

# The Bordeaux VLBI Image Database

(Version 2)

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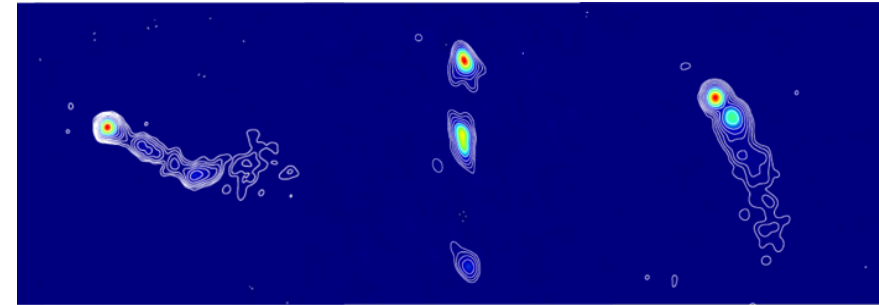
*Laboratoire d'Astrophysique de Bordeaux, Université de Bordeaux / CNRS*

*24<sup>th</sup> EVGA Meeting, Gran Canaria, Spain – March 17-19, 2019*



## Observing sources with VLBI

- Sources are not point-like at VLBI scales
- Structure can (rapidly) evolve with time  
→ Necessity to **monitor source structure**



## Observations of (ICRF) sources in the framework of the IVS

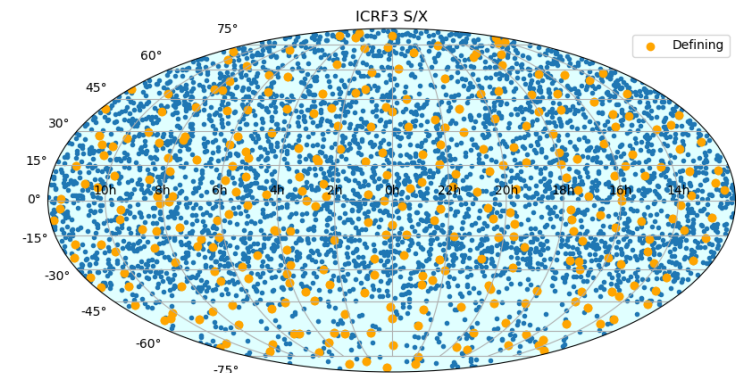
Sessions adapted to the imaging, i.e. RDV (R & D with the VLBA) sessions.

Main products:

1. *High-resolution images*
2. *Astrometric information (Structure Index)*



→ Make it accessible to everyone  
through a **database/web interface**

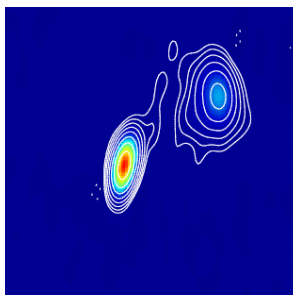


# The Bordeaux VLBI Image Database (BVID)

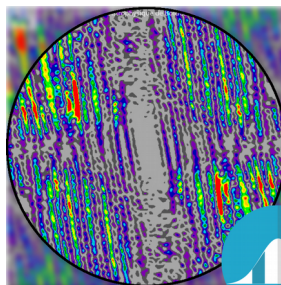


## Available products

VLBI Images

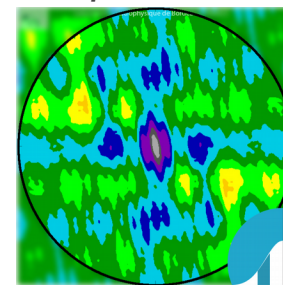


Structure Correction maps /  
Structure indices



Structure  
Index

Visibility maps /  
Compactness values



Source  
Compactness

## User interface until now

Available since 2008...

**BVID The Bordeaux VLBI Image Database**

Home BVID Database access

**NEWS (archive)**

**2018-02-08 New sessions added**  
The sessions RV116 (2016-02-09), RV118 (2016-07-06) and RV120 (2016-11-30) were added to the BVID.

**2017-06-20 New sessions added**  
The sessions RV110 (2015-03-25), RV112 (2015-07-15) and RV114 (2015-12-02) were added to the BVID.

**2016-05-27 New sessions added**  
The sessions RV102 (2013-12-11), RV104 (2014-04-1), RV106 (2014-09-03) and RV108 (2014-12-03) were added to the BVID.

*Note: The website and database are in constant evolution. If you encounter any bug, please help us by reporting it. Thanks.*

The Bordeaux VLBI Image Database (BVID) is developed by the M2A team at the Laboratoire d'Astrophysique de Bordeaux (LAB) as part of its activities for the maintenance and improvement of the International Celestial Reference Frame (ICRF) in the framework of the International VLBI Service for Geodesy and Astrometry (IVS).

The BVID contains the following products:

- VLBI images at 2 GHz (S-band) and 8 GHz (X-band).**  
Images at 24 GHz (K-band) and 43 GHz (Q-band) are also available for some sources.
- Structure correction maps and structure indices.**
- Visibility maps and source compactness information.**

The BVID contains a total of **6145 VLBI images of 1343 extragalactic radio sources** together with the corresponding structure correction and visibility maps.

The BVID may be queried by *date*, *source name*, or *coordinates*.

Details about the BVID aims, the VLBI technique and the BVID products are available in the [content](#) section.



BVID

Menu

Home

Skymap

Database Access

Help & references

Contact

BVID

The Bordeaux VLBI Image Database

Introduction

The **Bordeaux VLBI Image Database (BVID)** is developed at the **Laboratoire d'Astrophysique de Bordeaux (LAB)** as part of its activities for the maintenance and improvement of the **International Celestial Reference Frame (ICRF)** in the framework of the **International VLBI Service for Geodesy and Astrometry (IVS)**.

The BVID provides **products** and **tools** to better understand **radiosources**:

VLBI Images  
at multiple frequencies

→ Reveal **morphologies**

Structure correction maps  
& Structure indices

→ Characterize and quantify **structures**

Visibility maps  
& Source compactness

→ Indicate 'strength' and **compactness**

SOURCES  
1344

SESSIONS  
77

VLBI MAPS  
6116

STRUCTURE CORRECTION MAPS  
12891

Sky Map

Search Source:  
Ex: 0059+581

RA: NaN, Dec: NaN  
1344 sources

Nb of Obs

1 5 10 20 50

Def. Not Def. None

ICRF3 Cat.

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Disclaimer & Privacy Policy

<http://bvid.astrophys.u-bordeaux.fr>

Arnaud Collioud

24th EVGA Meeting - Gran Canaria (Spain) - March 17-19, 2019

4



# What's new?



## New interface

dynamic, modern, adaptative

## New tools

- Sky map
- Multi-criteria query form \*
- Interactive plots & tables
- Export data (images, tables, plots) \*

## New data

- Images in FITS format \*
- Source models (CLEAN components) \*
- (u,v)-plots, amplitude vs. (u,v)-radius plots \*

\*: Access to some functionalities or data requires creating an **account** on the BVID website.

The screenshot shows the BVID website interface. At the top, there's a navigation bar with 'BVID' and 'The Bordeaux VLBI Image Database'. Below this is an 'Introduction' section explaining the database's purpose. The main content area features three circular icons representing different data types: 'VLBI images at multiple frequencies', 'Structure correction maps & Structure indices', and 'Visibility maps & Source compactness'. Below these is a 'News' section with two articles: 'Official opening' and 'Presentation of the BVID'. A statistics section shows 'SOURCES 1344', 'SESSIONS 77', 'VLBI MAPS 6116', and 'STRUCTURE CORRECTION MAPS 12891'. The bottom section is a 'Sky Map' showing a distribution of sources on a celestial map. The footer includes copyright information and a disclaimer.

# Use Case 1... Queries



BVID Member area Logout

Search

SOURCE NAME DATE COORDINATES MULTI-CRITERIA

Source name: 0014+813  
ICRS or ICRF name, IAU name, other designation...  
 Partial names are allowed (Ex: '0202' or '4C1')

Search in: ☐ Name ☒ Alias ☐ Simbad first identifier

Search

Top sources of the month: 0002-478 0025+197 0046+511 0202+149 0002+541

Results: Source name 1

Source 0014+813

Source information

Name: 0014+813

Other names: Show

Coordinates (RA, Dec)  
 00:17:08.47489694 81:35:08.1365094  
 or  
 4.2853120705833 81.585593474833  
[Coordinates from "ICRF3 S/X catalog"]

ICRF2 Category  
 Not Defining

ICRF3 Category  
 Not Defining

Links  
[Aladin Lite](#) (Optical image)  
[Simbad](#)  
[NED](#)  
[OPAR](#) (Position time series)  
[MOJAVE](#)

Data

Tools

RV110 (2015-03-25)

S-band

Flux (Jy) Structure Index Compactness Map quality

1 1.51 0.69 2014.83

X-band

Flux (Jy) Structure Index Compactness Map quality

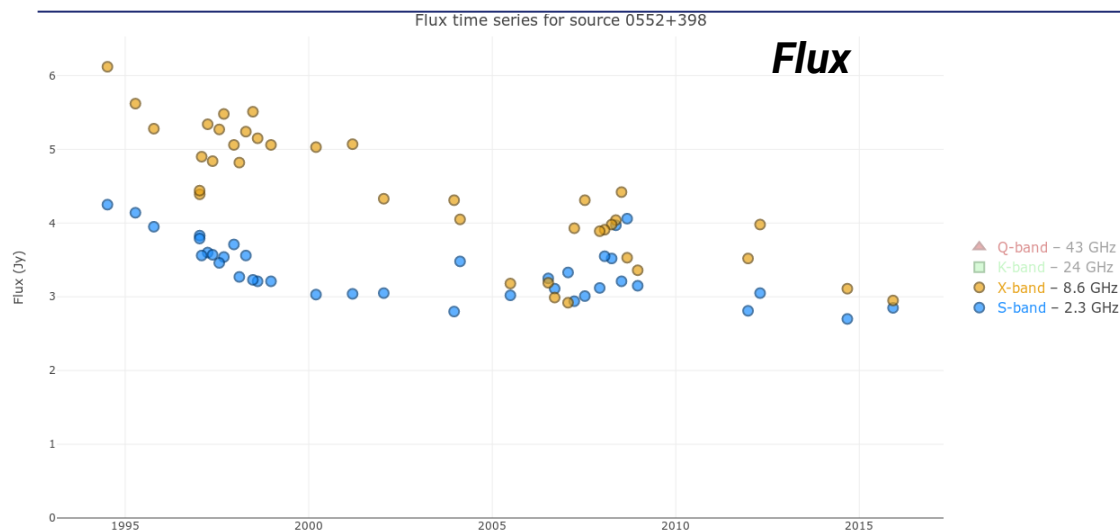
1.25 3.42 0.27 1329.15

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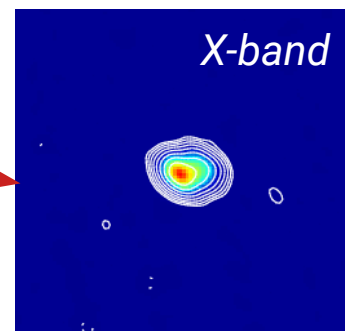
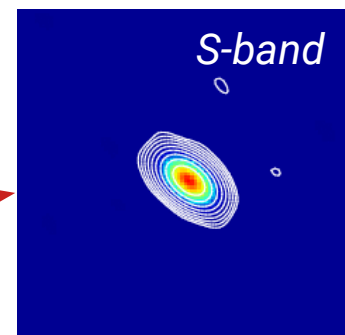
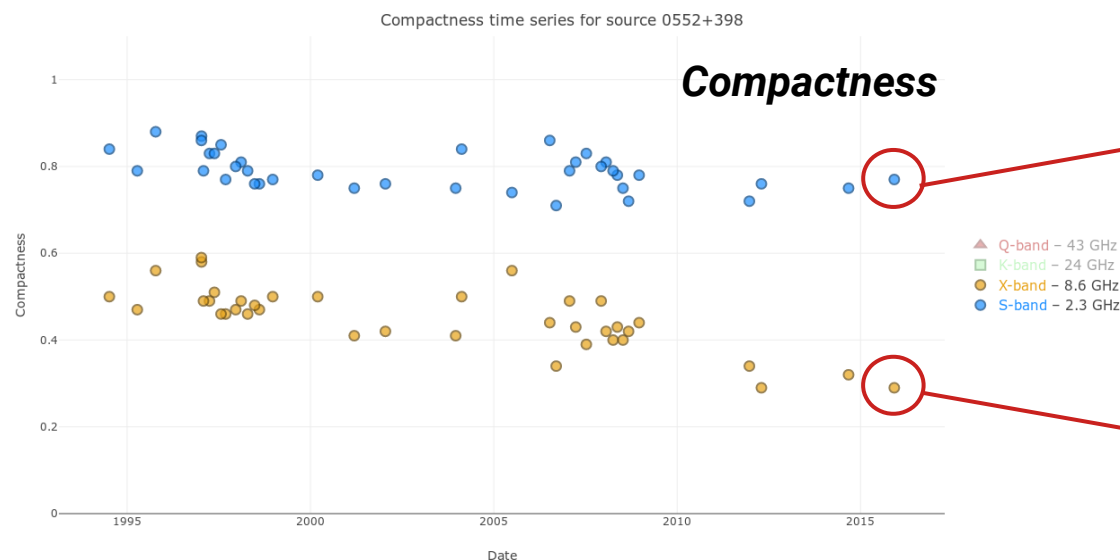
Ex: Query by « Source name »  
 (0014+813)

# Use Case 2... Time series



Source 0552+398

ICRF3 Def. source  
38 sessions from 1994 to 2015



*NB: Images not to scale*

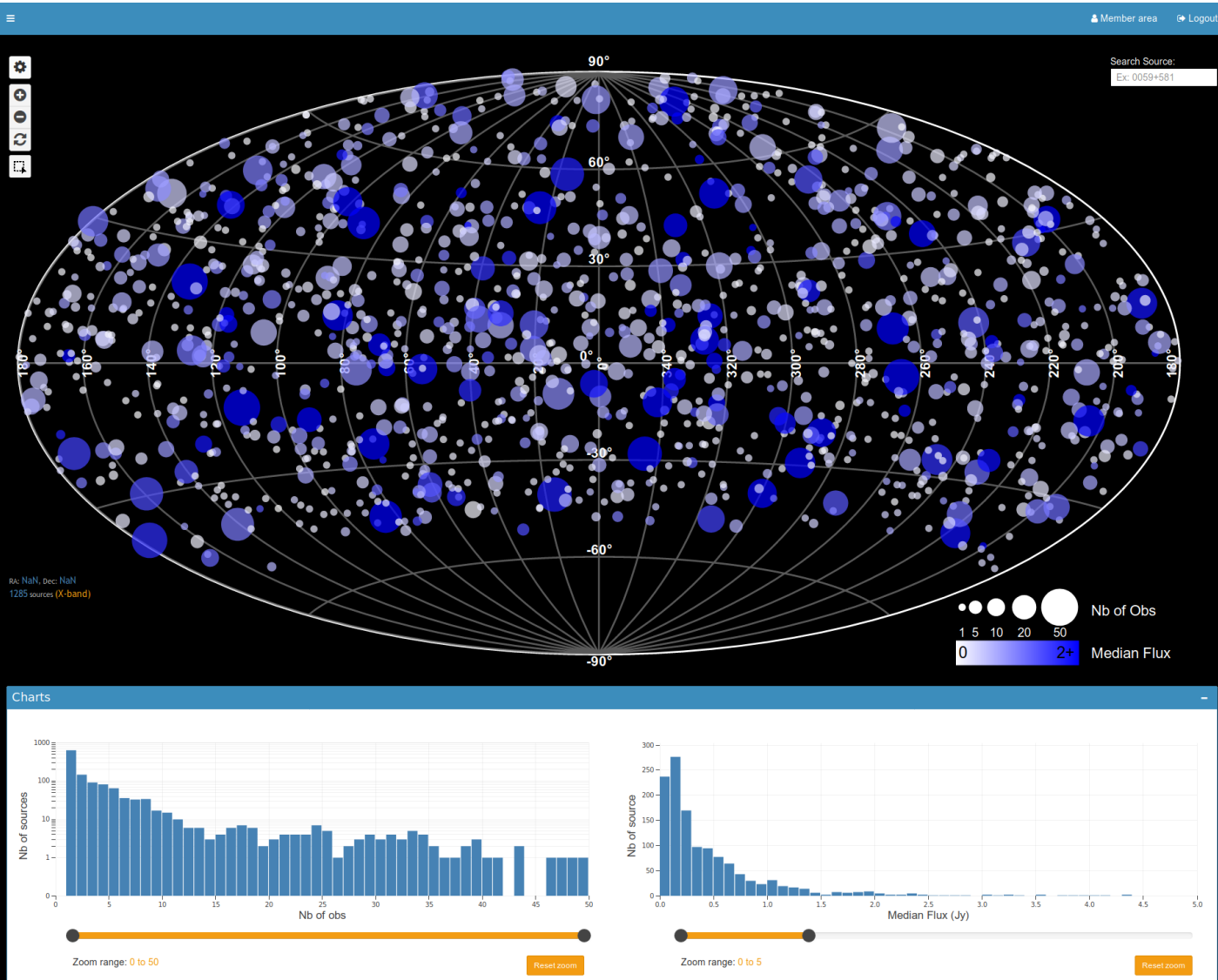
Credit: Bordeaux VLBI Image Database (<http://bvdi.astrophy.u-bordeaux.fr>)

# Use Case 3... Sky map



Median flux  
at X-band

Whole range from  
0.02 to 18.02 Jy



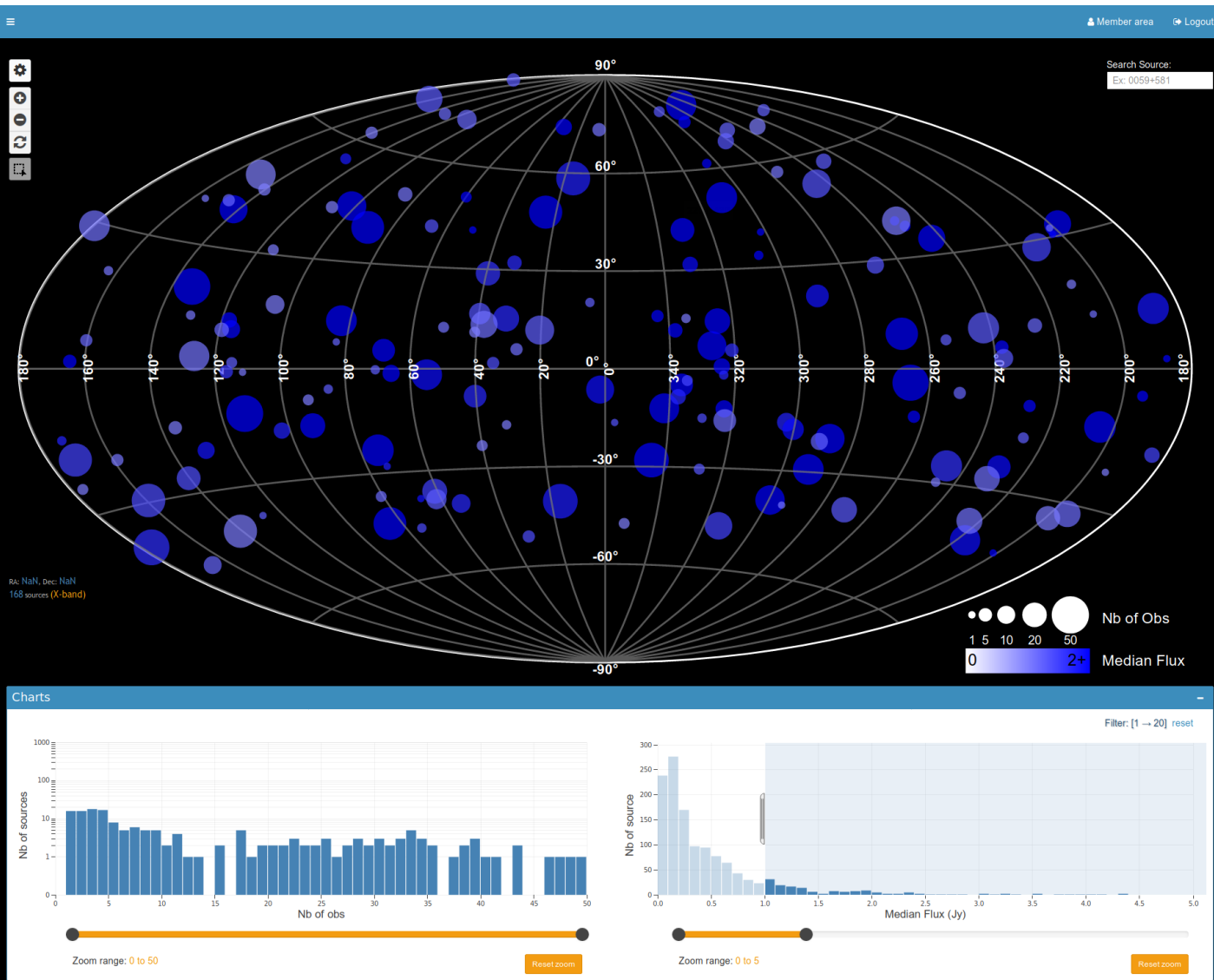
**1285 sources**

# Use Case 3... Sky map



Median flux  
at X-band

Filtered range:  
 $\geq 1$  Jy



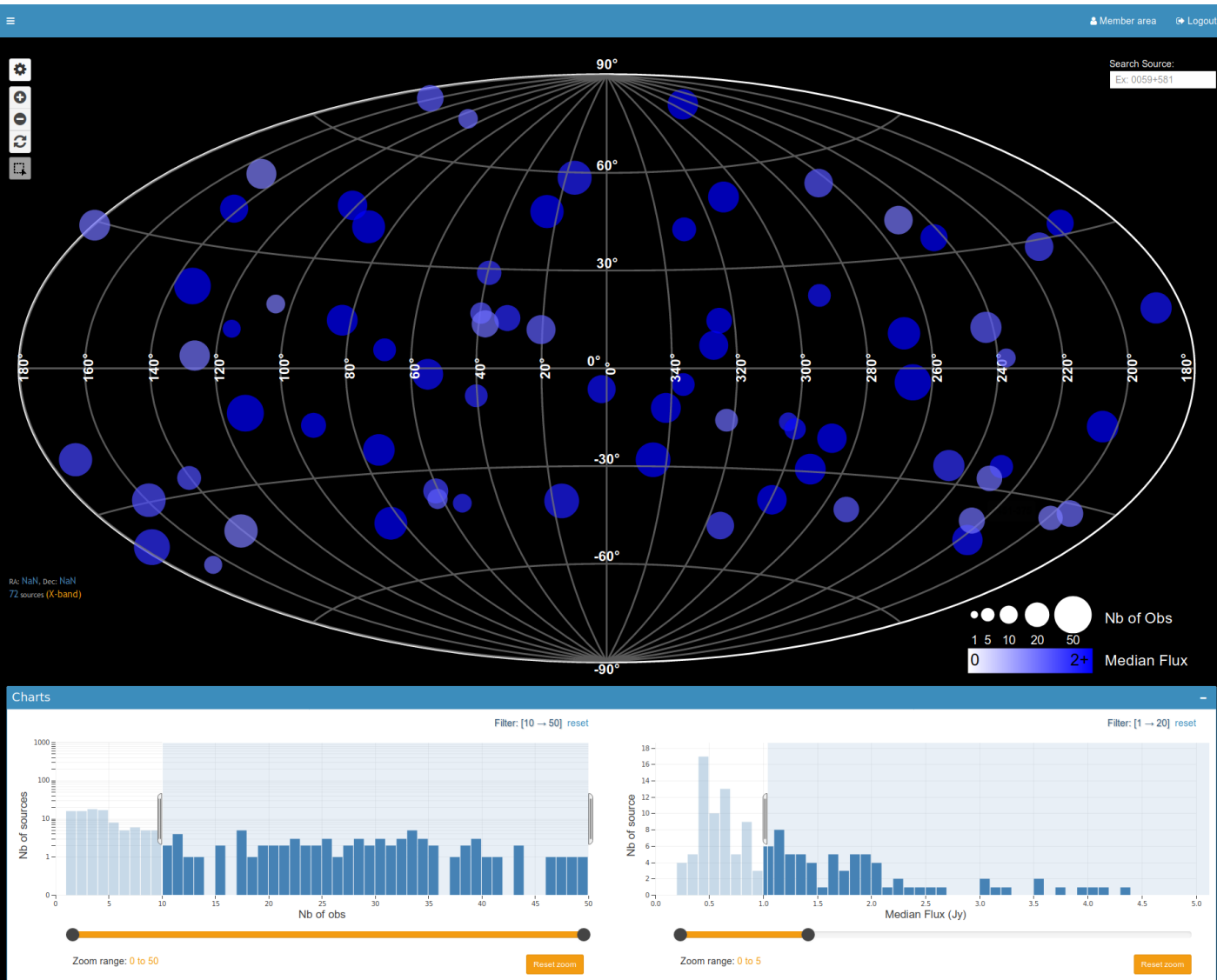
168 sources

# Use Case 3... Sky map



Median flux  
at X-band

**Filtered** range:  
 $\geq 1$  Jy  
&  
More than 10  
sessions



**72 sources**



# Use Case 3... Sky map

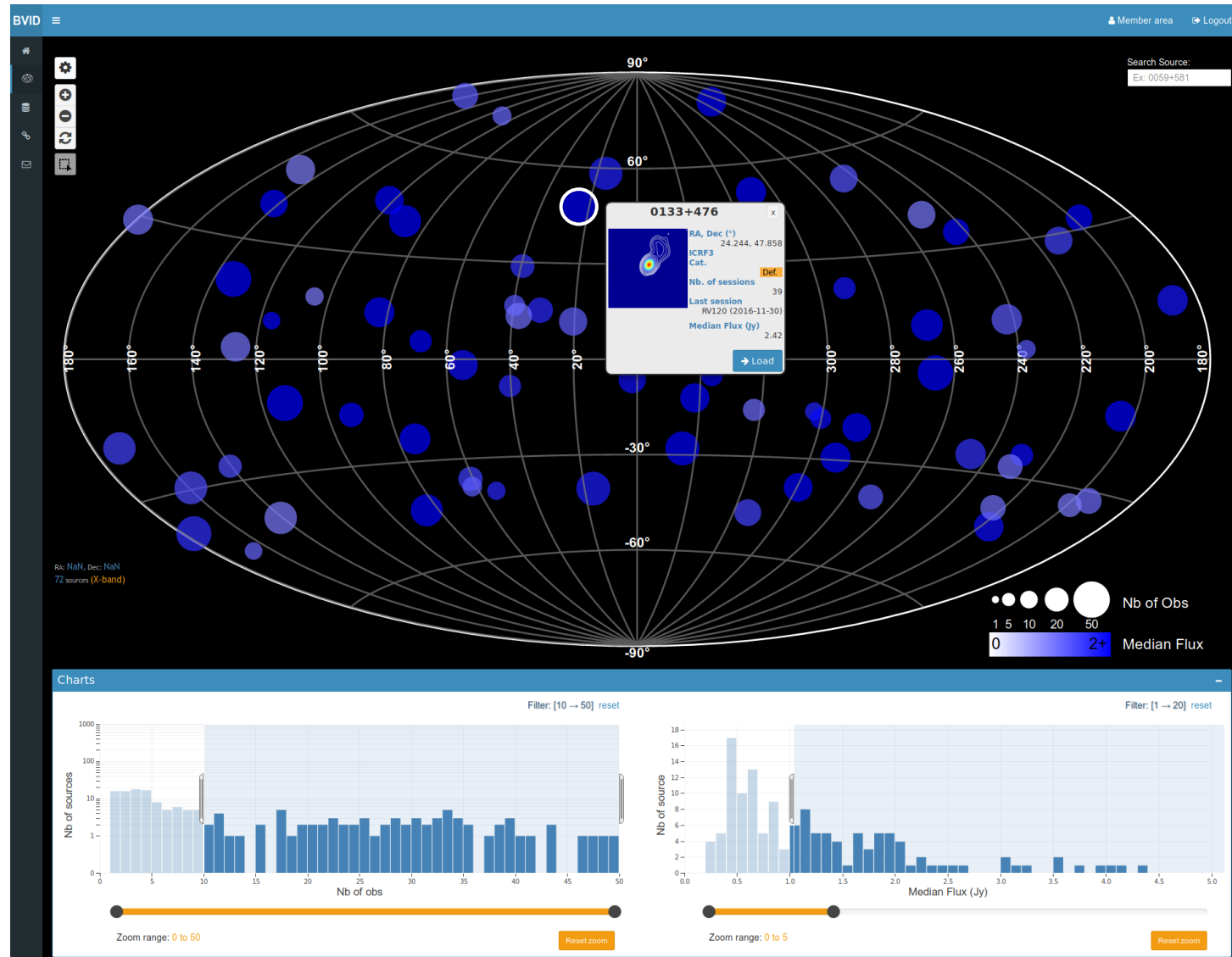


Median flux  
at X-band

Filtered range:  
 $\geq 1$  Jy  
&  
More than 10  
sessions

→ possibility to  
look at **individual  
sources**

**72 sources**



# Global statistics



On average, **4 to 5 sessions per source**  
(at X- and S-band)

## 4 frequency bands

**S** - 2.3 GHz  
**X** - 8.6 GHz  
**K** - 24 GHz  
**Q** - 43 GHz

**59 RDV sessions**  
(34 analysed at  
Bordeaux)

## ICRF3 Categories

- 246 Def.
- 1053 Not Def.
- 45 not in ICRF3



SOURCES  
**1344**



SESSIONS  
**77**

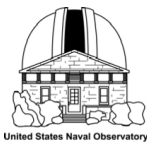


VLBI MAPS  
**6116**



STRUCTURE  
CORRECTION MAPS  
**12891**

Time span:  
**22 years**



**+ 6775 links** to images of  
the “Radio Reference Frame  
Image Database” (RRFID)

The same number of:

- Structure index
- visibility maps
- Compactness values

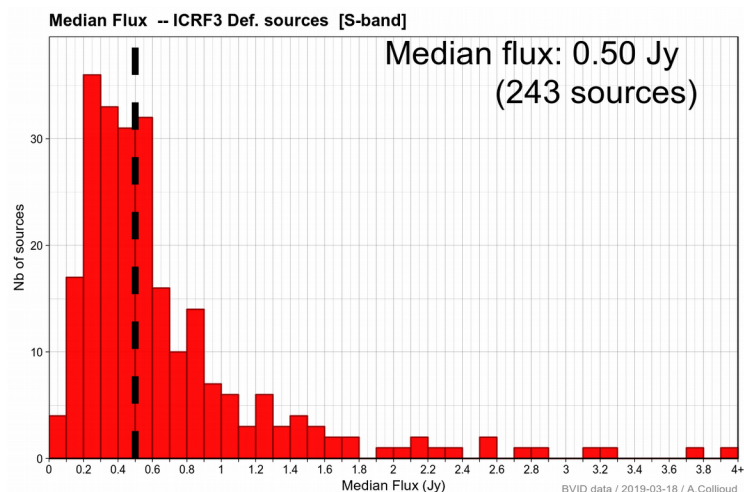
# Statistics: BVID and ICRF3



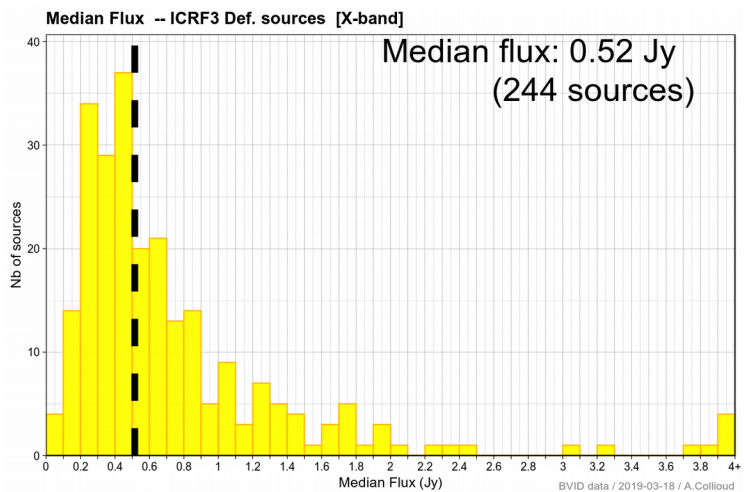
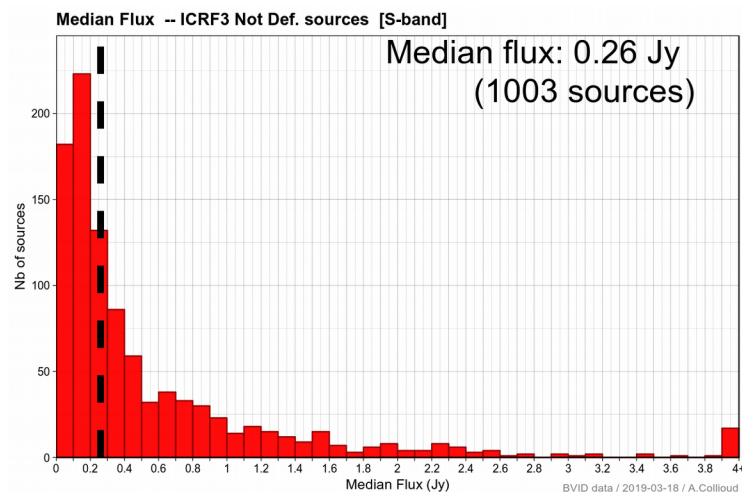
ICRF3 Def.

Median Flux

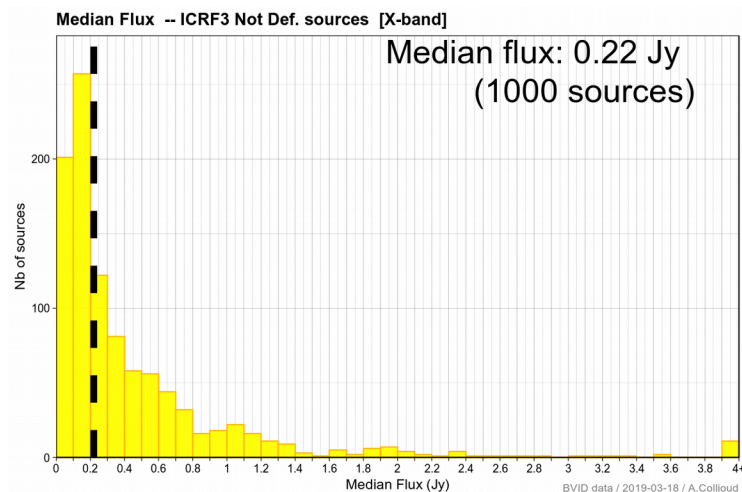
ICRF3 Not Def.



*S-band*



*X-band*



# Statistics: BVID and ICRF3

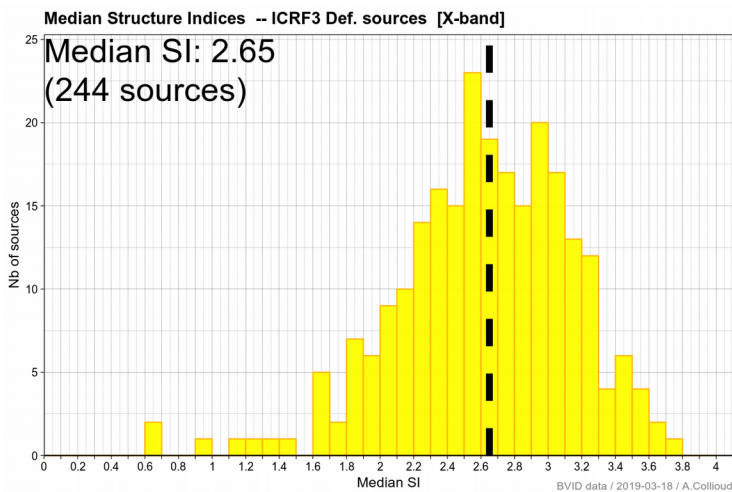
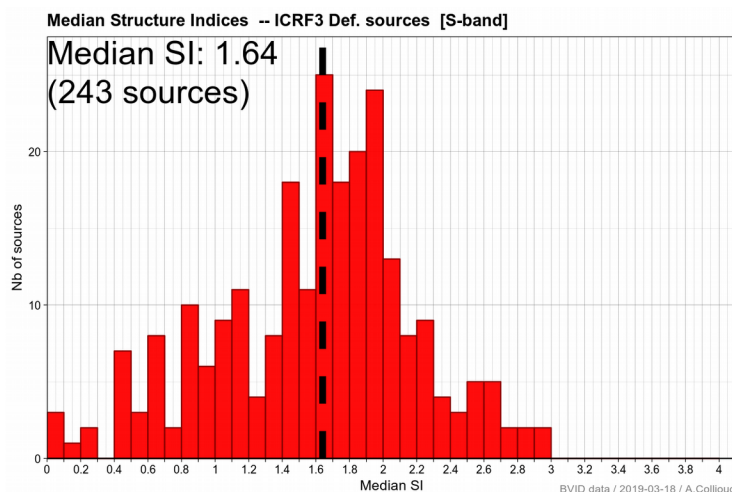


**Median  
Structure  
index**

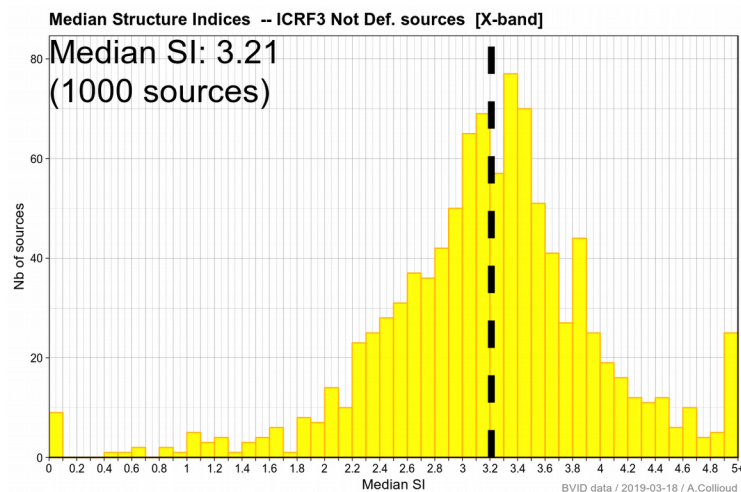
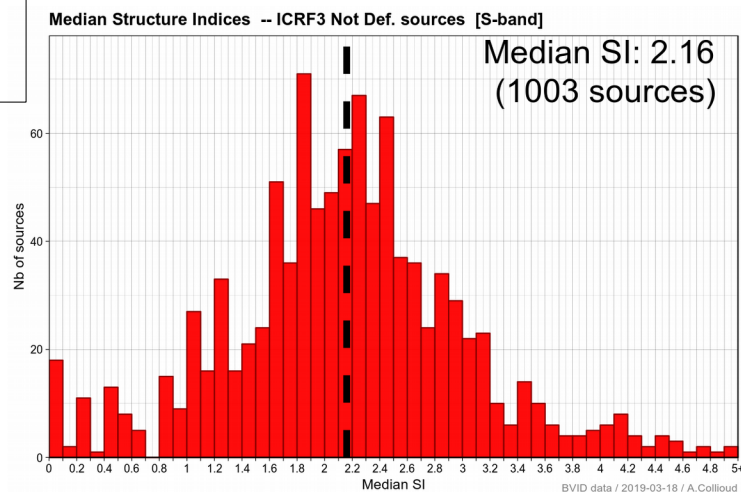
**S-band**

**X-band**

**ICRF3 Def.**



**ICRF3 Not Def.**



## “Release Candidate” version

- Ready for intensive testing
- Possible **bugs**  
→ Please contact us if you find one
- Data missing (especially for the “oldest” sessions)



## Available to host images...

- You produced VLBI images...
- ...but you do not know how to disseminate them

→ Make them **available** to the community **through the BVID** with full credits to you and your co-author(s)



*Please come to see me if you are interested!*

# Thank you!

<http://bvid.astrophys.u-bordeaux.fr>

@ Contact: [arnaud.collioud@u-bordeaux.fr](mailto:arnaud.collioud@u-bordeaux.fr)