# Densification of the International Celestial Reference Frame: Results of EVN+ Observations

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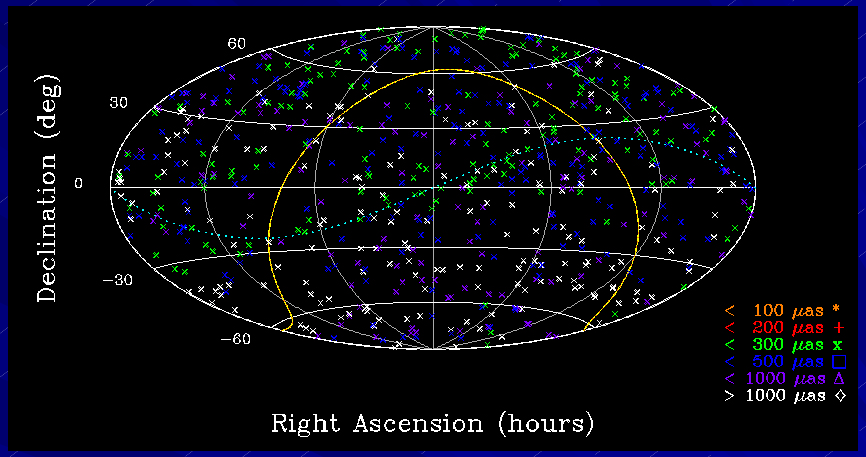
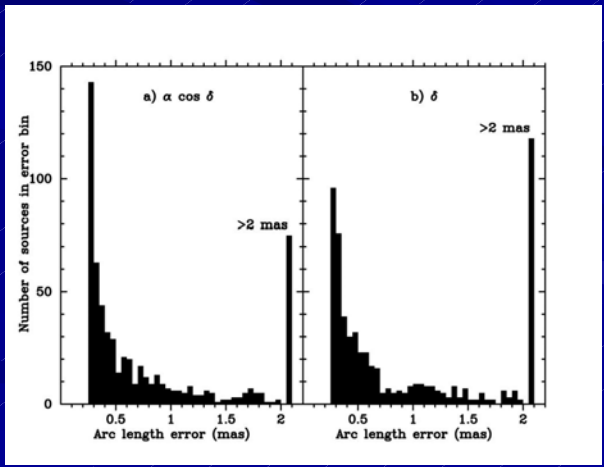
# Outline

- Current status of the ICRF
- Overview of ICRF densification project
  - source selection
  - observations
- Results
  - astrometric precision
  - comparison with VCS1 positions

# The International Celestial Reference Frame (ICRF)

- Currently 717 sources
- 250 μas position accuracy at best
- Orientation of frame known to 20 μas/yr

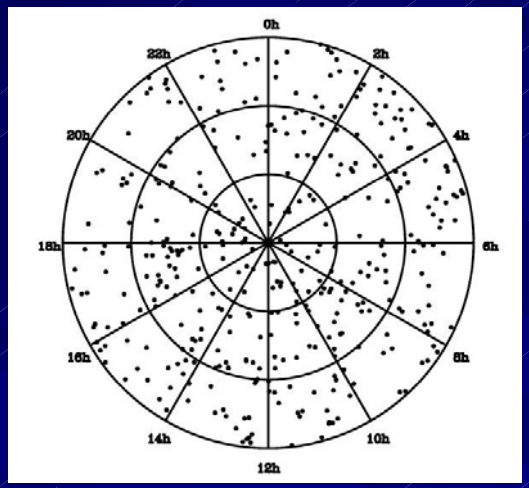


# Overview of densification project

**Northern sky**

**ICRF**

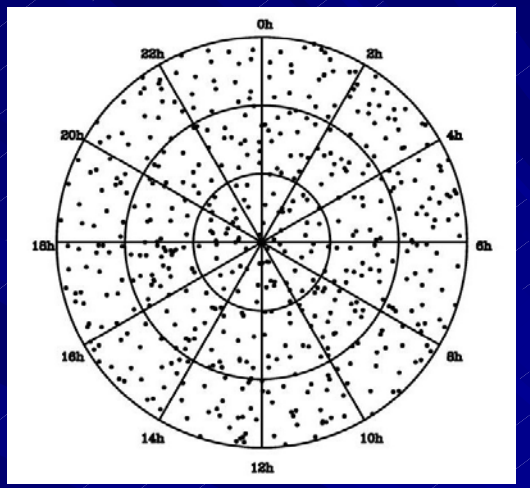



**392 sources**

**1 source / 7˚x 7˚**
**nearest source at 13˚ max**

**Northern sky**

**ICRF**
**+ 150 new sources**




**542 sources**

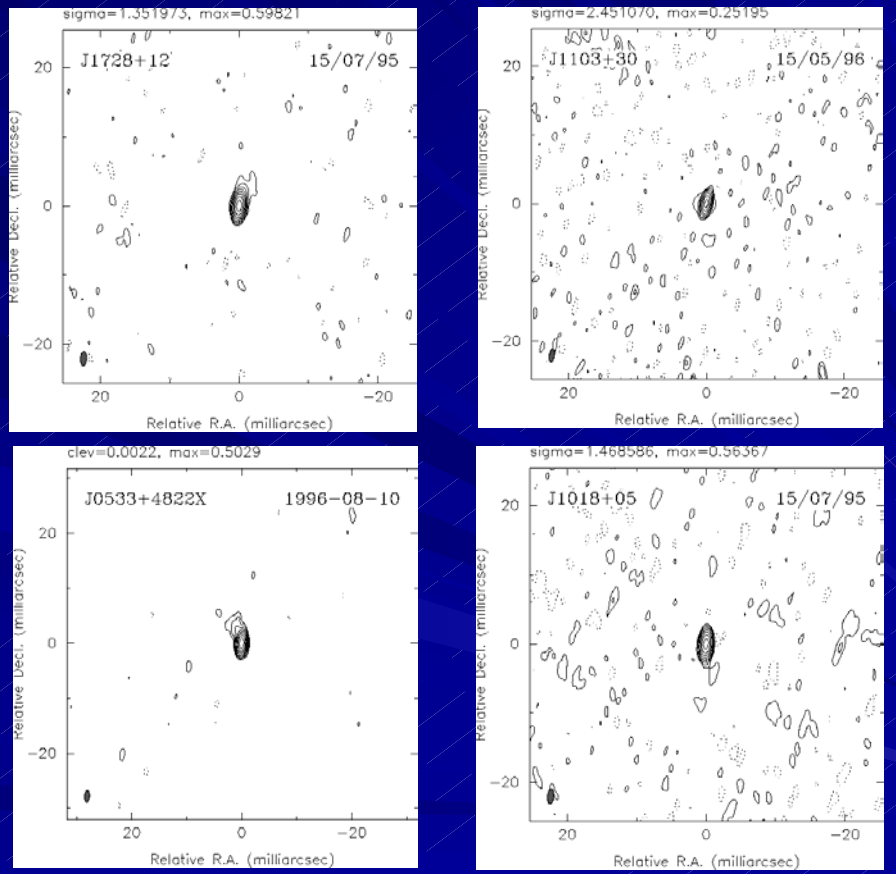
**1 source / 6˚x 6˚**
**nearest source at 6˚ max**

- Concentrate on the northern sky
- Obtain a more uniform ICRF source distribution
- Select sources of high astrometric value (no or limited extended structure)

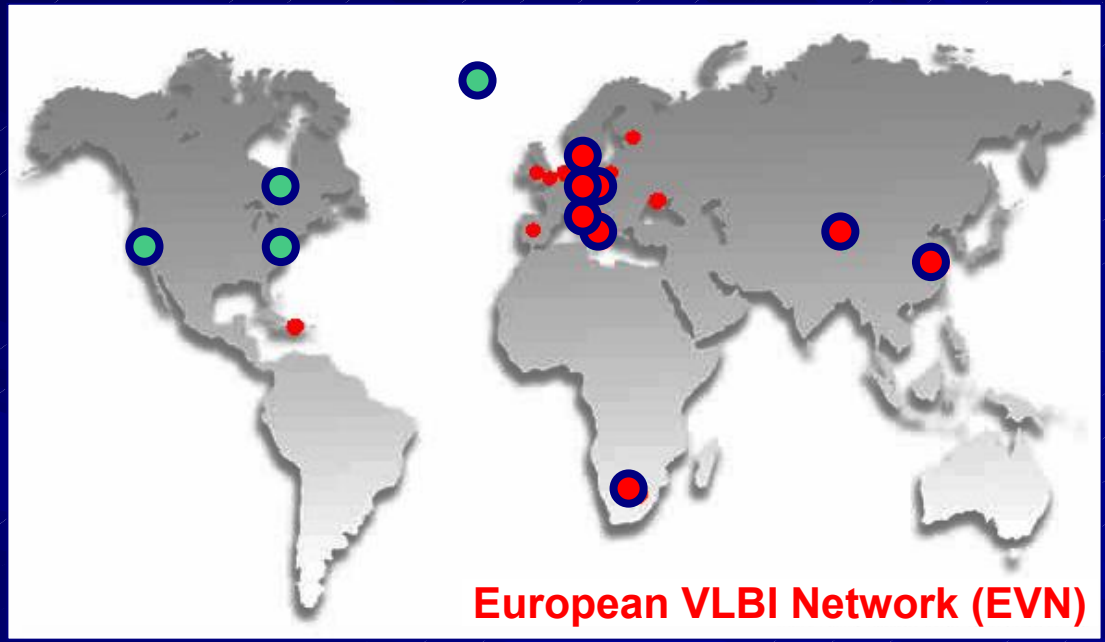
# Source selection strategy

- Input: JVAS catalog (2118 sources in the northern sky)
- Strategy: fill first the “empty” regions of the frame
- Candidate sources filtered out using VLBI images

**Typical targets**



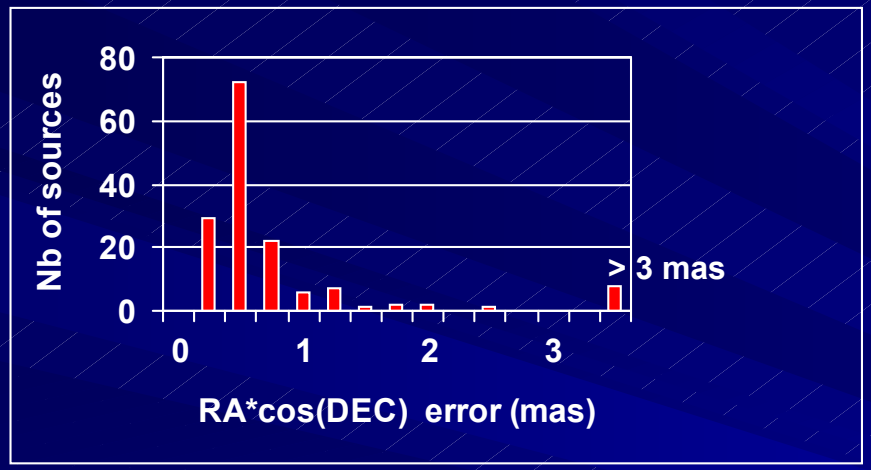
# Observations

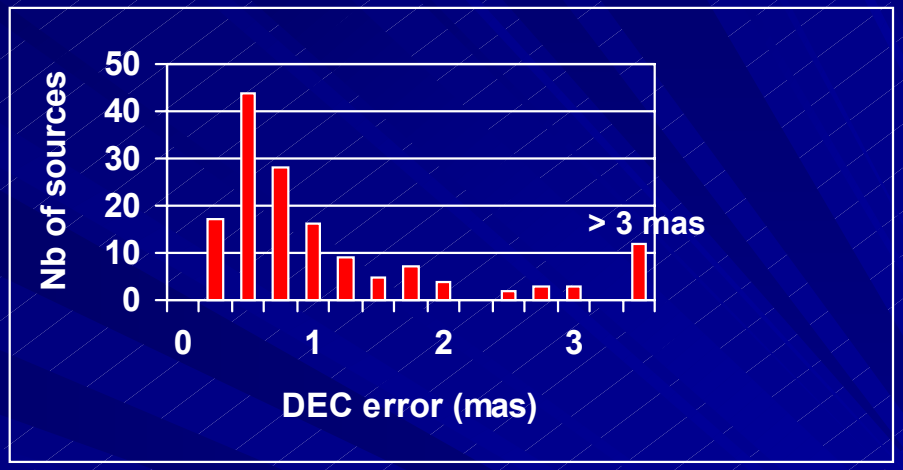



- Three 24-hour VLBI experiments carried out in May 2000, June 2002, and October 2003.
- 50 new sources + 10 high-quality ICRF sources observed in each experiment.

# Results

## Astrometric precision

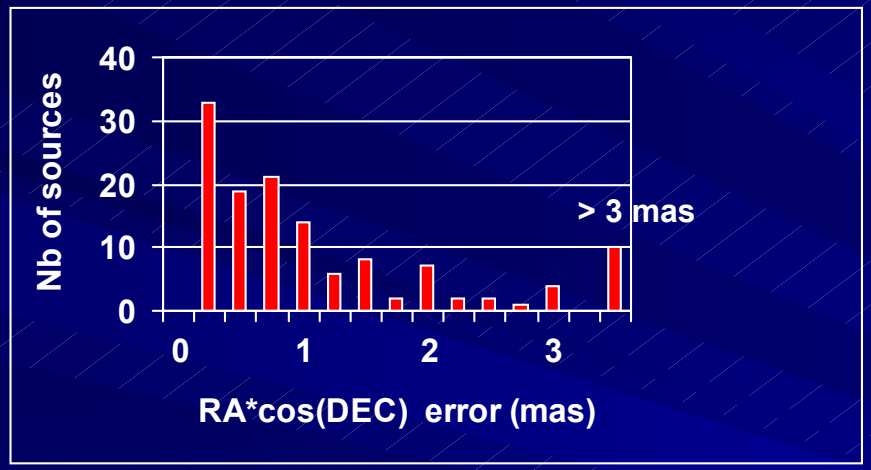


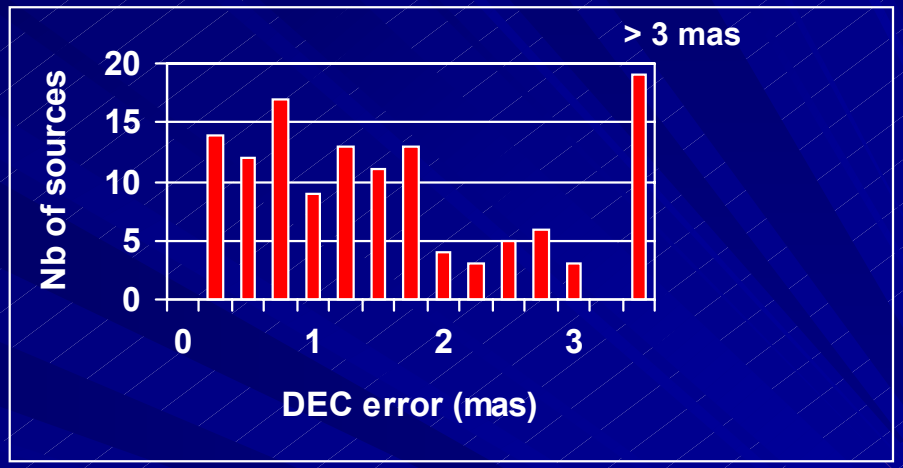




- All 150 new sources successfully detected.
- Coordinate uncertainties:
  - < 1 mas for most sources
  - larger in declination

# Results

## Comparison with VCS1 positions




- 129 sources part of the VLBA Calibrator Survey (VCS1) astrometric catalog.
- Coordinate differences at the level of:
  - < 1 mas in right ascension
  - 1-2 mas in declination

# Summary

- 150 new potential ICRF sources observed AND detected in three EVN+ experiments.
- Coordinate uncertainties < 1 mas for most sources.
- Agreement at the 1-2 mas level with the VCS1 astrometric positions.
- Further investigation of the VCS1-EVN+ differences necessary to search for possible systematic trends.