

EWASS 2019 - SS41a
2019/06/28 - Lyon



How to deal with the VLTi :
*use the **JMMC** services !*

Laurent Bourgès

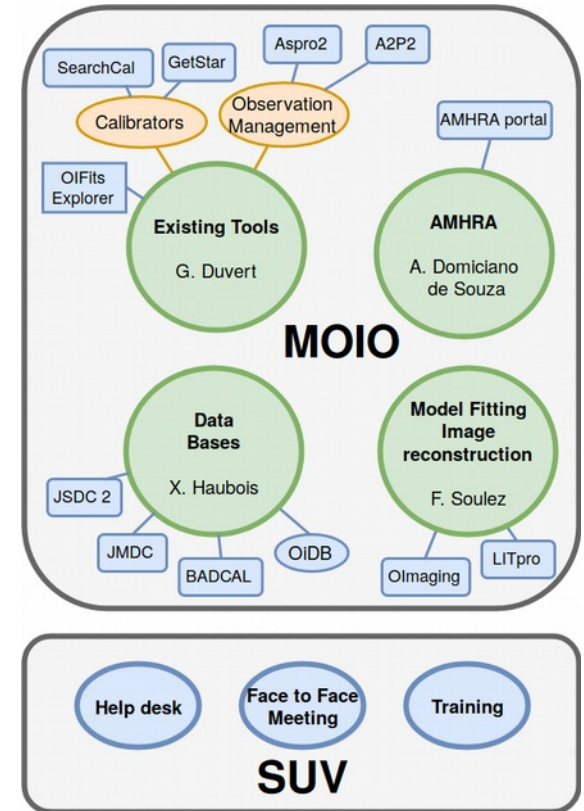


REF: JMMC-PRE-0000-0029

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 VLT/ELT Center
 - Support center: face-to-face help to reduce data, perform data analysis
 - Training network



Service overview



Reduce data
amdlib
pndrs



VLT



CHARA

+ Training

+ User Support

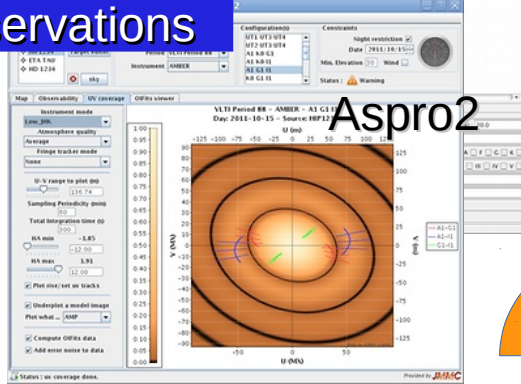
2019/06/28

Prepare Observations

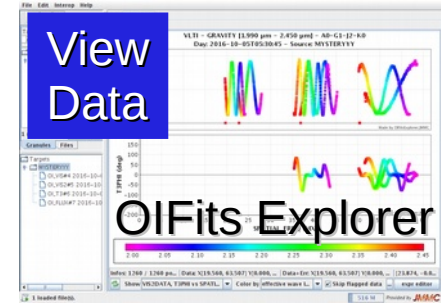
SearchCal



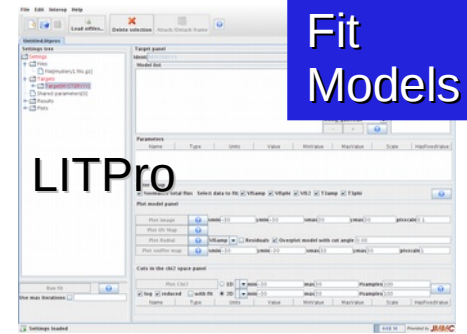
Aspro2



View Data

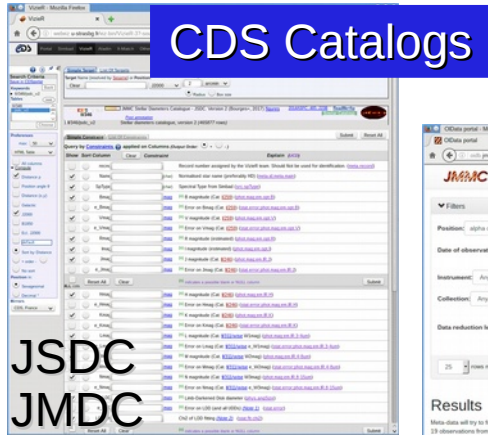


LITPro

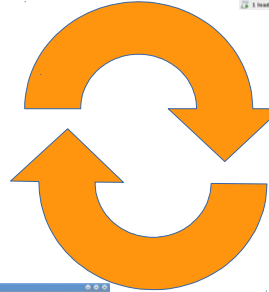


Fit Models

CDS Catalogs

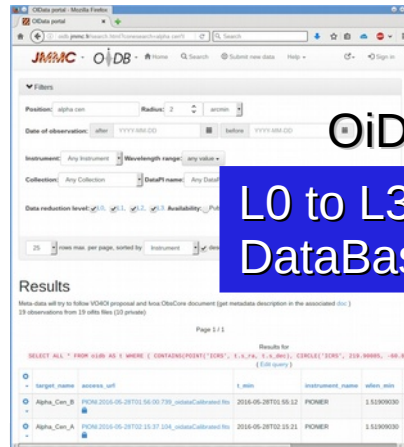


JSDC
JMDC



OiDB

L0 to L3
DataBases



Reconstruct Images

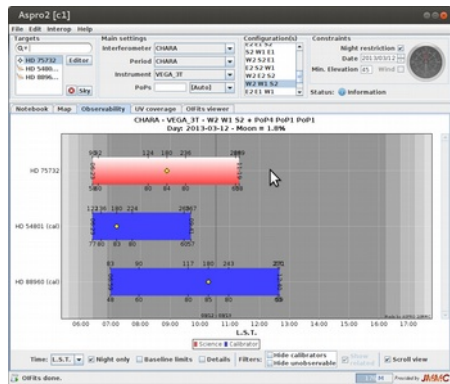
OImaging



ASPRO2: Astronomical Software to PRepare Observations

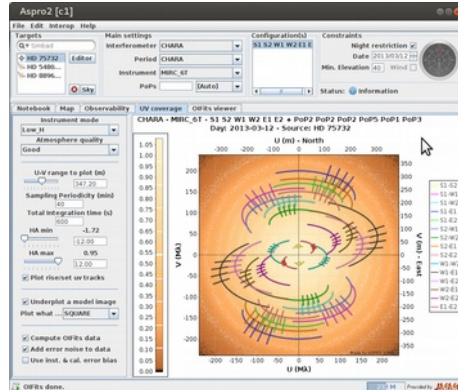
Complete observation preparation tool for VLTI / CHARA (all instruments)

- Estimates observation feasibility (proposal preparation)
- Simulates data sets with proper noise modeling in OIFITS format
- Feeds directly OBs to ESO p2
- Handles & shares your large source lists, helps night scheduling

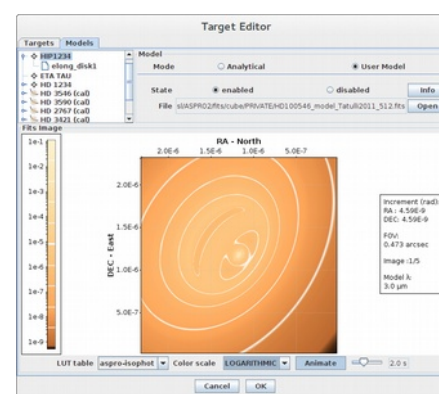


Observability

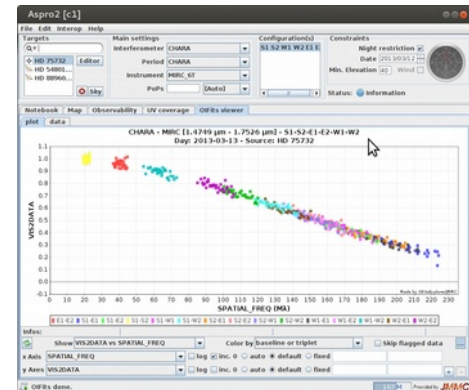
2019/06/28



UV plane



Target Model



Data simulation



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

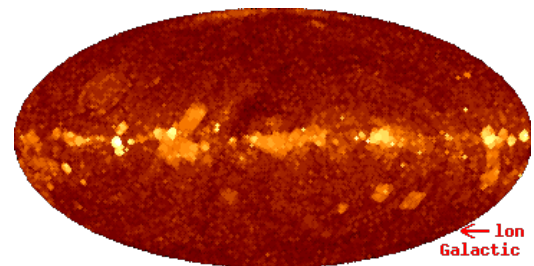
The screenshot shows the SearchCal interface with the following parameters:

- Instrumental Configuration:** Magnitude Band: V, Wavelength (Å) [min]: 0.6562, Max. Baseline [m]: 216.6477
- Science Object:** Name: HD 71712, RA 2000 (hh-mm-ss): 28 52 35.811, DEC 2000 (+/-dd-mm-ss): +28 19 50.953, Magnitude (V): 5.95
- SearchCal Parameters:** Min. Magnitude (V): 3.95, Max. Magnitude (V): 7.95, Scenario: Bright, RA Range [deg]: 240.0, DEC Range [deg]: 20.0

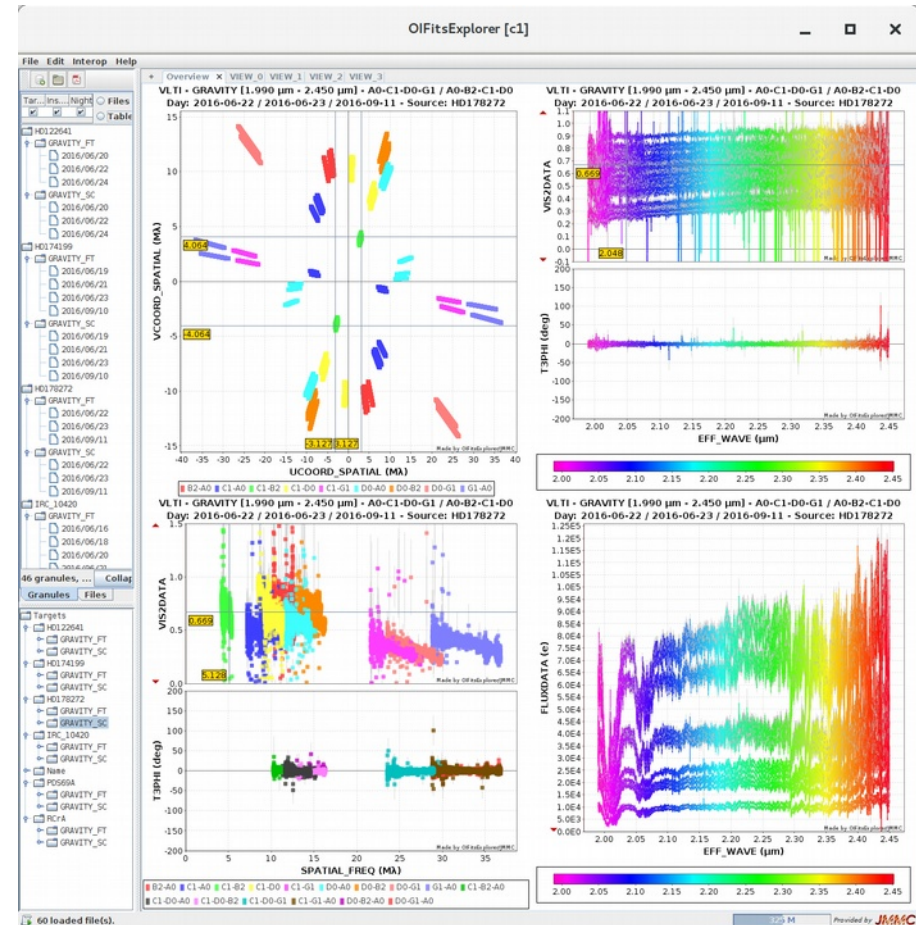
The table below shows a portion of the 'Found Calibrators (949 sources, 736 filtered)' results:

Index	ID	HP	RA2000	DEC2000	SpType	V	K	UD_V	UD_R	H	UD_K	vis2	vis2Err	diam_bv	Catalogs
180	18286	83627	10 08 27	+24 18 3	F0	7.794	7.262	0.12	0.121	0.968	0.124	0.903	0.013	0.157	JSDC-2.5
181	83220	8382	10 11 08	+20 41 4	F2V	6.931	1.87	0.244	0.287	5.732	0.295	0.551	0.048	0.285	JSDC-2.5
182	84660	50291	10 13 42	+28 09 0	A2	7.534	7.338	0.102	0.103	7.901	0.106	0.93	0.009	0.128	CDS
183	85560	50056	10 13 11	+23 21 1	F2	7.817	6.996	0.162	0.164	6.775	0.169	0.789	0.026	0.18	ZELL
184	86627	50141	10 14 10	+31 25 2	F0	7.602	6.835	0.158	0.159	6.865	0.163	0.838	0.021	0.175	JMASC
185	87261	50213	10 18 09	+35 09 9	A3V	7.338	6.807	0.142	0.143	6.5	0.147	0.668	0.017	0.153	JSDC
186	89260	10303	10 16 14	+29 18 3	A0Vn	6.411	6.187	0.244	0.242	6.411	0.241	0.514	0.01	0.144	JSDC
187	89251	50335	10 16 56	+25 51 3	G0V	7.574	6.083	0.255	0.258	6.337	0.266	0.617	0.043	0.257	JSDC
188	89266	50364	10 17 06	+21 54 4	F5 III	7.611	6.306	0.193	0.195	6.839	0.201	0.762	0.029	0.211	JSDC
189	89213	50359	10 18 10	+27 24 5	A0V	6.525	6.604	0.126	0.127	6.599	0.13	0.896	0.014	0.15	JSDC
190	89261	50368	10 18 57	+27 42 0	A0	6.842	6.723	0.132	0.133	6.751	0.136	0.866	0.015	0.149	JSDC
191	89265	50381	10 22 38	+24 35 4	F5	7.809	6.644	0.188	0.19	6.841	0.195	0.778	0.028	0.184	JSDC
192	89262	50382	10 23 05	+35 33 0	A8 III	7.053	6.579	0.164	0.168	6.815	0.171	0.824	0.022	0.179	JSDC
193	89264	50400	10 23 06	+33 56 2	A0V	5.885	5.506	0.257	0.261	5.568	0.268	0.614	0.043	0.248	JSDC
194	90164	50392	10 25 01	+30 22 1	F0V	7.892	6.89	0.216	0.218	6.592	0.226	0.922	0.026	0.211	JSDC
195	90681	51332	10 28 53	+18 53 0	G0	7.822	6.42	0.215	0.218	6.851	0.224	0.712	0.014	0.241	JSDC
196	90221	51658	10 29 58	+27 49 3	F8	7.802	6.603	0.192	0.194	6.866	0.199	0.766	0.029	0.191	JSDC
197	91161	51550	10 31 45	+24 06 5	G0V	7.918	6.297	0.212	0.215	6.560	0.243	0.666	0.019	0.252	JSDC
198	91163	51574	10 32 01	+29 43 5	G2V	7.868	6.404	0.218	0.221	6.463	0.228	0.703	0.035	0.221	JSDC
199	91021	51679	10 32 05	+17 59 0	G0	7.816	6.168	0.223	0.226	6.596	0.234	0.69	0.017	0.261	JSDC
200	91865	51685	10 31 36	+18 59 1	A2Vn	5.571	5.148	0.262	0.265	5.413	0.271	0.608	0.044	0.263	JSDC
201	91651	51701	10 31 50	+20 18 1	F8 V	7.289	6.083	0.248	0.251	6.114	0.258	0.836	0.041	0.277	JSDC
202	91566	51720	10 34 48	+28 09 3	F5	7.81	6.877	0.185	0.187	6.727	0.191	0.783	0.027	0.194	JSDC

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



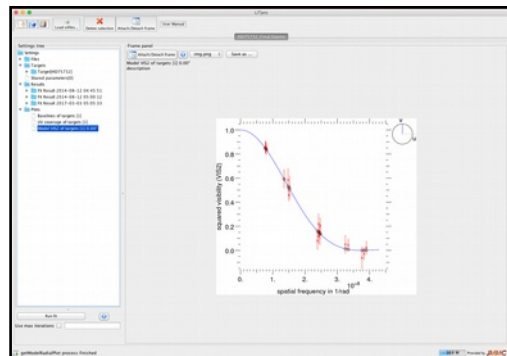
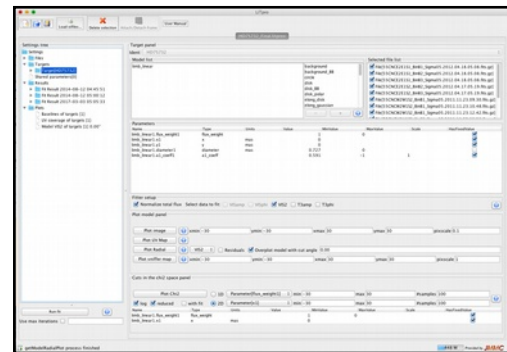
- OIFITS standard has been instrumental in the success of Optical Interferometry
- OIFITS Explorer allows to load, select / merge & visualize OIFITS files (even a large collection)
- **New**: export selection to OIFits file
- Visualization:
 - UV plane
 - V2, T3, VIS, flux...
 - Extra quantities: HA, 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



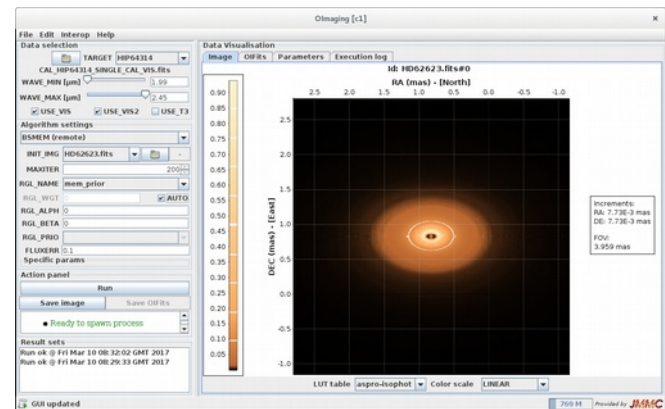
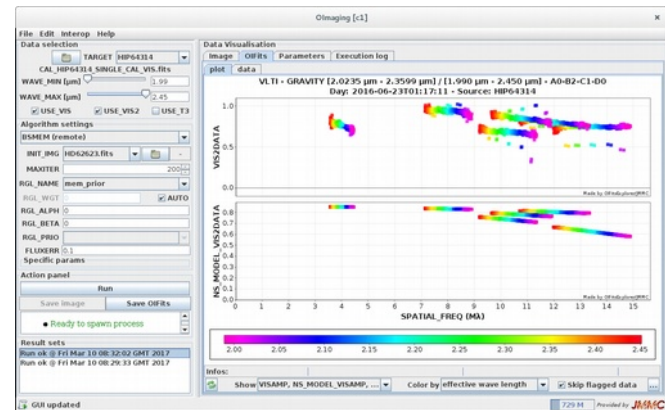
OImaging

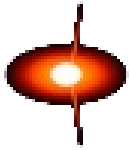
New: OImaging provides a generic interface to run image reconstruction software:

- Based on OIFITS + FITS image (OI_Image extension for parameters)
- Integration of BSMEM / WISARD / MiRA, running remotely on JMMC server (docker)
- Visualization of images, plots (residuals)

Future:

- Improve prior-image generation, data selection, image comparison, job processing
- *Contact us to integrate your imaging software !*





AMHRA "Analyse et Modélisation en Haute Résolution Angulaire"

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)

<https://amhra.oca.eu/>

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

Please upload your published datasets !

Results

Meta-data will try to follow VO4OI proposal and Ivoa:ObsCore document (get metadata description in the associated doc)
19 observations from 19 oifits files (10 private)

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Results for
SELECT ALL * FROM oidb AS t WHERE (CONTAINS(POINT('ICRS', t.s_ra, t.s_dec), CIRCLE('ICRS', 219.90085, -60.83
(Edit query)

target_name	access_url	t_min	instrument_name	wlen_min
Alpha_Cen_B	PIONI.2016-05-28T01:56:00.739_oidataCalibrated.fits	2016-05-28T01:55:12	PIONIER	1.51909030
Alpha_Cen_A	PIONI.2016-05-28T02:15:37.104_oidataCalibrated.fits	2016-05-28T02:15:21	PIONIER	1.51909030

Last word ...

<http://www.jmmc.fr/>

- 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 !