

# What's in a name – the early days of JIVE

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JIV-ERIC Symposium, Diwngeloo

20 April 2015

# 1975-1980 context



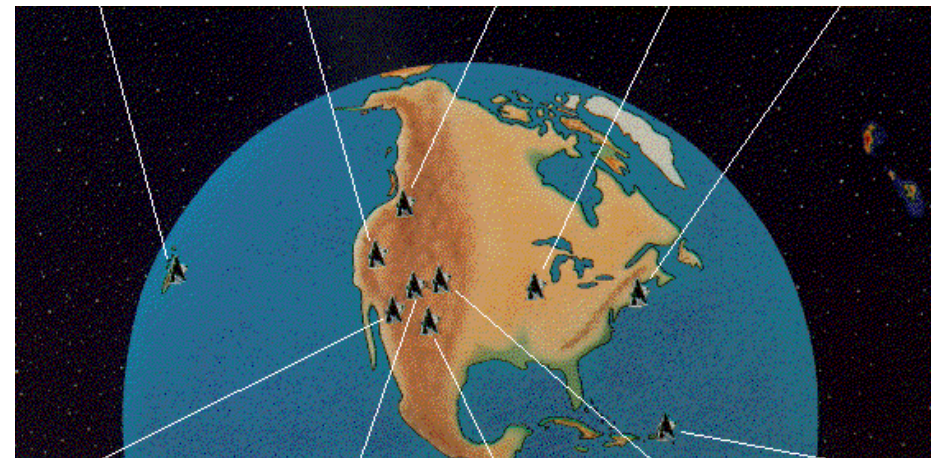
## Genesis of the EVN

see talk by Roy Booth

**US Network** established in 1976

NRAO proposal for an  
**intercontinental array**

See talk by Ken Kellermann

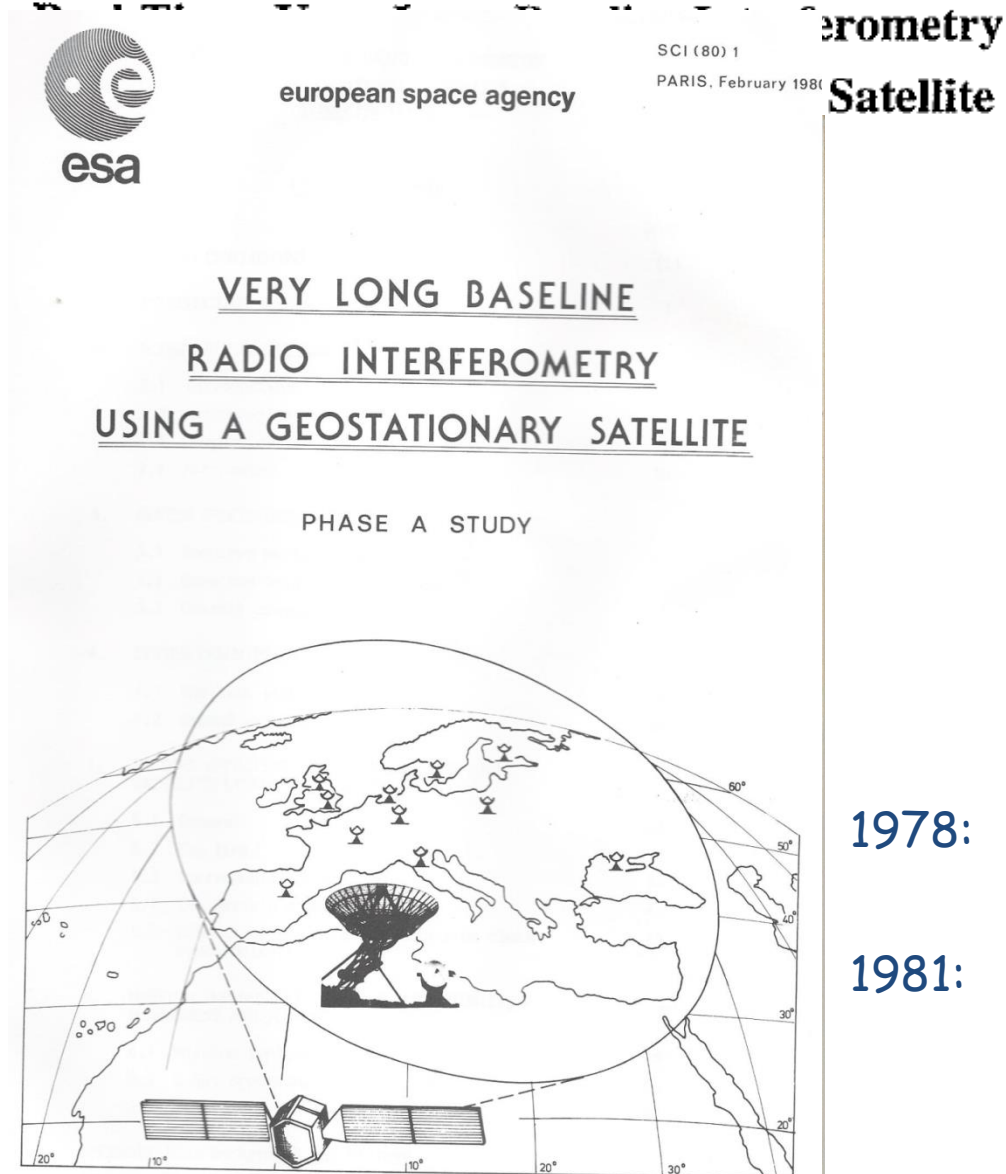


# European discussions on (large) correlators

- late 1970s** Internal discussions in MPIfR, Jodrell Bank, and NFRA
- Nov 1979** MPIfR decision
  - purchase 3-station Mk3 correlator from Haystack
- Mar 1980** First meeting of Telescope Directors in Bonn discussed satellite-linked VLBI and data processing needs - **8-station real-time correlator**

# satellite-linked VLBI

1977



erometry

Satellite

1978: ESA Feasibility Study of satellite-linked VLBI

1981: ESA Phase A study of satellite-linked VLBI using L-SAT

# European discussions on (large) correlators

- |                                |   |
|--------------------------------|---|
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| <b>Mar 1980</b>                | First meeting of Telescope Directors in Bonn discussed satellite-linked VLBI and data processing needs – 8 station real-time correlator |
| <b>Mar 1980 –<br/>May 1981</b> | Exchange of letters between EVN (HvdL) and ESA on L-SAT opportunity   |

# European discussions on (large) correlators (2)

- early 1981      Proposal to utilise WSRT Digital Line backend design for a VLBI correlator for satellite-linked VLBI (Schilizzi, Miley, Goss)
- Jun 1981      Director's Meeting in Leiden discussed EVN data processor needs again
- ESA required 2.5-3.5 MECU for modifications to L-SAT for VLBI + pay for ground stations at each telescope**  
                  → Demise of satellite-linked VLBI
- early 1982      QUASAT feasibility study begins
- Jan 1983      Director's meeting in Garching
- 1) upgrade Mk3 processor at MPIfR to 12 stations  
                  2) develop new generation (12 station) data processor in Dwingeloo for the longer term future

# The courtship of Brussels begins

- Sep 1983** proposal by Giancarlo Setti et al to EC for expansion of Mk3 correlator. Not successful
- ? 1983** Contact by Setti with Herbert Curien, President of the ESF
- Jul 1984** Directors Meeting in Vienna  
European Consortium for VLBI formed with the aim to find funding for a large correlator centre
- ?1984** Setti contact with Prof Fasella, D-G of Research in EC

# The courtship continues for some time...

**Feb 85**

Decision by Consortium Board to seek funds from 'Europe' for a 12-station correlator to be located in Dwingeloo

MPIfR Directors decided to upgrade their 3-station correlator to 5-stations. (Operating a large correlator as a service facility for the European community not within MPG remit)

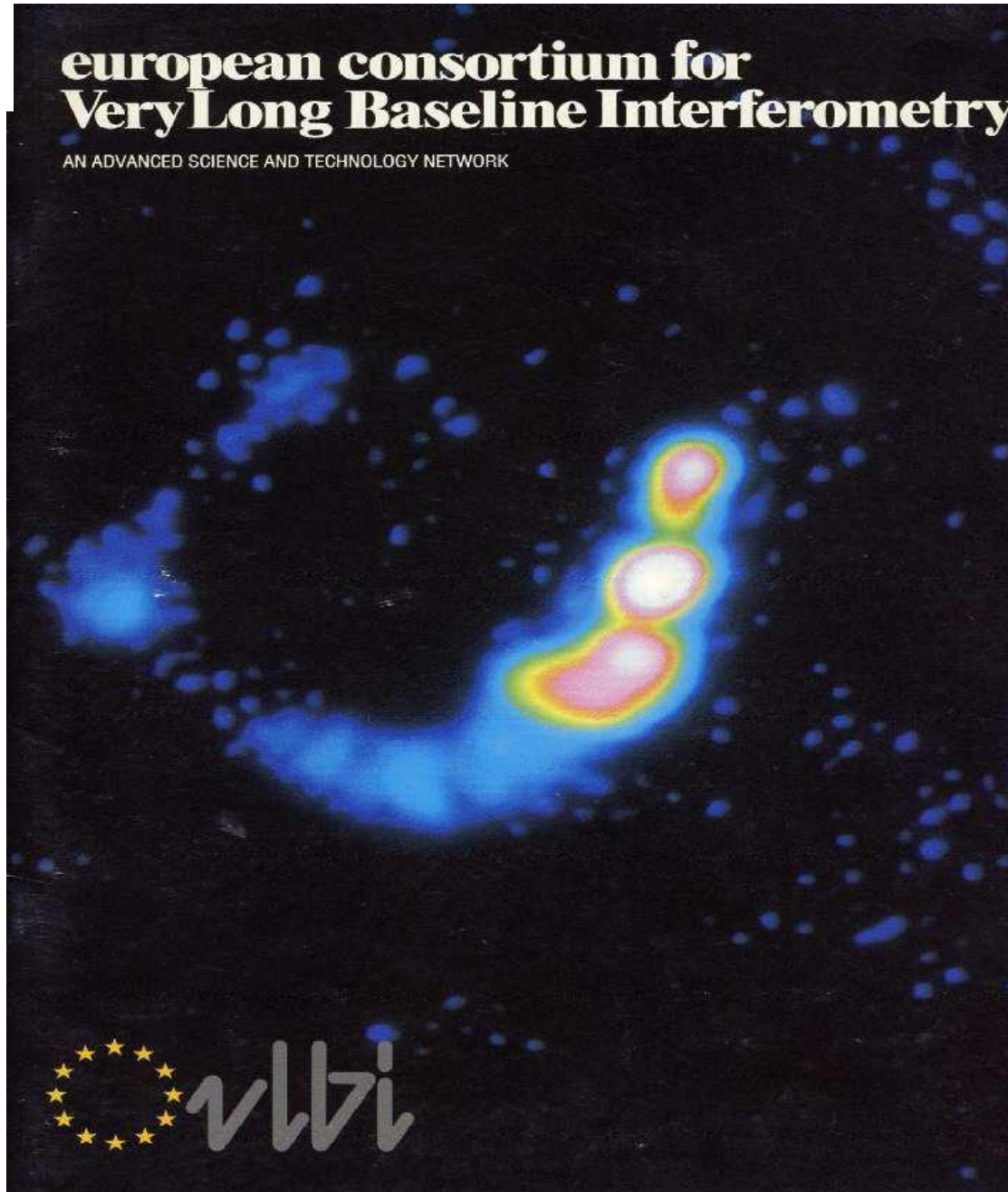
**Nov 85**

EVN brochure published



# europaean consortium for Very Long Baseline Interferometry

AN ADVANCED SCIENCE AND TECHNOLOGY NETWORK



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- Nov 85** EVN brochure published
- May 86** visit to DGXII in Brussels by NL representatives, R. van Lieshout, Harry van der Laan, RTS

# Serious proposal writing and “discussions”

- Nov 86** Proposal for the EVN data processor (12 stations) submitted to CEC and circulated to European Science Ministries
- Mar 87 – Jan 88** discussions with Prof Jules Horowitz, DGXII consultant on Large Facilities Programme  
Result: VLBI not recommended
- Sep 87** EC Framework Programme approved
- Jan + May 88** Consortium Board discusses “science” programme with DGXII representatives
- Jun 88** Proposal to EC for the first phase of a 20 station data processor (total cost 17.8 M€)

# Finally some traction

- Dec 88** CODEST Committee report highlighted “the extremely high quality and scientific value of the project, but lack of funds in the science programme meant that only a feasibility study could be funded”
- Consortium delegation discussed future strategy with Director of Science Stimulation Programme in DGXII (Herbert Allgeier)
- Feb89** Nature uses VLBI as an example of a project that should be funded by the CEC

# nature

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NATURE VOL. 337 23 FEBRUARY 1989

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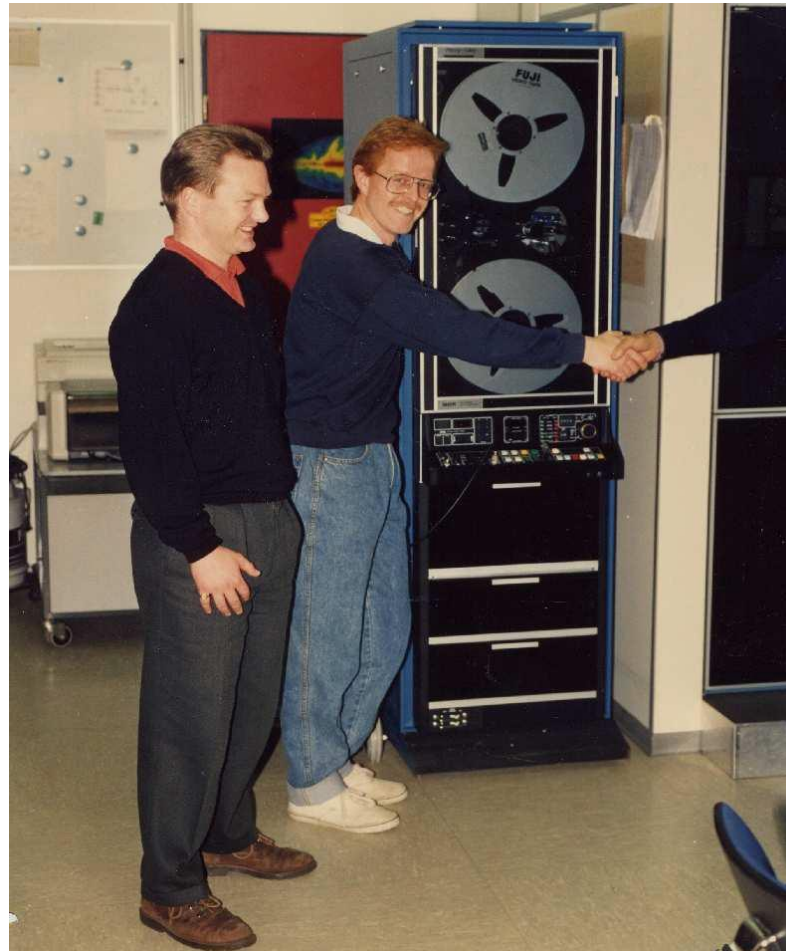
## What science for Europe's 1992?

*An acid test of the European Community's intentions in support of science after 1992 is its willingness to respond to an imaginative proposal from radioastronomers.*

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- Feb89** Nature uses VLBI as an example of a project that should be funded by the CEC
- Feb 89** NL Science Minister (Deetman) discusses VLBI with his French counterpart (Curien). Decided to consult other ministers on inviting ESF to report on VLBI priority within ground-based astronomy
- NL delegation discussed VLBI with a Dutch MEP
- Apr 89** Feasibility study of VLBI tape recorders submitted to CEC
- Jun 89** Approved

# Penny & Giles tape recorder delivered to Bonn, 1991



# The final steps....

- Apr 90** Ministers agree to ESF Review  
NL and FR request ESF to take action
- Jul 90** ESF Review Panel on ground-based astronomy  
recommends funding by EC
- Oct 90** NL Ministry led pressure on Brussels for EC funding of  
pure research facilities like VLBI in the Framework  
programme
- May 91** NL Ministry reserves 12 Mfl (€5.5M) in the Budget for  
International Facilities (BIF)
- Sep 91** NL Ministry invites other European Science Ministries to  
a meeting to decide on VLBI funding



# Funding at last!

## 19 Feb 1992

- 5.5 M€ from Ministry of Education and Science in NL
  - 0.3 M€ from CNRS in France
  - 0.55 M€ from the Swedish Wallenberg Foundation
  - Engineering support from Jodrell Bank Observatory in the UK, CNR in Italy, and IGN in Spain
- ? **1992** FP3 HCM grant (1M€) to EVN for Access to Large Scale Facilities and \$300k for Fellowships.

# What's in a name?

## Why JIVE?

Easy to remember in an era of E-everything  
(ESO, ESA, EMBL,.. European VLBI Institute)

Not everyone approved!

African-American slang: deceptive, nonsensical, or glib talk

Jazz or swing music

## Logo

Competition among the Dutch astronomy departments  
won by Olaf Kolkman from Groningen

9 June 1993

# official opening of JIVE in Dwingeloo



Director of Science Policy in the NL  
Education and Science Ministry

Ambassador of Sweden  
Representatives of the Embassies of  
France, Italy, Spain and the UK  
Queen's Commissioner for Drenthe





mr. A.H.C. van Drooge  
notaris te Dwingeloo

AFSCHRIFT

ENER AKTE VAN

OPRICHTING

VOOR:

STICHTING "JOINT INSTITUTE for V.L.B.I. in EUROPE  
(J.I.V.E.)"



First Chair of JIVE  
Board –  
Roy Booth

# The EVN Data processor at JIVE

- 1993 –1998 design, prototyping, and construction of EVN 16-station processor by international consortium  
  
Part of the EVN Upgrade
- Total cost 8.7 M€ including manpower
- 22 Oct 98 official opening of EVN Data Processor at JIVE

# Correlator design

First meeting March(?) 1992

Albert Bos

Alan Whitney

Sergei Pogrebenko

Bryan Anderson

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$$

$$\nabla \cdot \mathbf{B} = 0$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

$$\nabla \times \mathbf{B} = \mu_0 \left( \mathbf{J} + \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right)$$



## Project Managers

Jean Casse (JIVE), Alan Whitney (Haystack)

## Correlator design

JIVE – Albert Bos, Sergei Pogrebenko

WSRT DXB– Albert Bos

MkIV (Haystack, USNO, Bonn), SMA – Alan Whitney

## Correlator chip

Will Aldrich, John Canaris

## Station Unit

Bryan Anderson, Steve Parsley, Sergei Pogrebenko, Gino Tuccari, Stelio Montebugnoli

## Playback drives

Steve Parsley, Jan Buitter

## Software (JIVE)

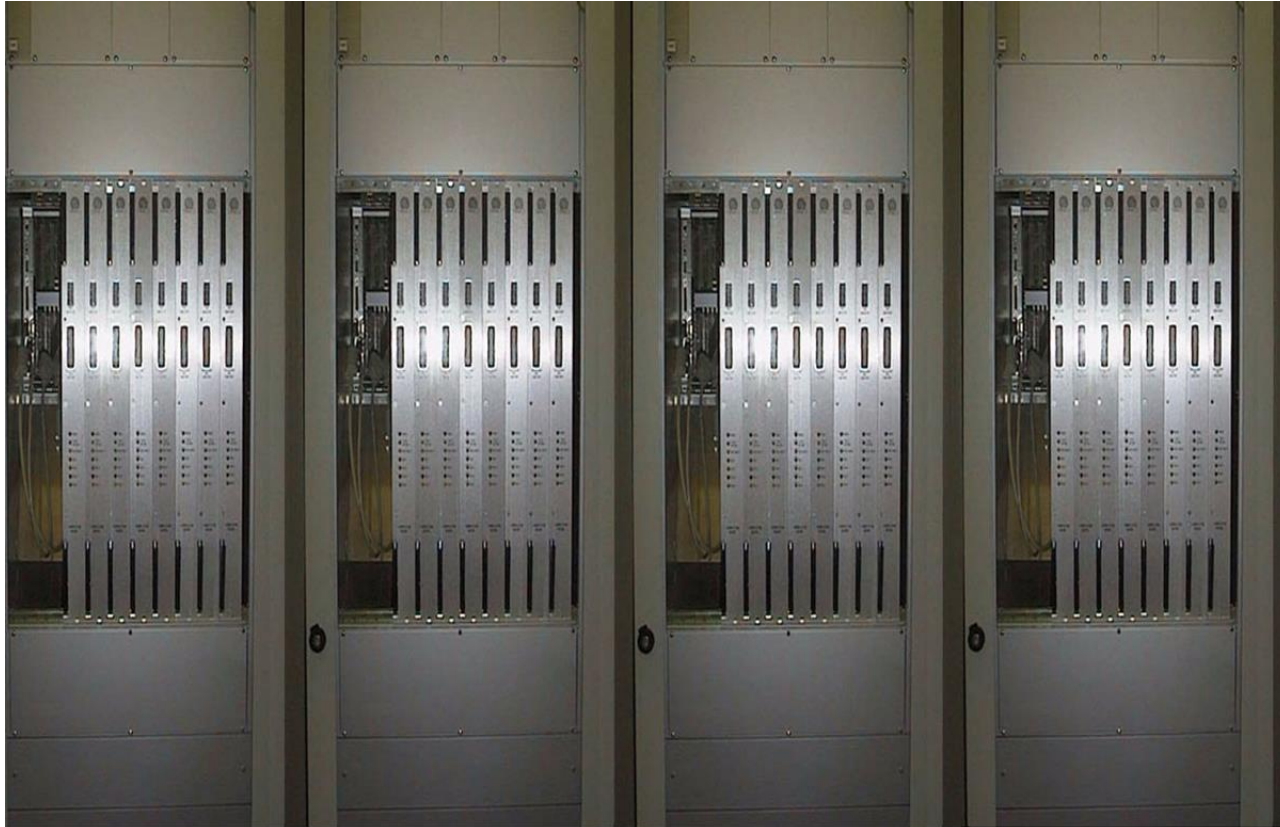
Roger Noble (on-line), Huib van Langevelde (post-correlation)

# Correlator chip story

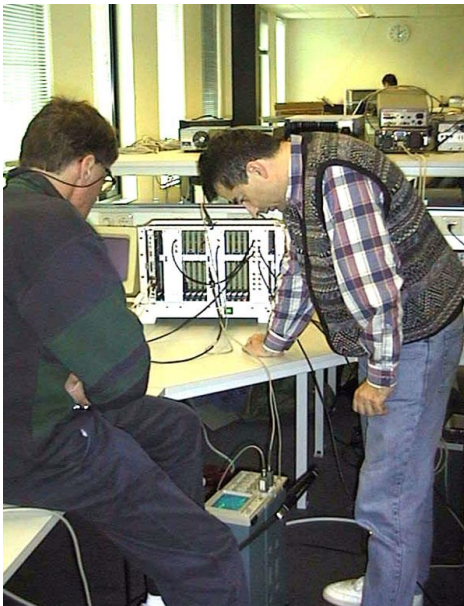
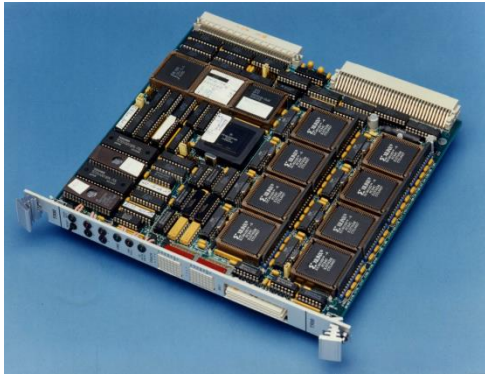
- End-94, problem in finding a fabricator was solved by good luck
  - Alan Whitney met HP CEO, Lew Allen on a trip to Silicon Valley
  - HP foundry available, but only for 1 year
- Time for only one iteration
  - Test wafers, packaging and testing at Haystack in correlator board
- End-96, final production runs → 8000 chips, enough for the 4 correlators and spares



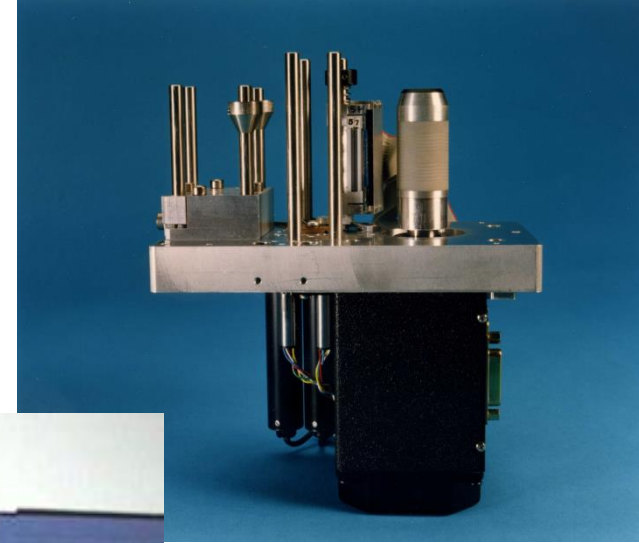
# The correlator



# Station Units



# Playback drives



16 P&G  
playback drives

# Correlator control software

Object oriented high level control software allowed relatively simple implementation of MkIII, VLBA and MkIV modes



**VENI VIDI VICI**

17 February 1998

# EVN support

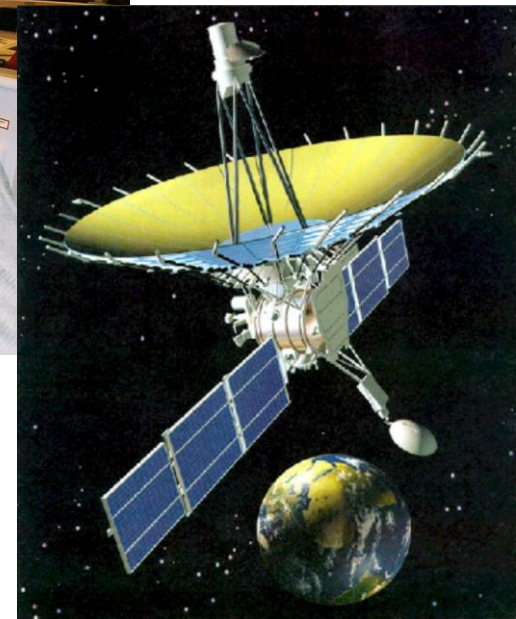
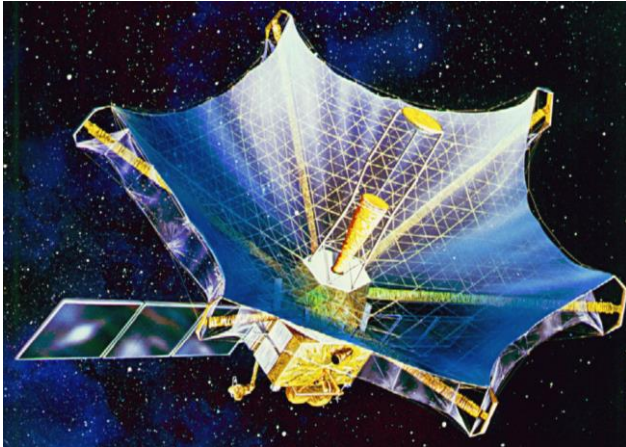
## Support Scientists

- on-site support to visiting astronomers
- planning, scheduling, analysis of data
- VLBI schools
- investigate calibration and polarisation of the EVN

Human Capital & Mobility money being well used

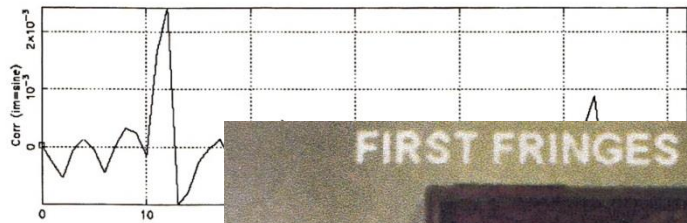
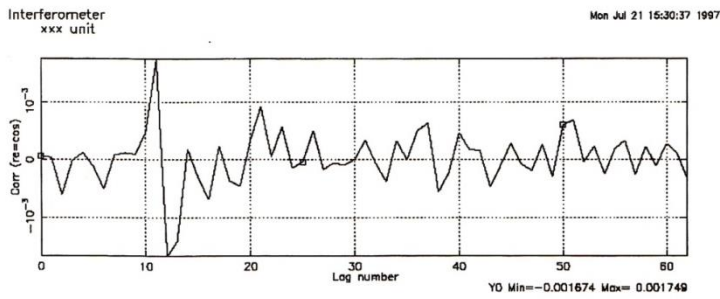


# Space VLBI



# First fringes

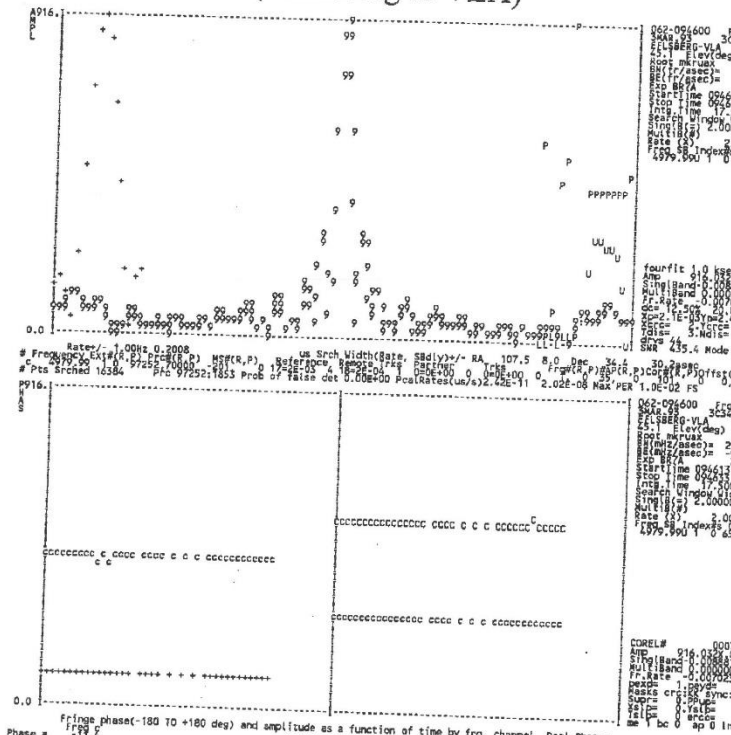
JIVE on 21 July 1997 (MkIII)



Haystack first fully-tested  
VLBI fringes 20 Oct 1997

OCT-23-1997 09:29 MIT HAYSTACK 617 991 0590 P.02/03

First Mark IV Correlator VLBI Fringes!  
(Effelsberg to VLA)



Phase = frq ch  
Pcal Phases  
Fringes phase(-180 TO +180 deg) and amplitude as a function of time by freq. channel Pcal Phases

# Official opening of the EVN Data processor at JIVE

22 October 1998

















# Postscript

First EVN correlation in ~ July 1999

By 2000, essentially all EVN observations and ~50% of global observations correlated at JIVE



# Correlator in operation



# Postscript

First EVN correlation in ~ July 1999

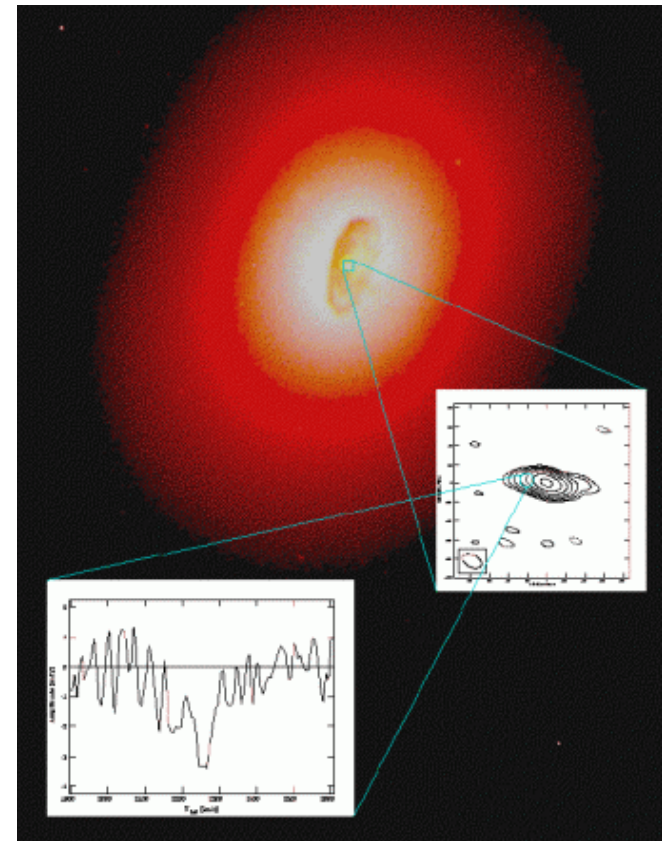
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**2000 - first science publication**

# First science

van Langevelde et al 2000

"A thin HI circumnuclear disk in NGC4261"



The first scientific result of the EVN data processor at JIVE is locating atomic Hydrogen close to the nucleus of NGC4261. The background is the Hubble telescope image showing a neutral accretion disk in the inner part of this active galaxy. Insets are the VLBI image of the nucleus at 21 cm (right) and the HI absorption spectrum, observed slightly offset from the nucleus (left).

# How lucky we were

## The Biblical Deluge of 28 Oct 1998



# Acknowledgements

- Richard Porcas
- Ina Lenten
- Leonid Gurvits
- Jean Casse
- Steve Parsley
- Jan Buitter
- Friso Olnon
- Mike Garrett
- Yvonne Kool