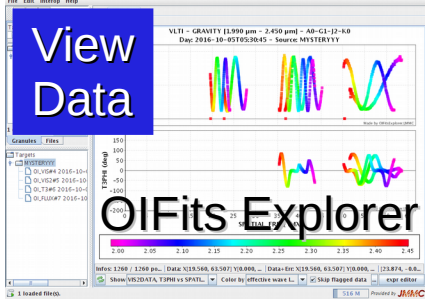
Fit Models

LITPro
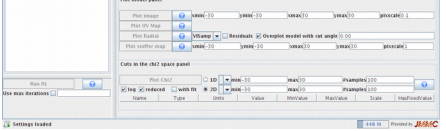
OiDB

Reconstruct Images

JSDC JMDC

L0 to L3 DataBases

OImaging

ESO
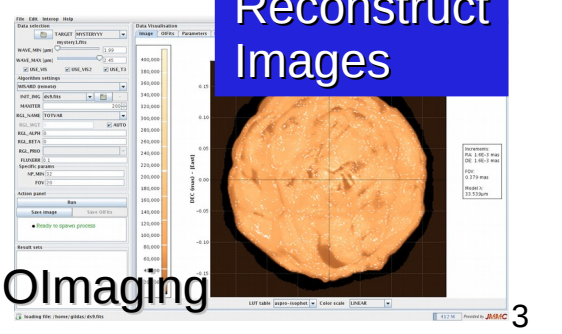
# ASPRO2: **A**stronomical **S**oftware to **PR**epare **O**bservations

Complete observation preparation tool for VLTI / CHARA (all instruments)

- Estimates observation feasibility (proposal preparation)

- Simulates data sets with proper noise modeling in OIFITS format

- Feeds directly OBs to ESO p2: use A2P2

- Handles & shares your large source lists, helps night scheduling
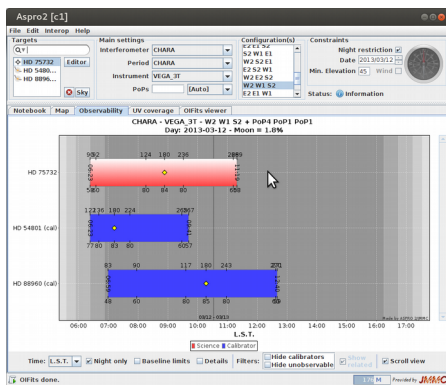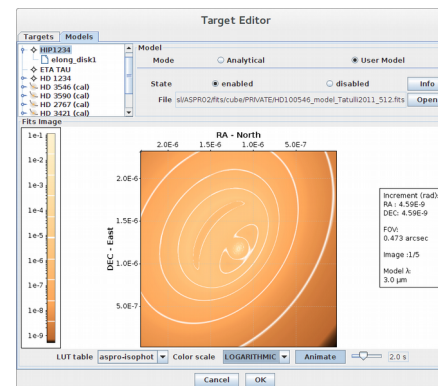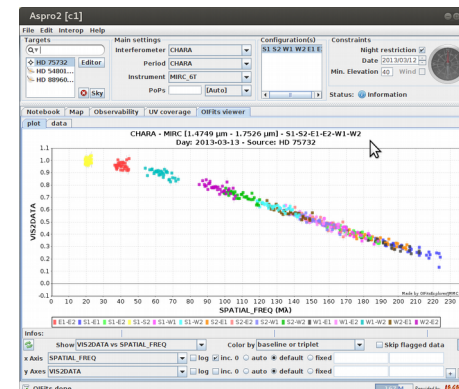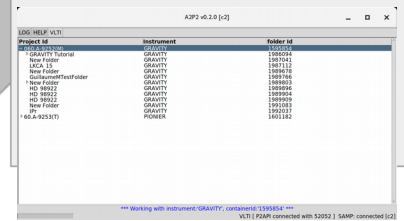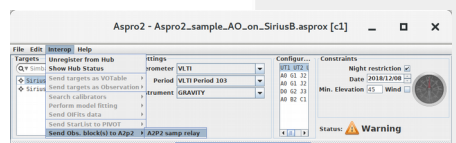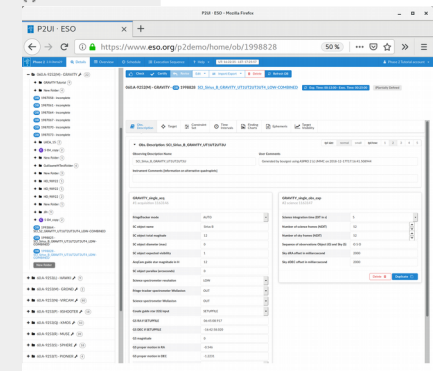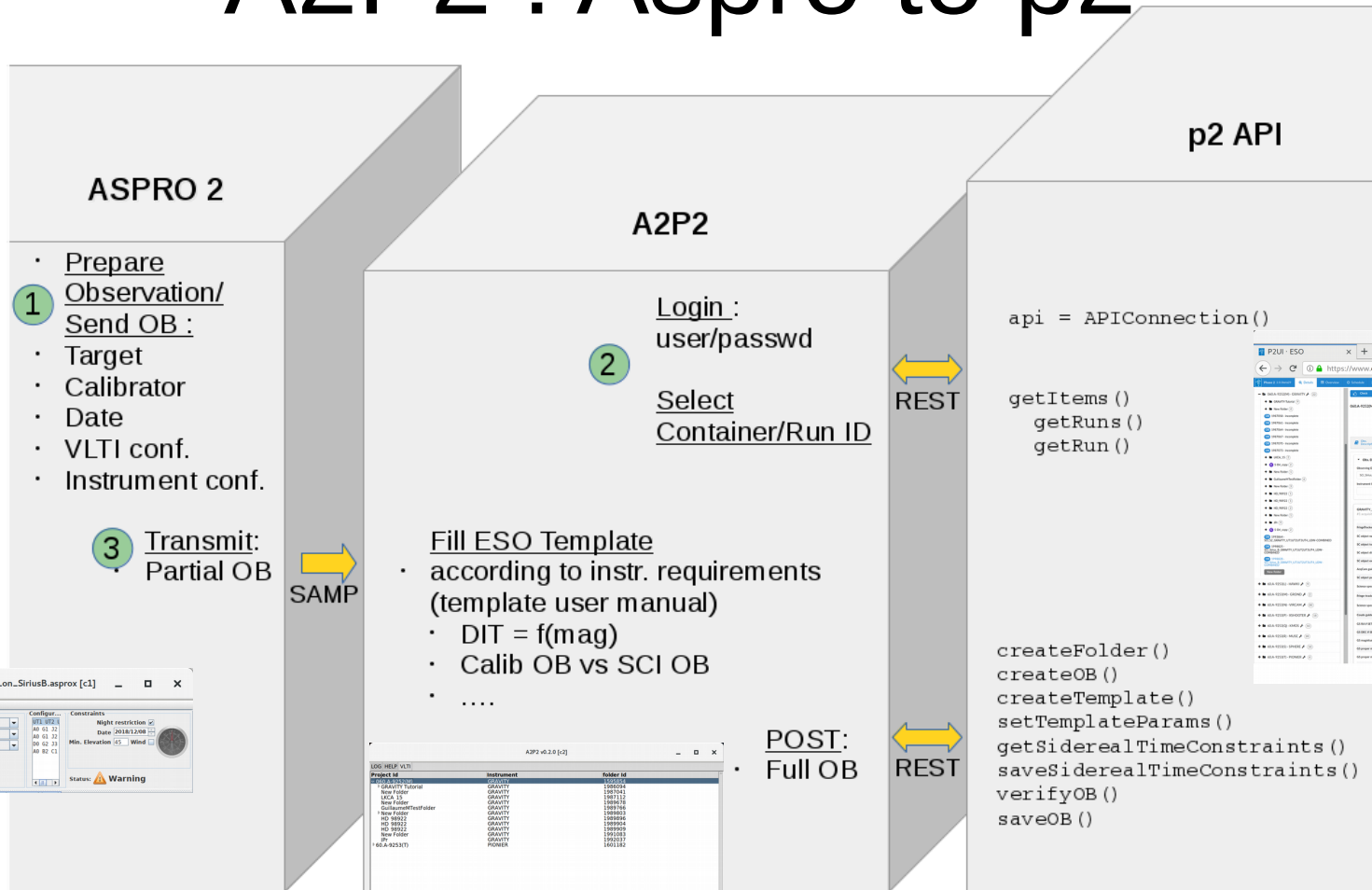

Observability
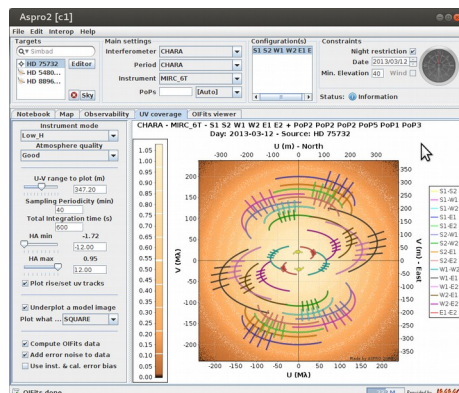
UV plane

Target Model

Data simulation

A2P2 : Aspro to p2

SearchCal / JSDC 2

- SearchCal service: 20 years of expertise in finding calibrator stars i.e. expected visibility is accurately known

  - Search Calibrator stars close to your science object and its photometry

  - Filter results (SP type, luminosity, V2 …)

  - Based on JSDC 2 + Faint mode (2.5m stars)

- JSDC 2: CDS Vizier II/346 ~ 465 877 stellar diameters => ESO calibrator list

"Pseudomagnitudes and differential surface brightness: Application to the apparent diameter of stars." by Chelli A., Duvert G., Bourgès L. et al., 2016, A&A, 589, 112

OIFITS Explorer

- OIFITS standard has been instrumental in the success of Optical Interferometry

- OIFITS Explorer allows to load, select / merge & visualize OIFITS files (even a large collection)

- *New*: export selection to OIFits file

- Visualization:

  - UV plane

  - V2, T3, VIS, flux…

  - Extra quantities: HA, PA, SNR…
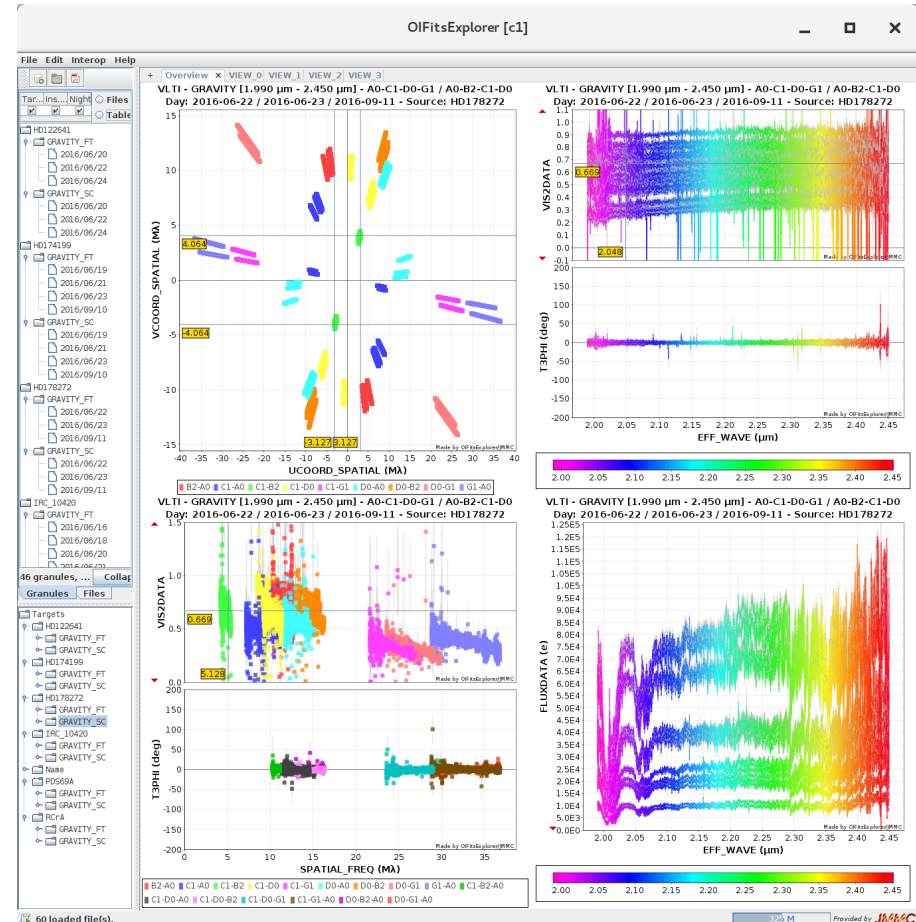
LITpro model fitting

LITpro fits a model, built from elementary analytical functions, on observation data (OIFITS)

- Provides lots of functions (disk, black-body, gaussian) + elongated / stretched variants

- Runs Fit:

  - Results: parameters with error bars + chi2

  - Plots: residuals + chi2 map

- Work in progress:

  - Genetic algorithm ~ global Fitter

  - User functions to expand existing model functions

   => astro-physical & polychromatic models
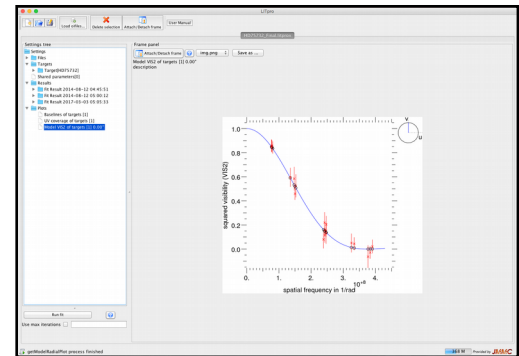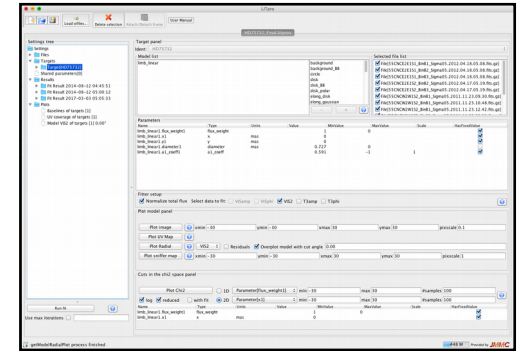
OImaging

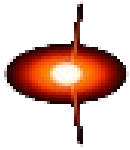*New*: Oimaging provides a generic interface to run image reconstruction software:

- Based on OIFITS + FITS image (OI_Image extension for parameters)

- Integration of BSMEM / WISARD / MiRA, MiRA + SPARCO running remotely on JMMC server (docker)

- Visualization of images, plots (residuals)

Future:

- Improve prior-image generation, data selection, image comparison, job processing
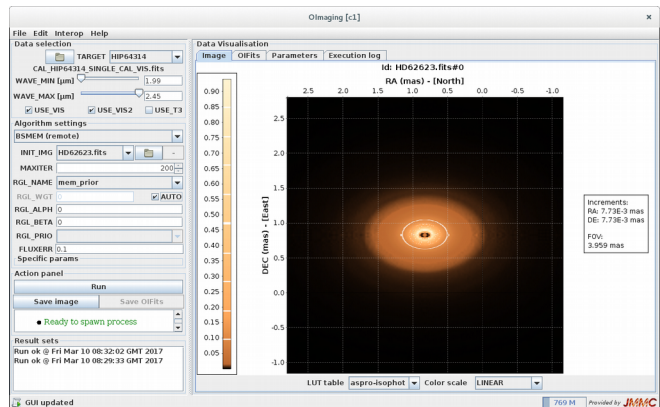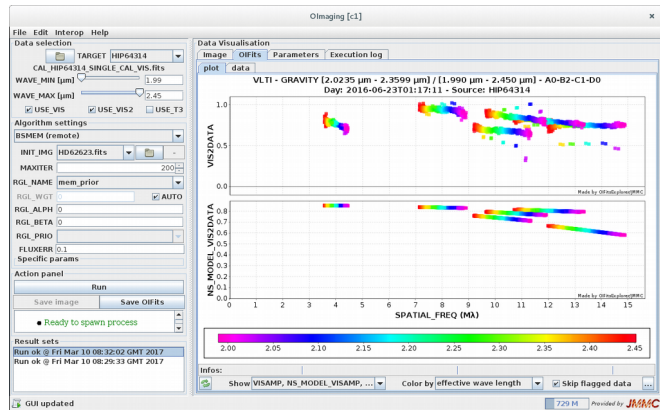
AMHRA "**A**nalyse et **M**odélisation en **H**aute **R**ésolution **A**ngulaire"

https://amhra.oca.eu/

New: AMHRA is a portal to the state-of-the-art models of stellar environment and surfaces.

- Provides polychromatic images, ready to use models in ASPRO, LITpro, OImaging

  - Fast computation time: Kinetic Be Disk, Disc and Stellar Continuum, Evolved stars, Binary Spiral Model

  - Pre-calculated grid: Supergiant B[e]

  - *Soon*: stellar emission profiles (better than limb-darkening laws)

- Provides analysis tools to compare observation data with these models (OIFits Modeler)

Optical **I**nterferometry **D**ata**B**ase

http://oidb.jmmc.fr

The worldwide database of Optical Interferometry observations

- Query & download OIFITS files

- Observation logs

  - ESO / VLTI

  - CHARA: Classic / Climb, Vega

- Observation data:

  - Reduced PIONIER data

  - Published data

SUV: private collections ?

Last word ...

- Visit www.jmmc.fr to get software & access freely JMMC services

- Feedback is welcome:

  - Bug reports & Enhancement requests

  - User support

- SUV helpdesk is now open !

- JMMC contributes to Open-Source: https://github.com/JMMC-OpenDev

Thank you for your attention !