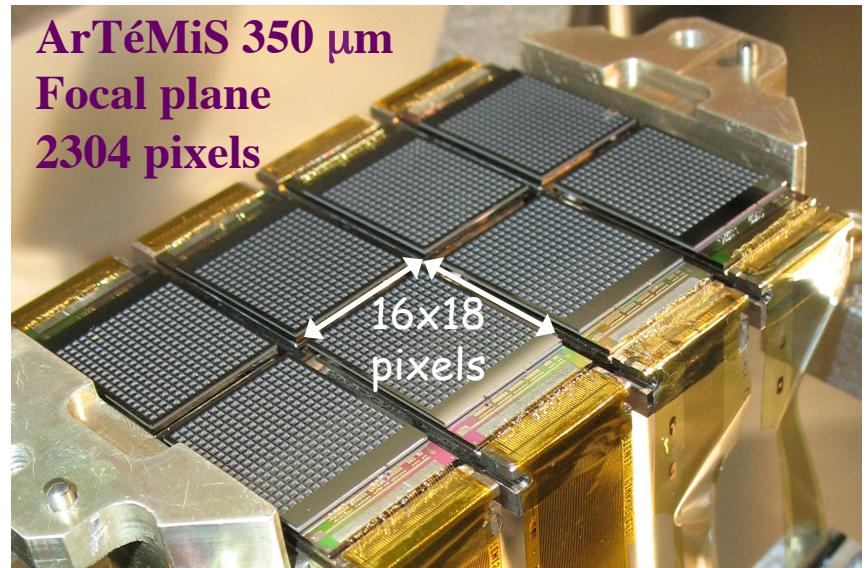
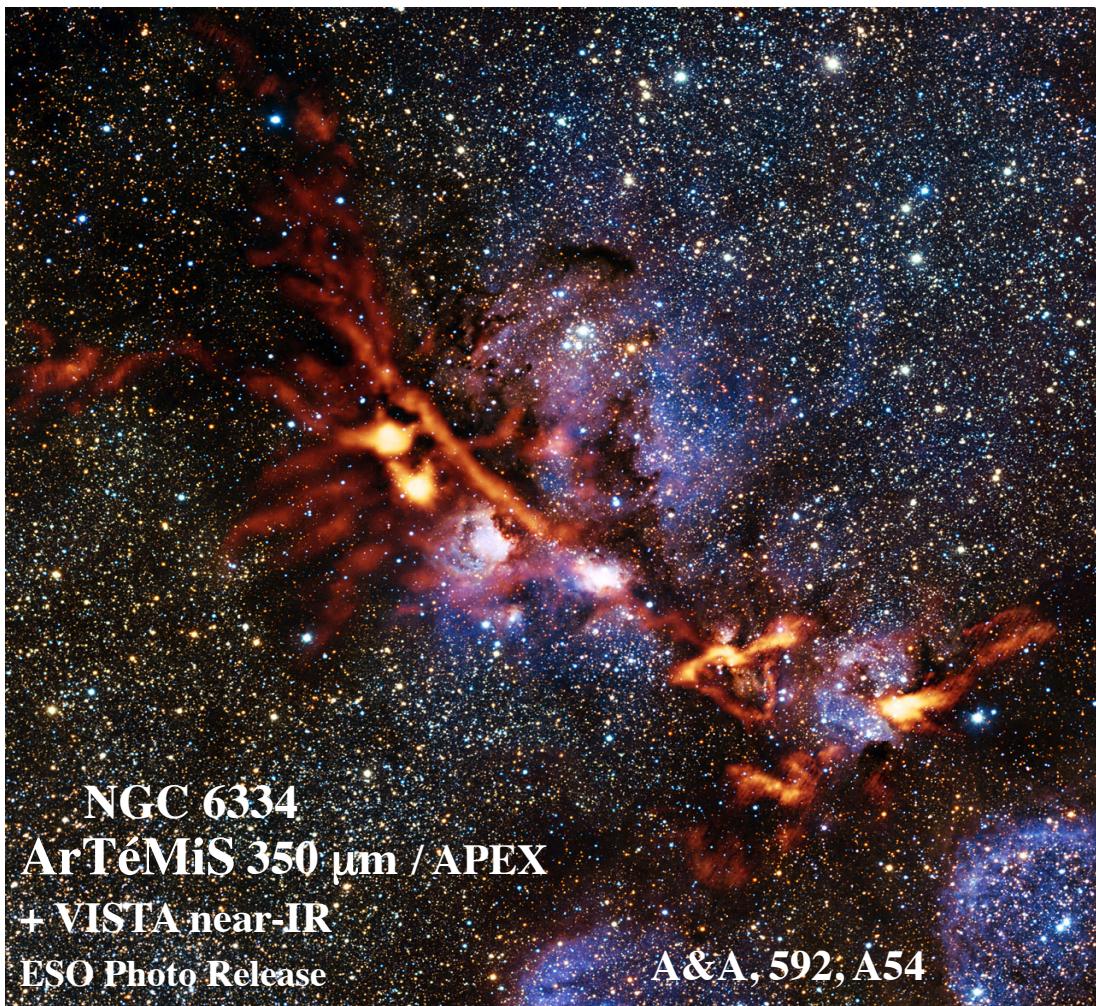


# The ArTéMiS Pipeline (APIS)

Pascal Gallais, Guillaume Willmann,  
Philippe André, and (more recently)  
Frédéric Schuller + Hélène Roussel for  
Scanamorphos



2304 pixels @ 450  $\mu\text{m}$   
2304 pixels @ 350  $\mu\text{m}$



SD2018 ESO – 15/03/2018



# APIS

- Genesis : March 2006 @ Gornergrat (KOSMA 3m)
  - For P-ARTEMIS, based on a 16x16 pixels array, installed on KOSMA
- Adapted along time and observing campaigns for ARTEMIS
  - Started with 1 focal plane of 32x36 pixels @350μm (2013)
  - Then 1 focal plane of 64x36 pixels @350μm (2014)
  - And now 2 focal planes, 64x36 pixels each, @350 and 450μm (> 2016)
- A package based on IDL (Harris)
  - based on IDL procedures and Calibration data files
  - Command line
  - Interactivity of the IDL language, plotting tools, ....

# Publicly available but developed on a best-effort basis

[Home](#) > [Instrumentation](#) > [PI instruments](#) > [Artemis](#)

See [http://www.apex-telescope.org/instruments/pi/artemis/data\\_reduction/](http://www.apex-telescope.org/instruments/pi/artemis/data_reduction/)

## Data Reduction for ArTeMiS data

### Reduction with BoA (BOlometer Array Analysis)

#### Background information

BoA is a software package for the reading, handling and analysis of bolometer array data. Its design and implementation is a collaborative effort of scientist at the MPIfR, AIfA, AIRUB and IAS started in 2002. The primary goal of BoA is to handle bolometer array data obtained at APEX (initially for LABOCA data), both for online visualization and offline processing. BoA can also be used to process data acquired with other instruments of APEX such as ArTeMiS, or from other telescopes (i.e. MAMBO at the IRAM 30-meter telescope). BoA includes most of the relevant functionalities of the reduction packages like MOPSIC, NIC or SURF. BoA naturally interfaces with APECS and the MBfits format.

#### Installation of BoA

You can download the BoA software at: [http://www3.mpifr-bonn.mpg.de/div/submmtech/software/boa/boa\\_main.html](http://www3.mpifr-bonn.mpg.de/div/submmtech/software/boa/boa_main.html)  
On this page, you will find the BoA procedures, the necessary libraries as well as the BoA reference manual.

#### Reduction

You can download the BoA package for ArTeMiS [here](#) and check some notes [here](#) on how to install and use it.

### Reduction with IDL (Interactive Data Language)

A dedicated data reduction pipeline running in IDL has been developed by the instrument team. You can download the IDL packages for ArTéMiS below:

Package	Link	Documentation
Calibration files	<a href="#">Calibration_2017.tgz</a>	-
Basic IDL Pipeline (APIS)	<a href="#">IDL_proc_mar2018.tgz</a>	APIS installation instructions (soon) <a href="#">APIS documentation (Oct 2014)</a>
Scamamorphos (to be used together with APIS)	<a href="#">SCANAM_ARTEMIS_v3.tar.gz</a>	<a href="#">Scamamorphos Guide (March 2018)</a>

# Tests of the *Herschel/PACS* imaging photometer in the lab

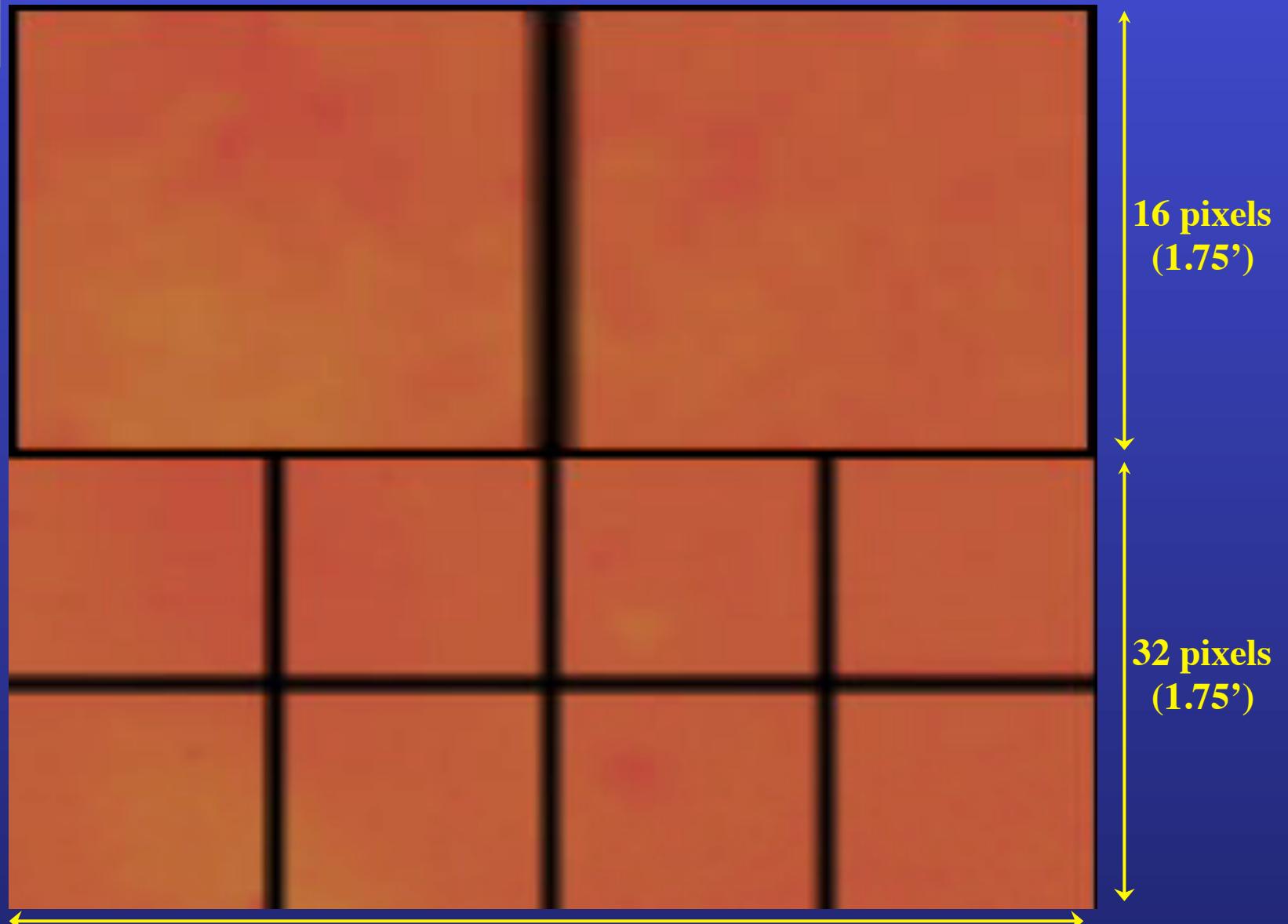
Images of the sky  
every 25 msec

« Red »  
Array

130 - 210  $\mu\text{m}$

« Blue »  
Array

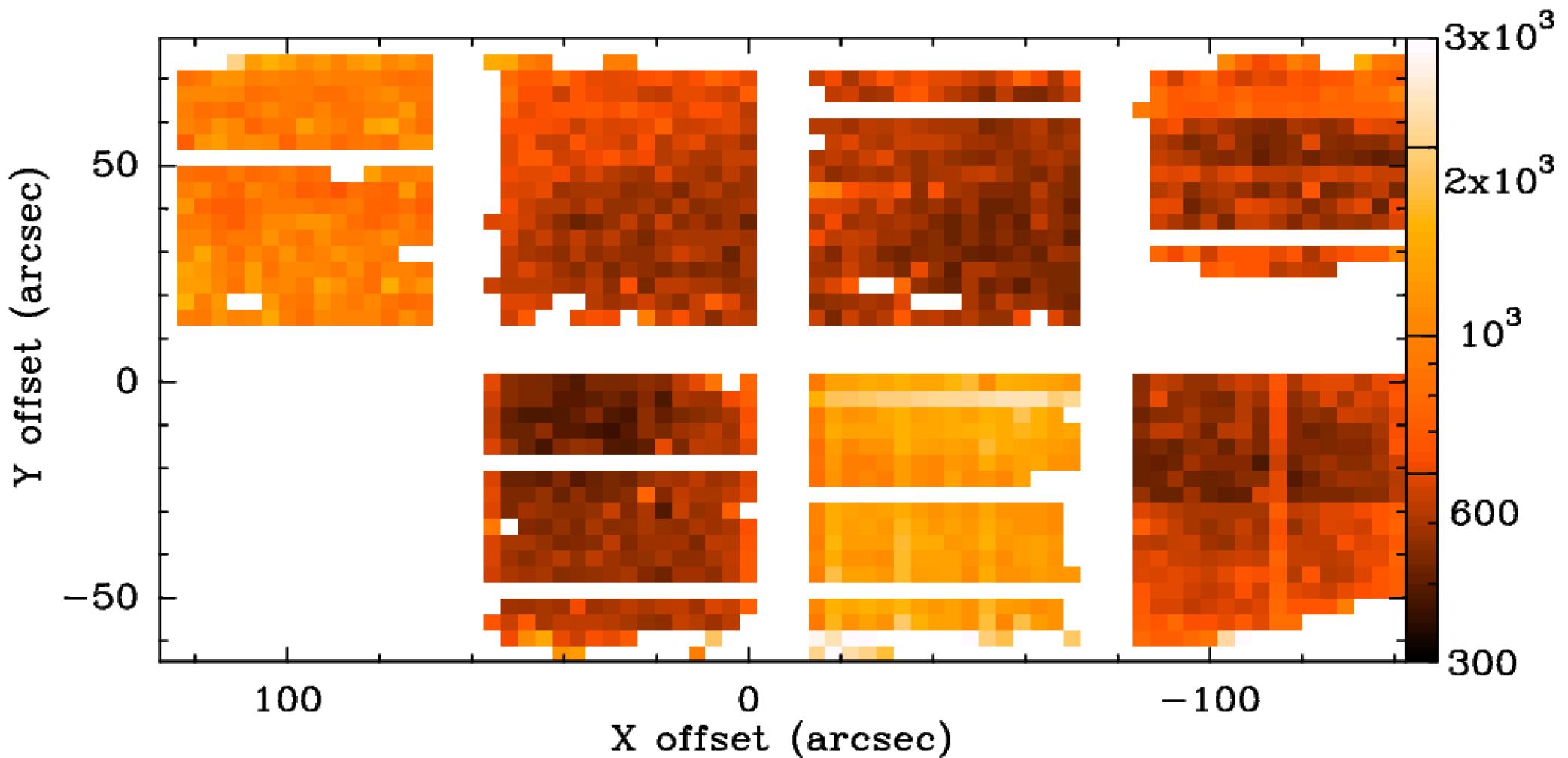
60 - 130  $\mu\text{m}$



64 pixels (3.5')

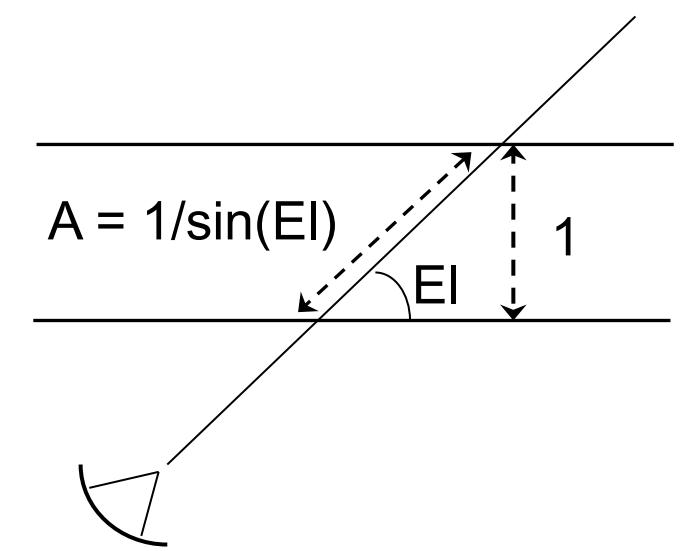
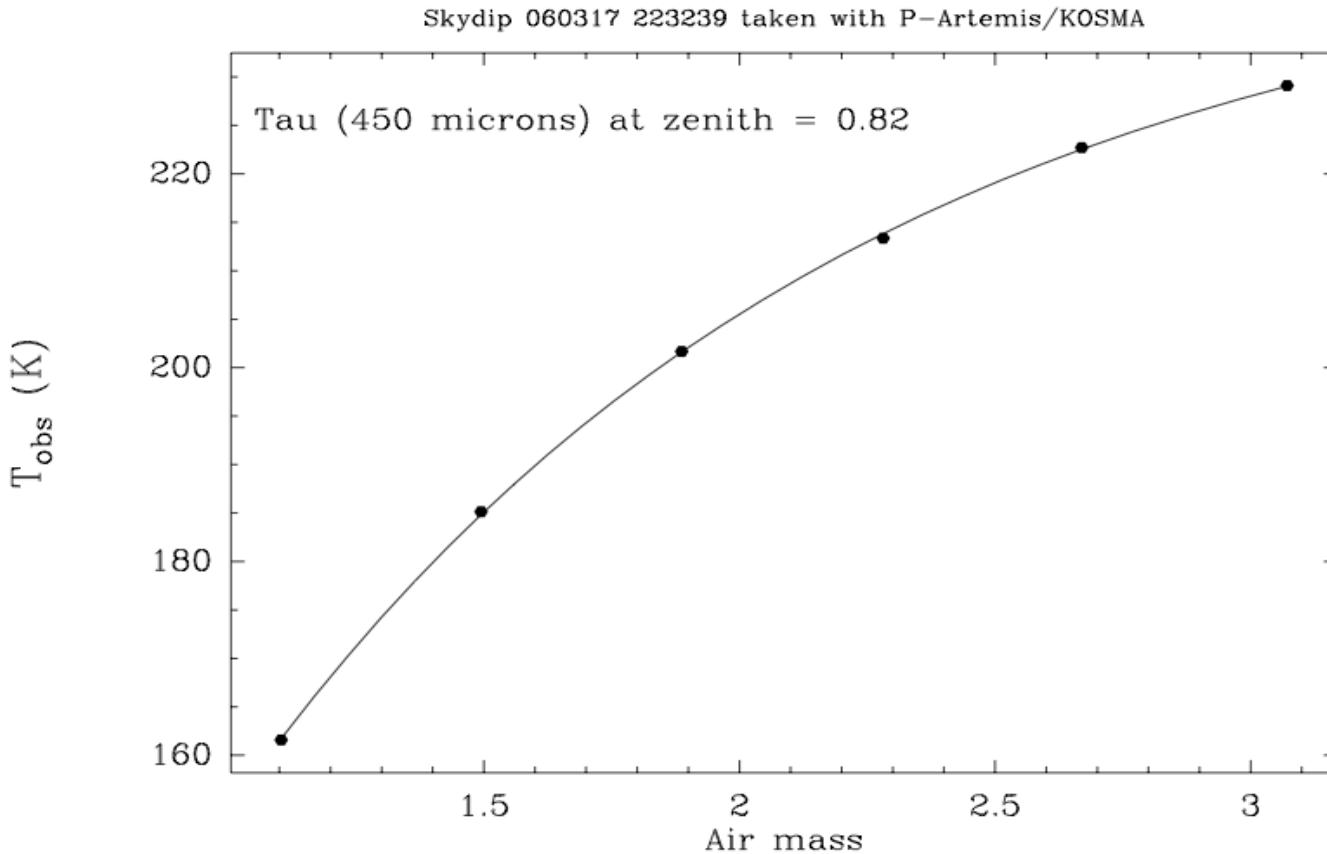
Ph. André - SD2018 ESO – 15/03/2018

## ArTéMiS: “Footprint” of the 350 $\mu$ m focal plane



# Calibrating the atmospheric opacity with skydips

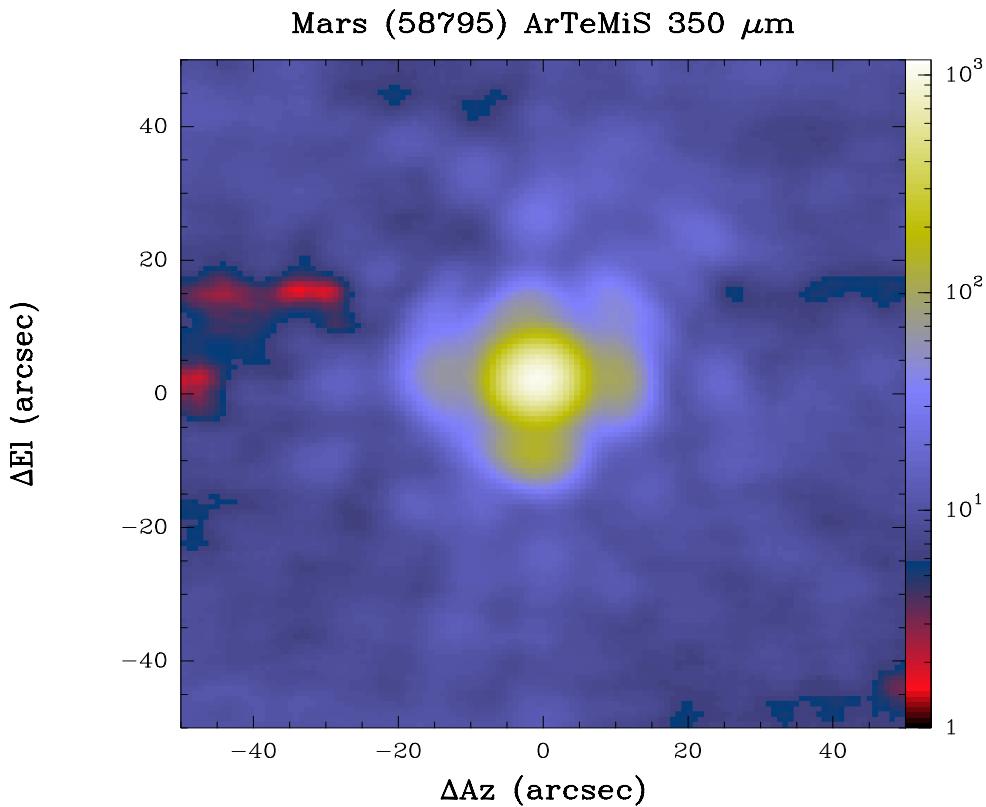
Total power measurements of the sky emission at a series of elevations (= air masses)



$$T_{\text{obs}} = F_{\text{eff}} T_{\text{atm}} (1 - e^{-\tau_{\text{atm}} A}) + (1 - F_{\text{eff}}) T_{\text{cab}}$$

# APIS: Calibration of the ArTéMiS camera

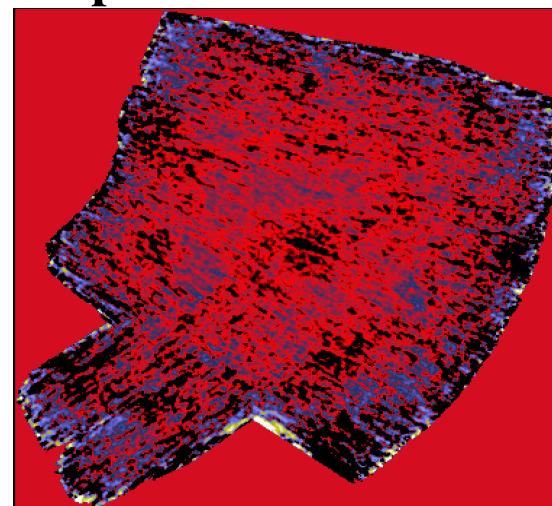
Beam Map (Mars)



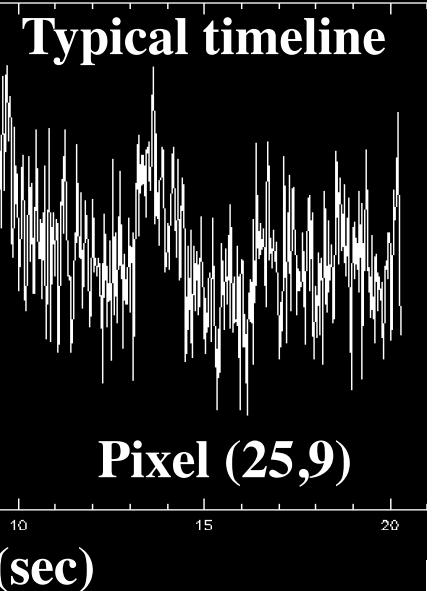
HPBW  $\sim 8''$  @ 350  $\mu\text{m}$

Calibration factor:  $\sim 10^{-5} \text{ V/Jy}$

Noise estimates using  
maps of ‘blank’ fields

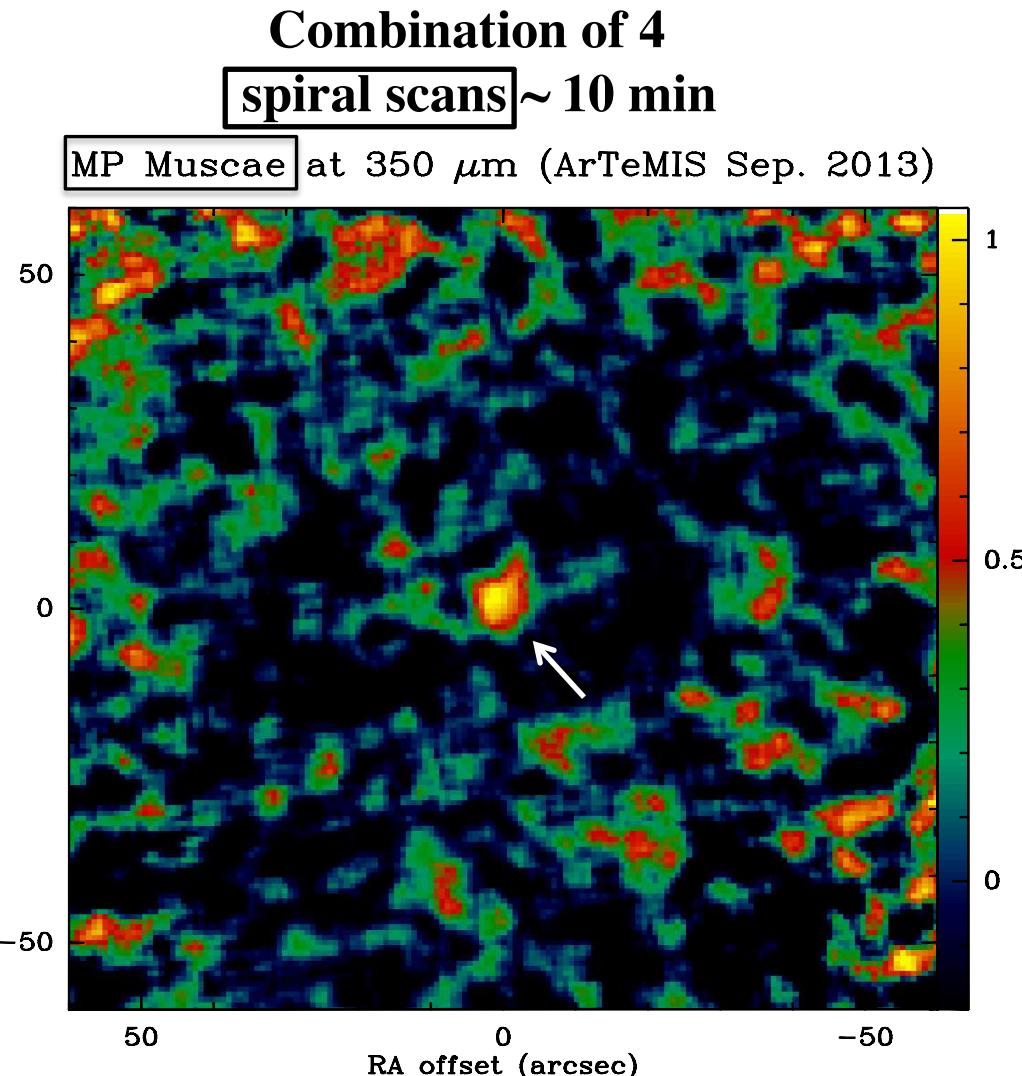


NEFD (rms)  
 $\sim 380 \text{ mJy.s}^{1/2}$   
in this example  
after baseline  
subtraction &  
correlated  
skynoise removal

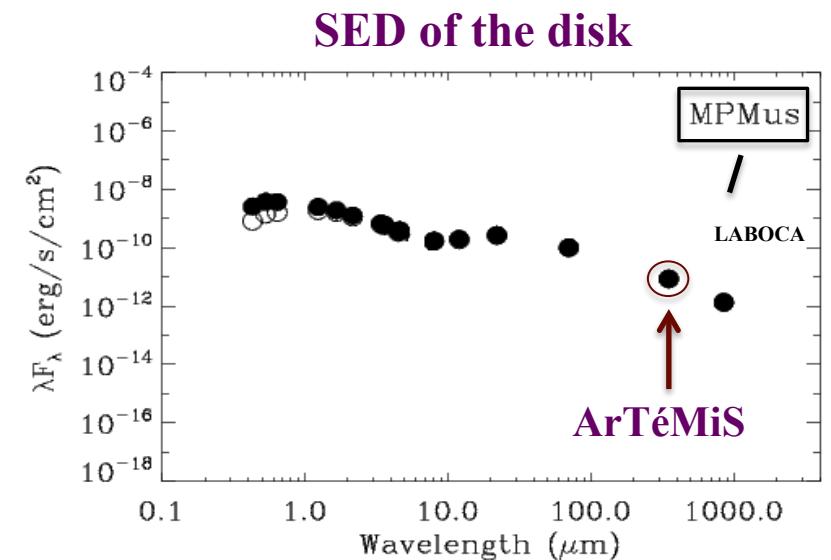


# APIS: Reduction of observations in “spiral mode”

Example of a protoplanetary (transition) disk at 350  $\mu\text{m}$  with ArTéMiS



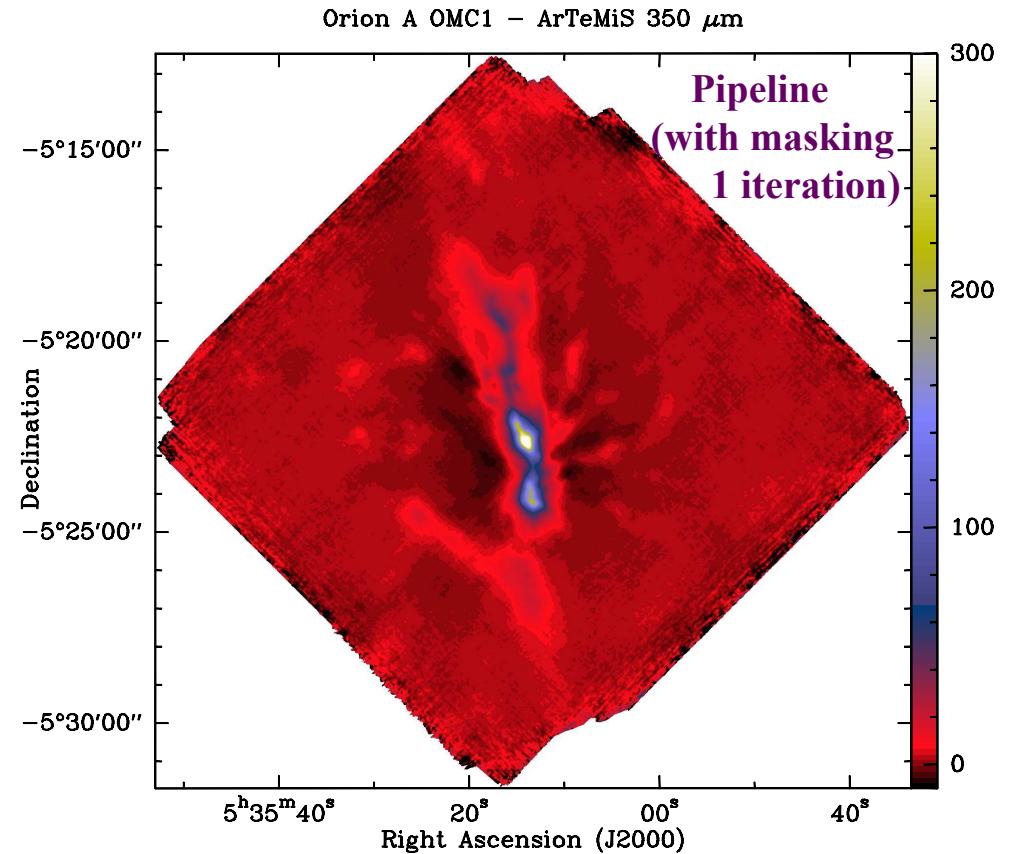
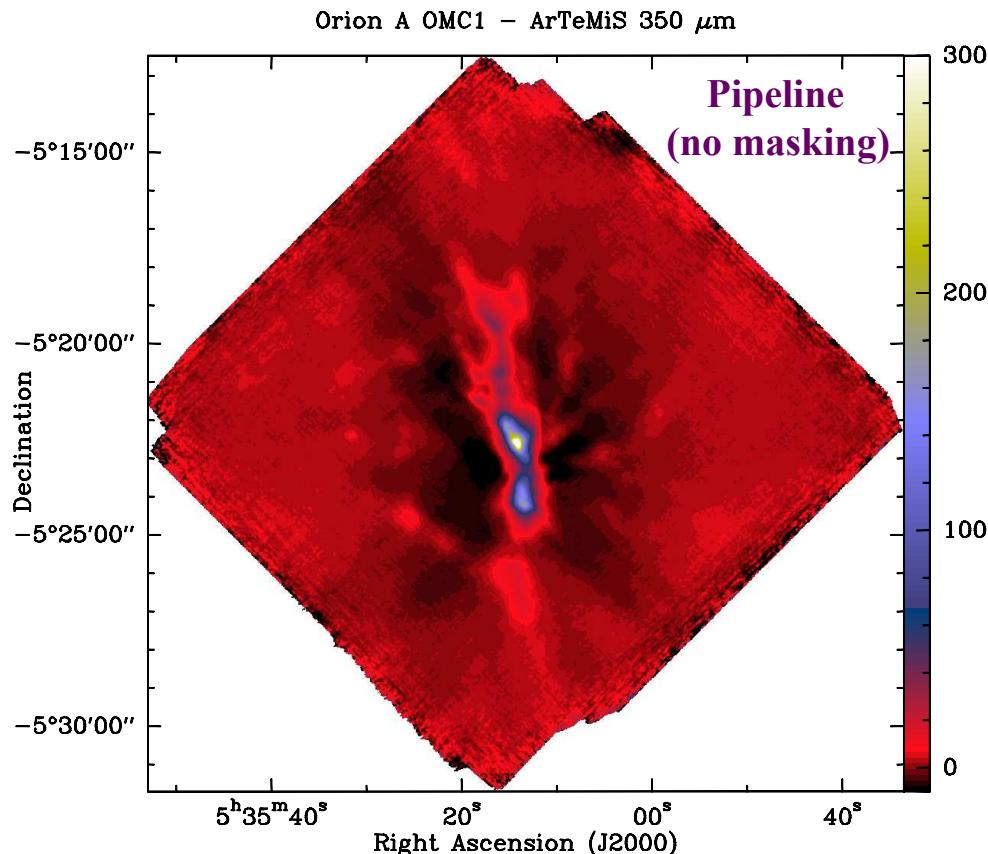
ESO Program 091.C-0822B-2013  
(N. van der Marel et al.)



N. van der Marel et al., in prep.

# Main purpose of APIS: Reducing OTF maps of « wide » fields

## ArTéMiS 350 $\mu$ m Mapping of the Orion Integral-Shaped Filament (2016 data)



Data reduction:

ArTéMiS pipeline

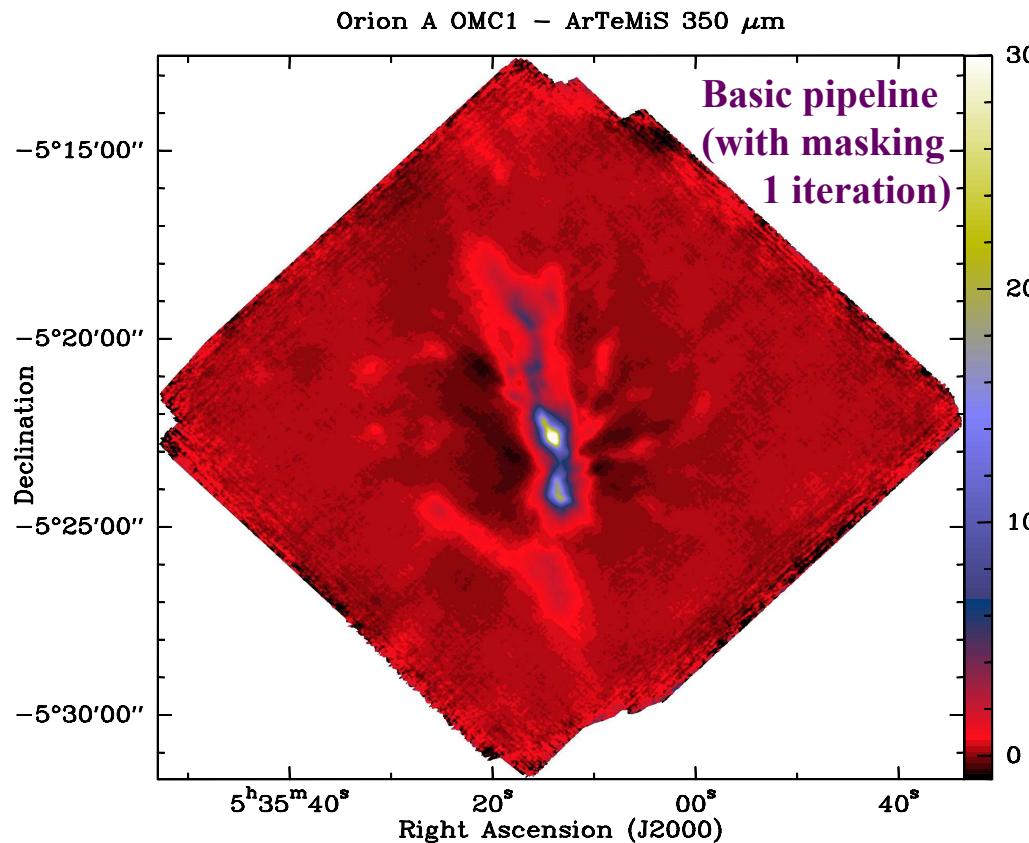
(« APIS » with IDL)

(P. Gallais, PhA, G. Willmann)

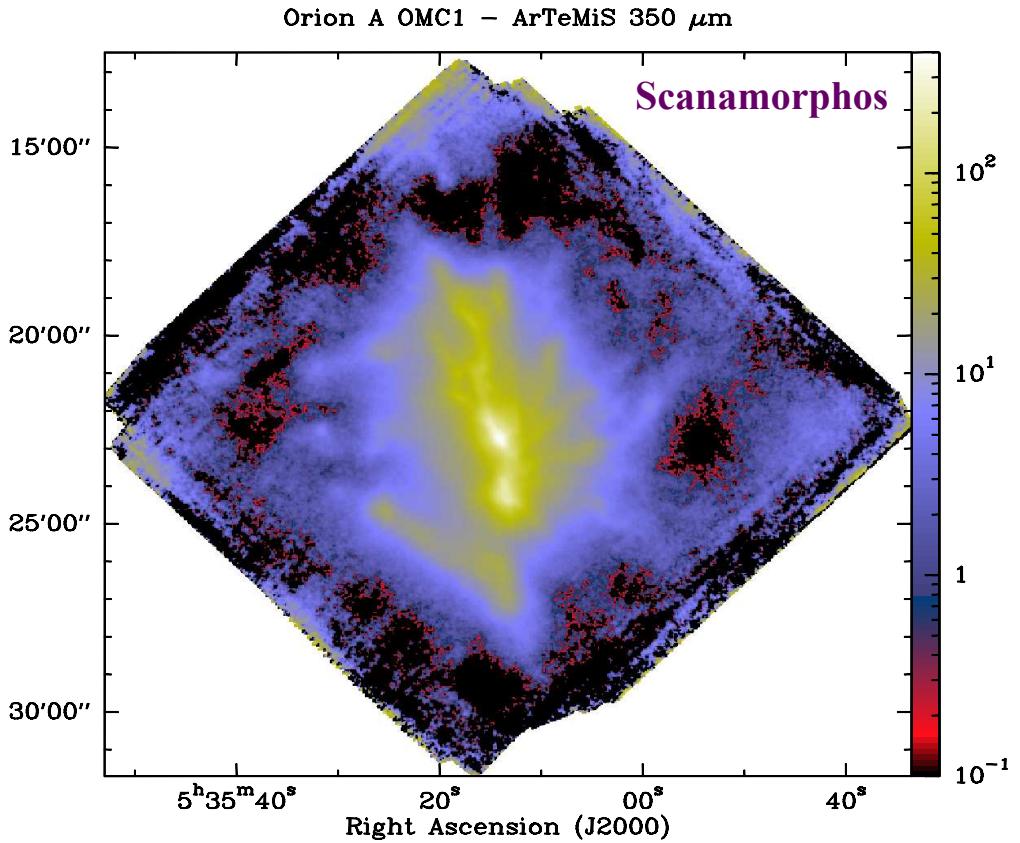
Obs.: V. Könyves, Y. Shimajiri, F. Schuller + PhA

# Main purpose of APIS: Reducing OTF maps of « wide » fields

ArTéMiS 350  $\mu$ m Mapping of the Orion Integral-Shaped Filament (2016 data)



Data reduction:  
ArTéMiS pipeline  
(``APIS'' with IDL)  
(P. Gallais, PhA, G. Willmann)



Data reduction:  
APIS + Scanamorphos  
(H. Roussel - cf. Roussel 2013, PASP)

Obs.: V. Könyves, Y. Shimajiri, F. Schuller + PhA