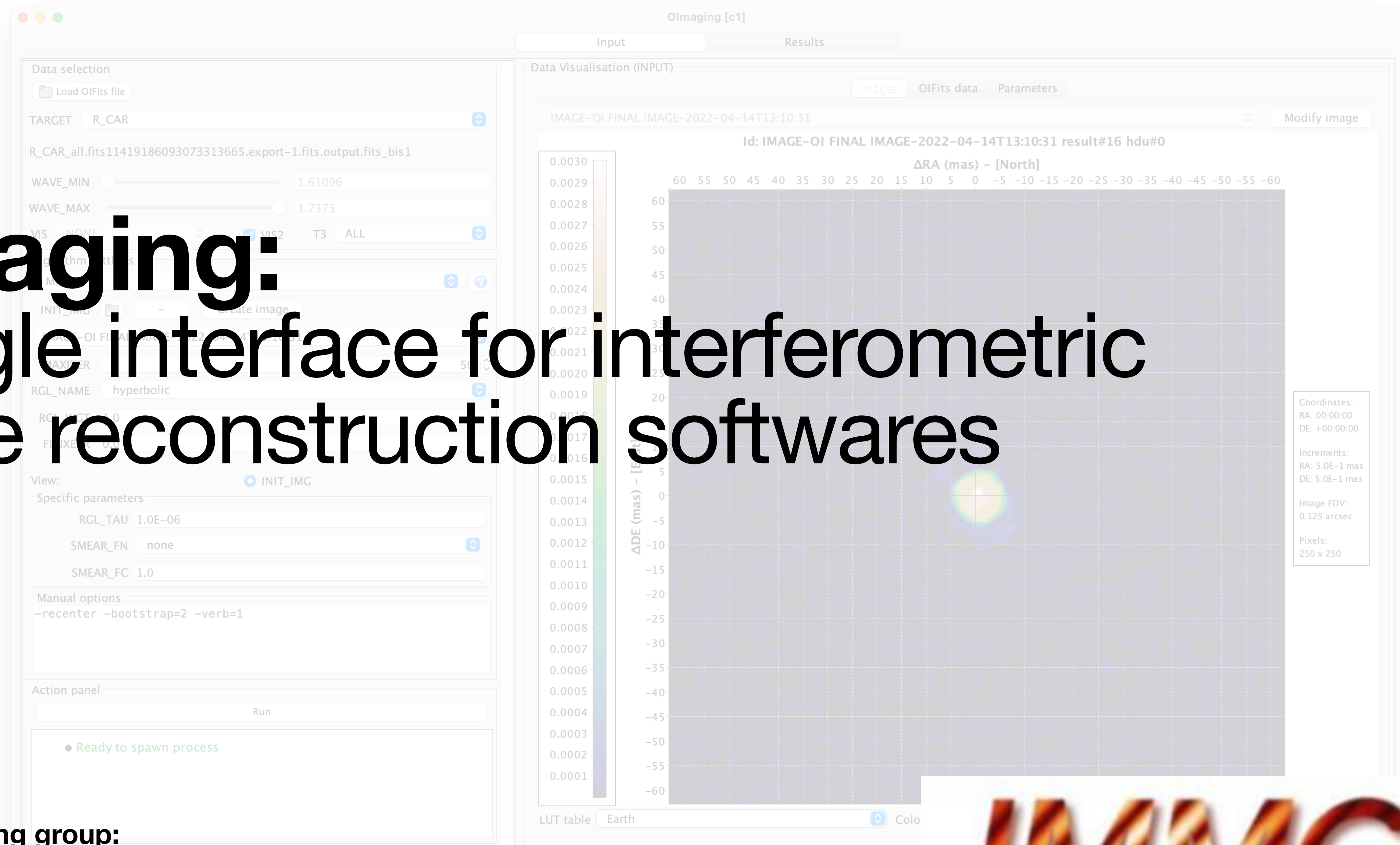


# OImaging: a single interface for interferometric image reconstruction softwares

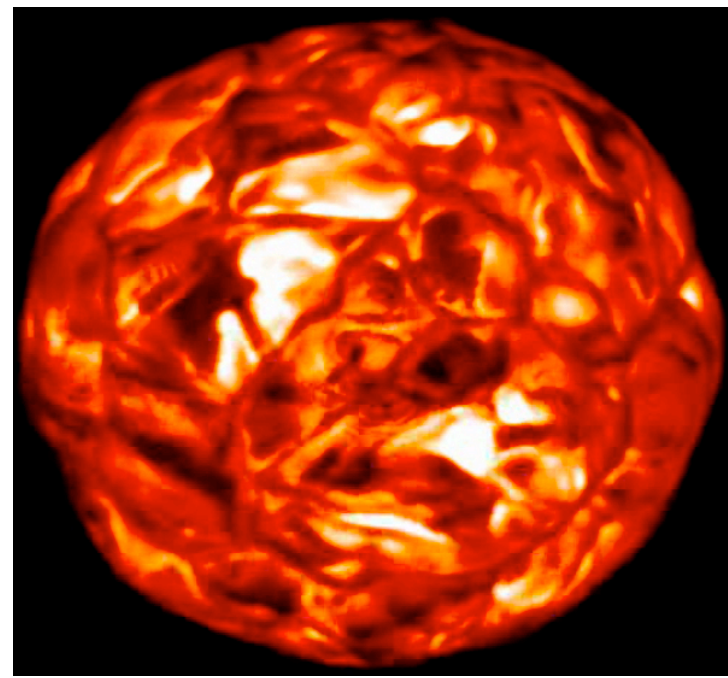


**JMMC MFIR working group:**

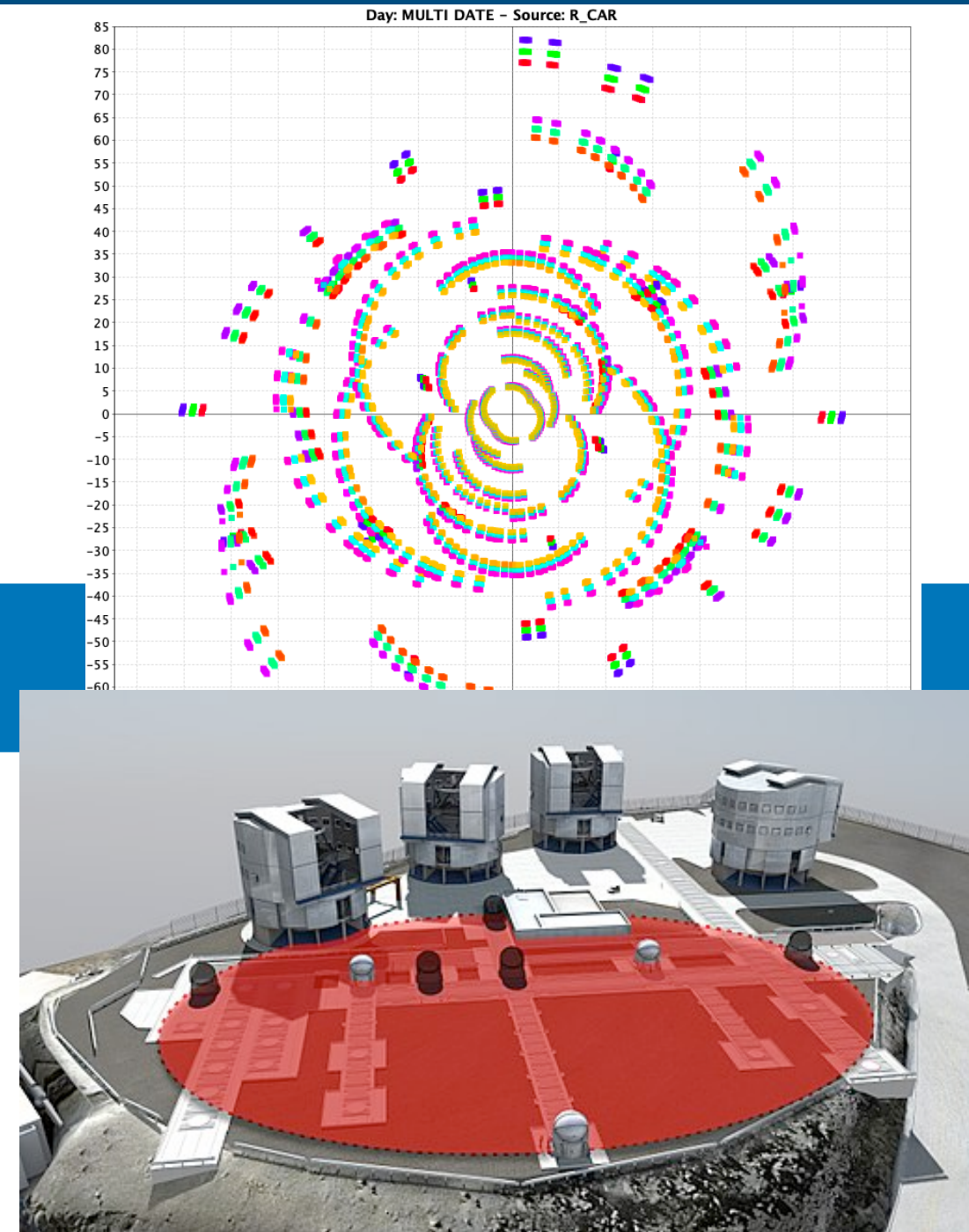
**Ferréol Soulez, L. Bourgès, A. Kaszycz, G. Mella, I. Tallon-Bosc, G. Duvert, E. Thiébaud, J. Kluska, J. Young, H. Beust, M. Tallon, N. Bruot, JP. Berger and L. Mugnier**



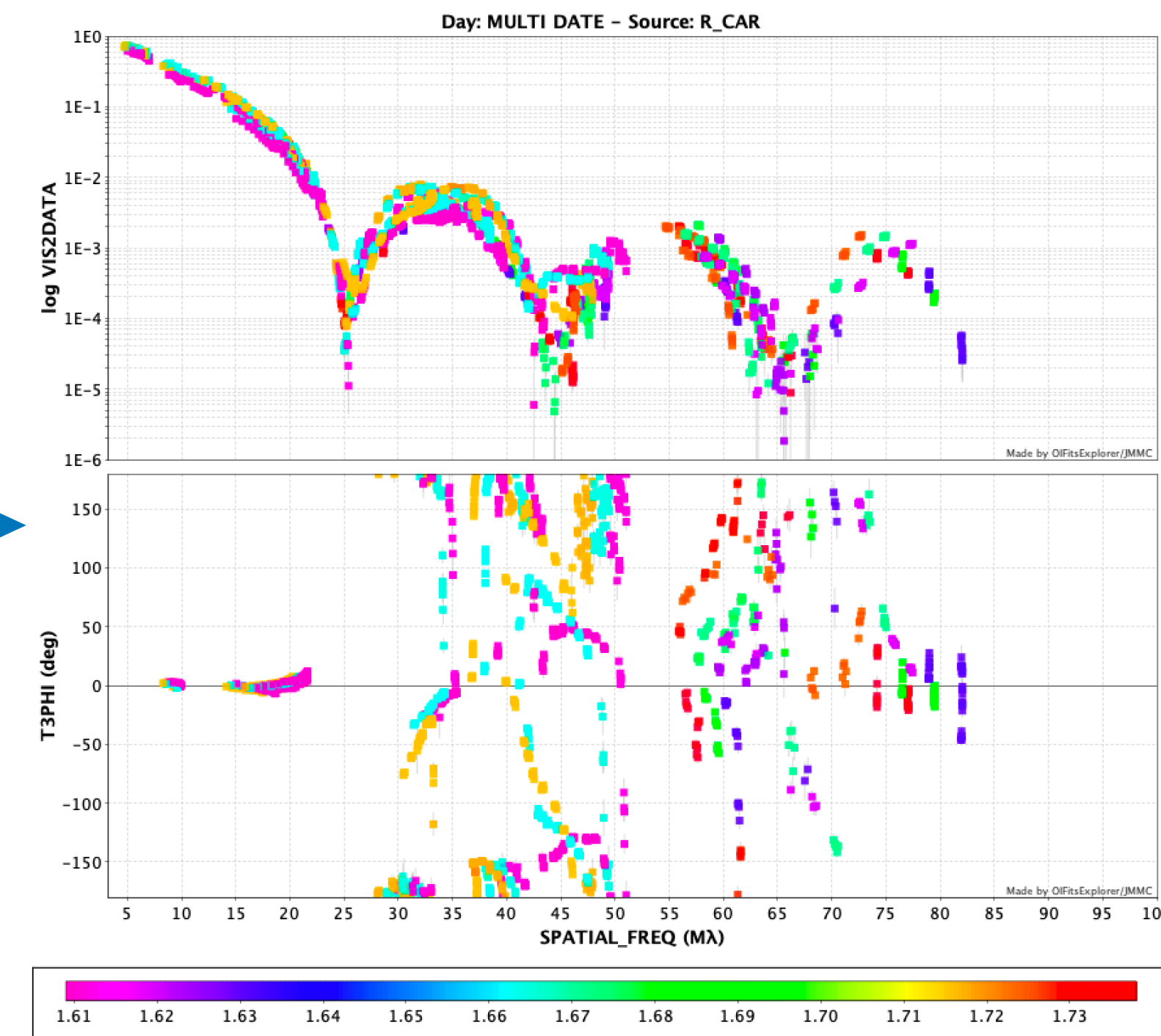
# Image reconstruction in interferometry



Object



Interferometric instrument

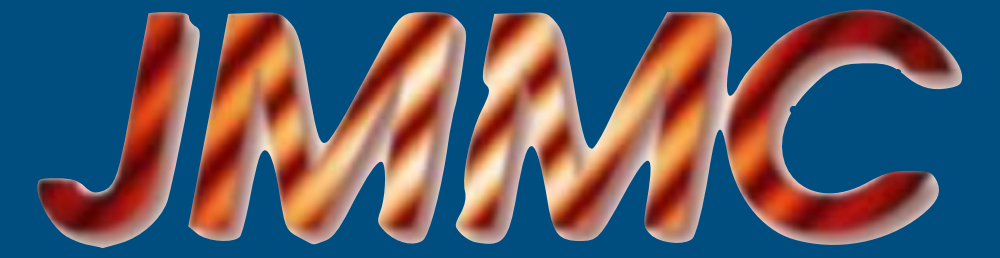


Measurements

Image reconstruction ?

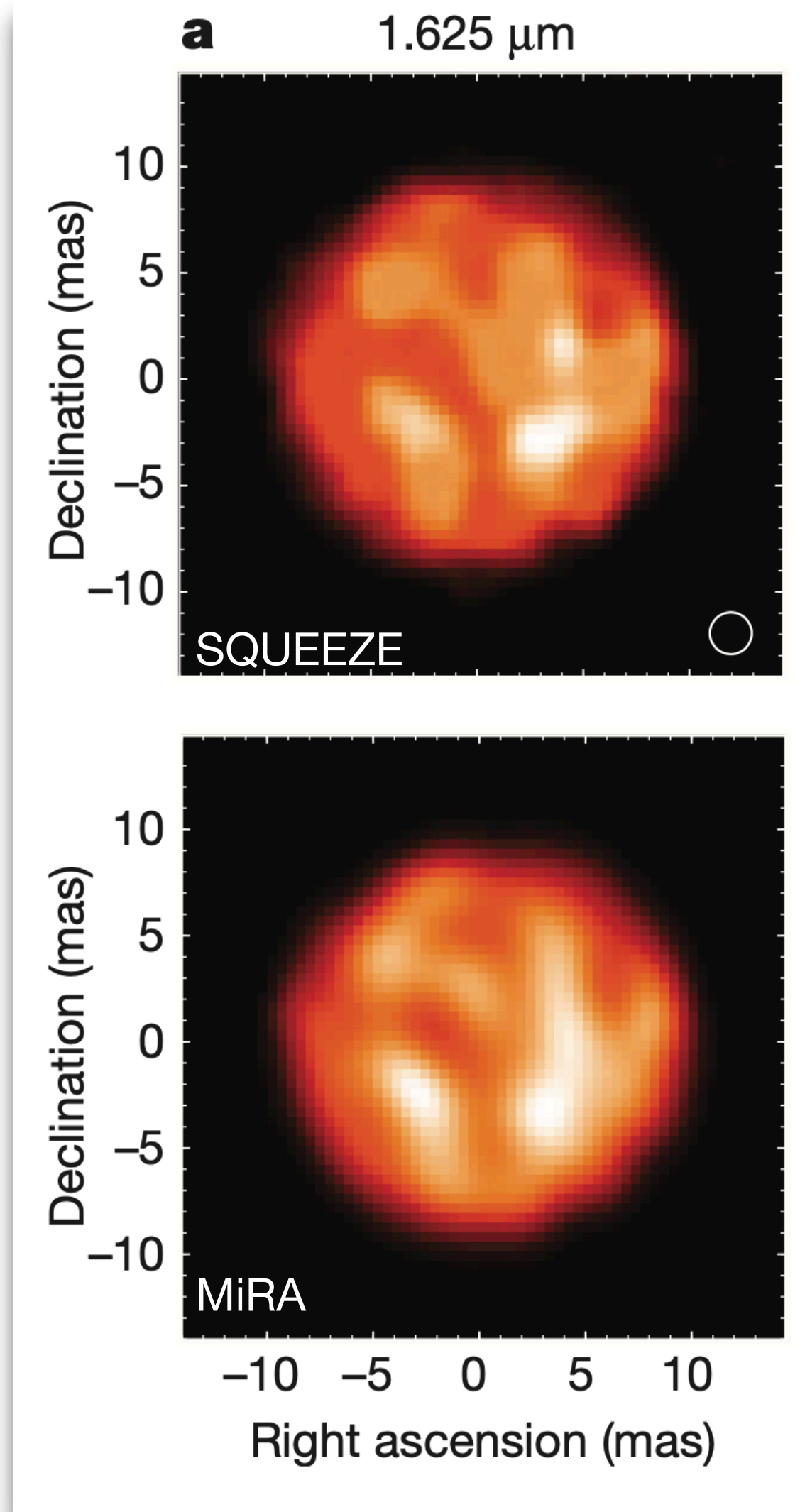


# Image reconstruction softwares

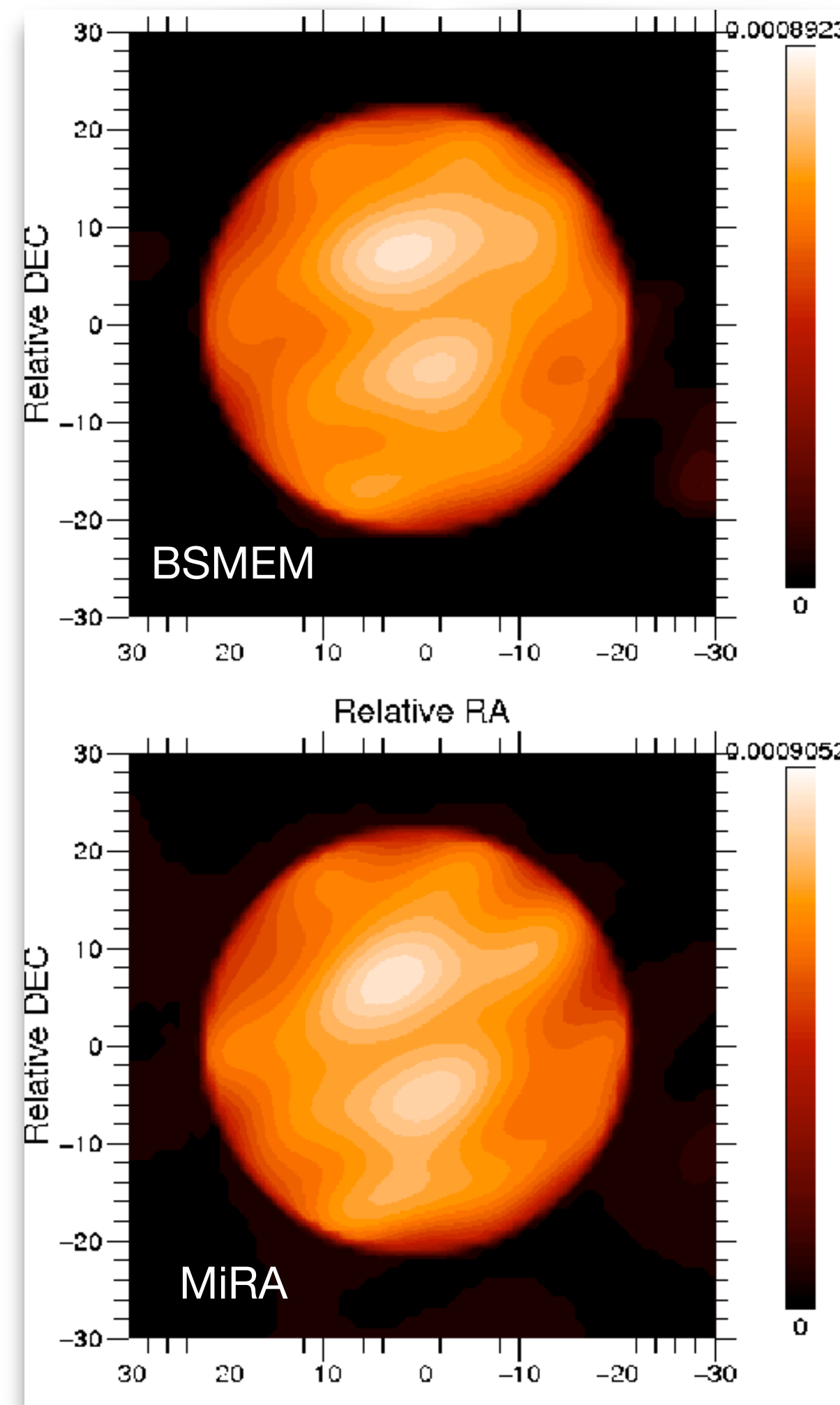


- ◎ **BSMEM** (Buscher et al, 1994) C
- ◎ **MACIM** (Ireland et al, 2006) C
- ◎ **MIRA** (Thiébaud, 2008) yorick
- ◎ **WISARD** (Mugnier et al 2008) IDL
- ◎ **SQUEEZE** (Baron et al, 2010) C
- ◎ **IRBIS** (Hoffman et al, 2014) C
- ◎ **SPARCO** (Kluska et al, 2014) yorick or C
- ◎ **ORGANIC** (Claes et al 2020) python
- ◎ **G<sup>R</sup>** (GRAVITY col., 2022) python

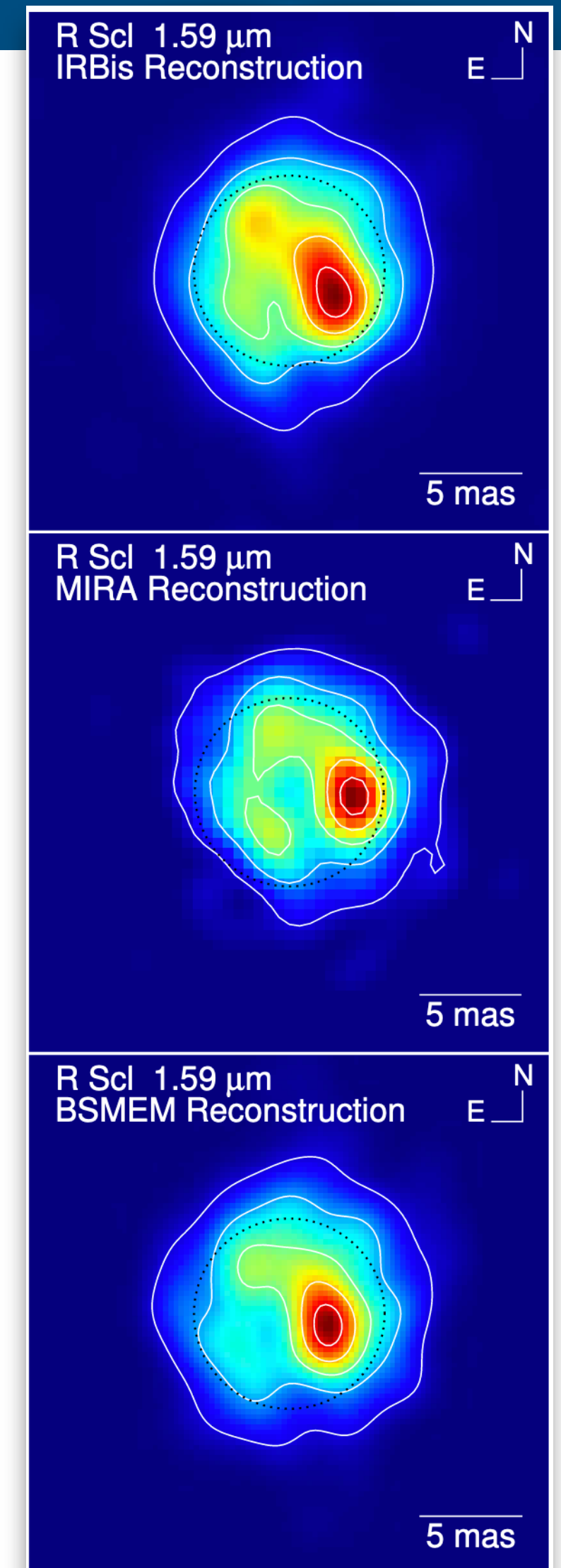
# Comparing reconstructions softwares



$\pi^1$  Gruis (Paladini, 2018)



Betelgeuse (Haubois, 2009)



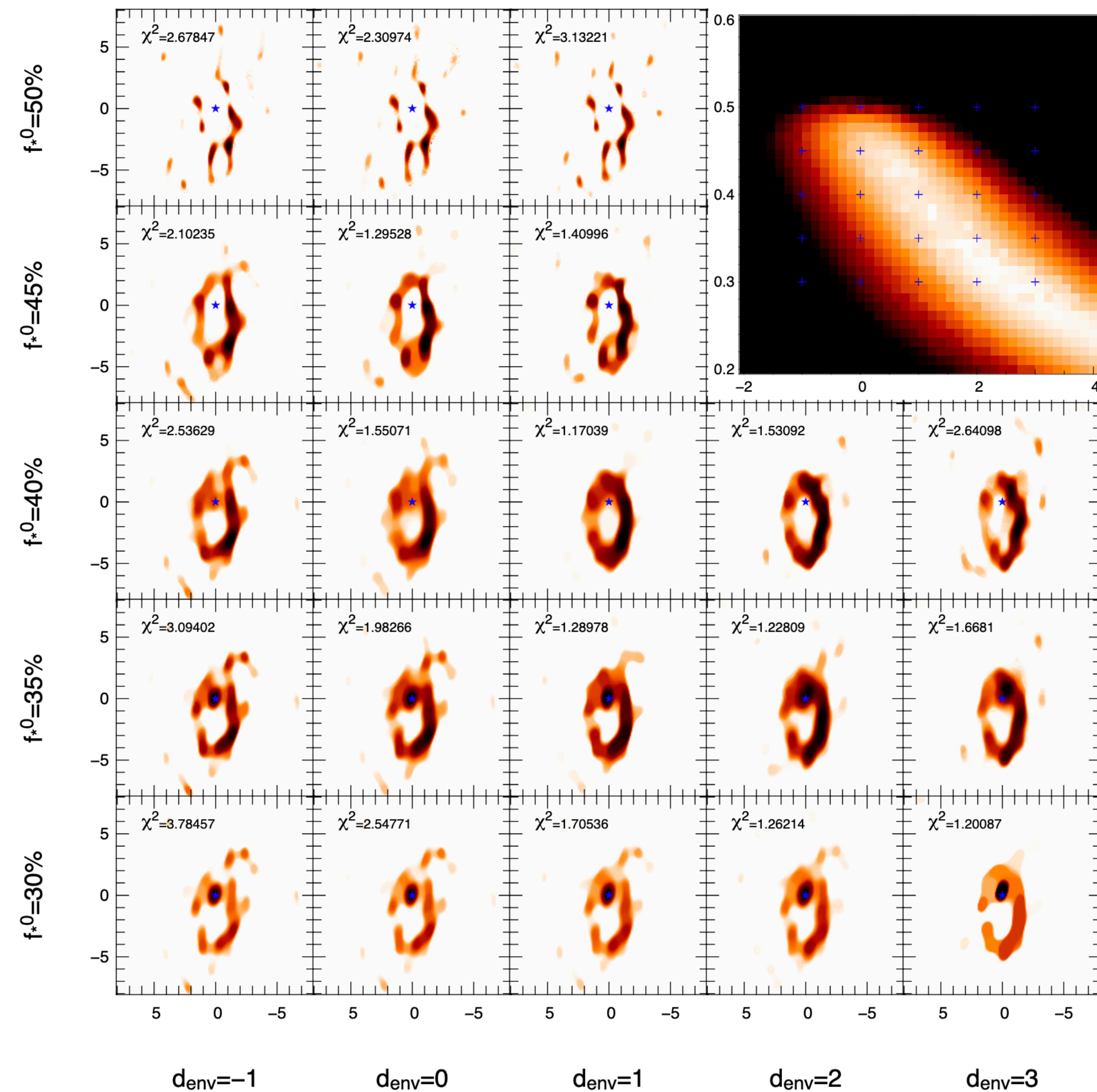
R Sculptoris (Wittkowski, 2017)



# Benchmarking parameters

## Comparing results with different

- Priors
- Parameters
- Initialization



(Kluska, 2014)

# OImaging Graphical User Interface



OImaging [c1]

Input Results

Data selection

Load OIFits file

TARGET R\_CAR

R\_CAR\_all.fits11419186093073313665.export-1.fits.output.fits\_bis1

WAVE\_MIN 1.61096

WAVE\_MAX 1.7373

VIS NONE  VIS2 T3 ALL

Algorithm settings

MIRA

INIT\_IMG - Create image

IMAGE-OI FINAL IMAGE-2022-04-14T13:10:31

MAXITER 50

RGL\_NAME hyperbolic

RGL\_WGT 1.0

FLUXERR 0.0

View:  INIT\_IMG

Specific parameters

RGL\_TAU 1.0E-06

SMEAR\_FN none

SMEAR\_FC 1.0

Manual options

-recenter -bootstrap=2 -verb=1

Action panel

Run

● Ready to spawn process

Data Visualisation (INPUT)

Images OIFits data Parameters

IMAGE-OI FINAL IMAGE-2022-04-14T13:10:31 Modify image

Id: IMAGE-OI FINAL IMAGE-2022-04-14T13:10:31 result#16 hdu#0

$\Delta RA$  (mas) - [North]

60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60

60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60

$\Delta DE$  (mas) - [East]

0.0030  
0.0029  
0.0028  
0.0027  
0.0026  
0.0025  
0.0024  
0.0023  
0.0022  
0.0021  
0.0020  
0.0019  
0.0018  
0.0017  
0.0016  
0.0015  
0.0014  
0.0013  
0.0012  
0.0011  
0.0010  
0.0009  
0.0008  
0.0007  
0.0006  
0.0005  
0.0004  
0.0003  
0.0002  
0.0001

Coordinates:  
RA: 00:00:00  
DE: +00:00:00

Increments:  
RA: 5.0E-1 mas  
DE: 5.0E-1 mas

Image FOV:  
0.125 arcsec

Pixels:  
250 x 250

LUT table Earth Color scale LINEAR Display keywords Ruler



# OI-Interface: a single format to connect them all

A unified way to call reconstruction softwares

- Every information in a single OI-FITS file
- Simpler interaction with softwares
- Reproducible results

The screenshot displays the GitHub interface for the repository `JMMC-OpenDev / OI-Imaging-JRA`. The repository is public and has 6 watchers, 6 forks, and 4 stars. The main content area shows a commit history table with the following entries:

File	Commit Message	Author	Date
<code>.github/workflows</code>	Update main.yml		last month
<code>doc</code>	Add keywords CONVERGE and PROCSoft in OUTPUT PARAM t...		last month
<code>.gitattributes</code>	Initial commit		7 years ago
<code>.gitignore</code>	Initial commit		7 years ago
<code>README.md</code>	fix typo in README		last month

The `README.md` file content is visible below the table:

## OI-Interface

Design and specification of an interface to image reconstruction and model fitting from optical interferometric data.

### Contents

- [Unified Image Reconstruction Description](#) exploits the *inverse problem* framework to present the general principles of image reconstruction from interferometric data.
- [Interface to Image Reconstruction](#) is a draft document giving the specifications for a graphical user interface to control image reconstruction algorithms.
- Directory `doc` contains the sources of the various documents.

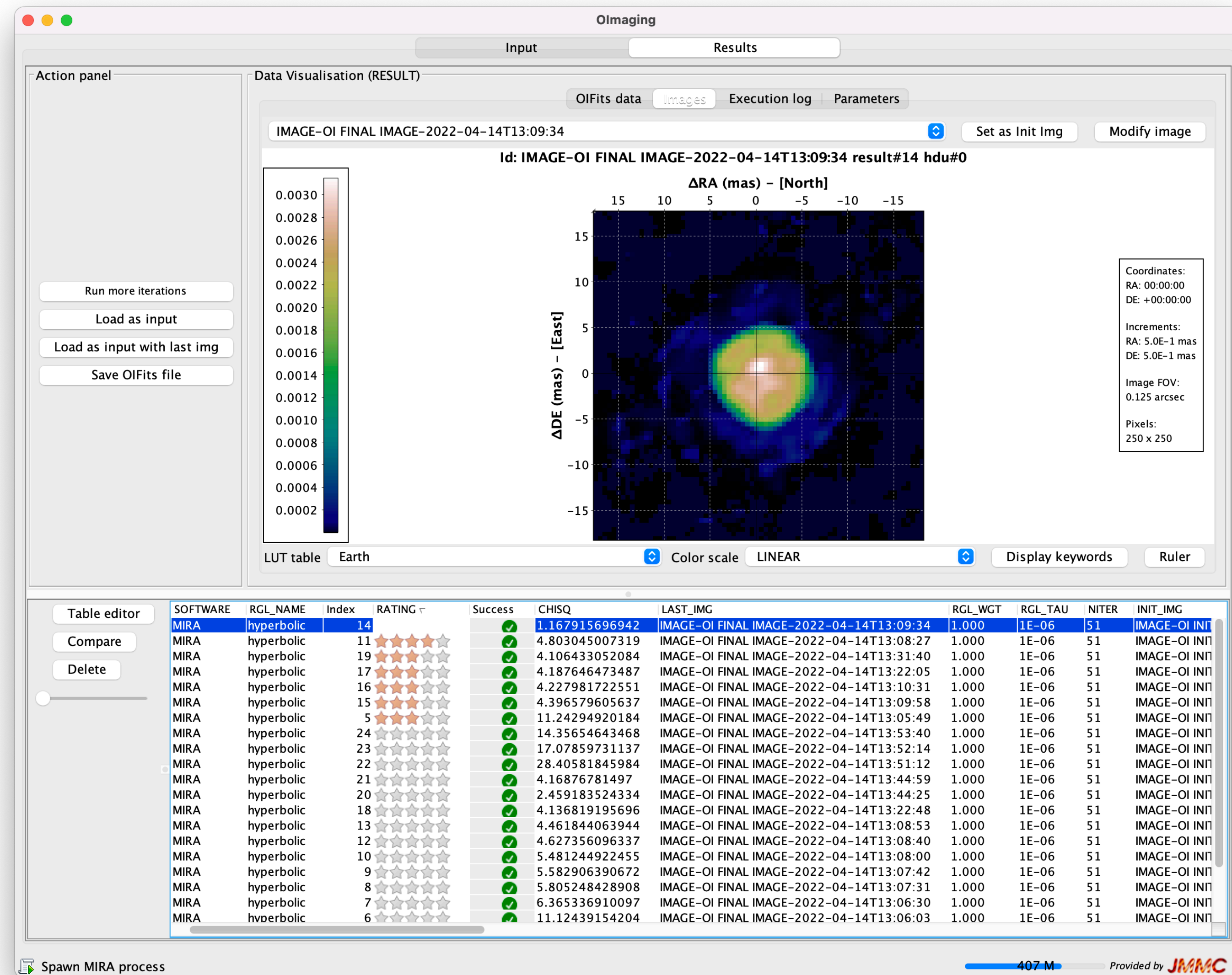
The right sidebar shows repository statistics: 4 stars, 6 watching, and 6 forks. It also lists contributors: emmt (Éric Thiébaud), jsy1001 (John Young), and FerreoIS (ferreol soulez).

# Conclusions

## Checkout the new release !

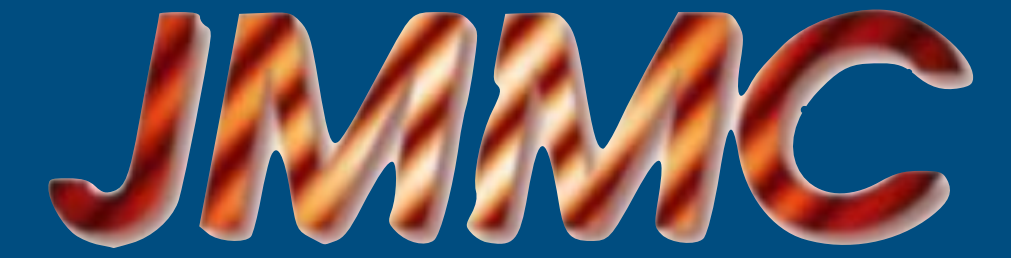
<https://www.jmmc.fr/english/tools/data-analysis/oimaging/>

- Do not hesitate do ask for features,
- Report bugs,
- Help is available in your expertise center





# OImaging: a collective project



## © The big chiefs:

I. Tallon-Bosc  
J-P. Berger  
G. Duvert

## © The developers:

L. Bourgès  
A. Kaszczyc  
G. Mella  
M. Pratoussy



## © The reconstruction software fathers:

G. Duvert  
J. Kluska  
L. Mugnier  
E. Thiébaut  
J. Young

## © The beta-testers:

J. Kluska  
M. Montargès