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JIVE
JOINT INSTITUTE FOR VLBI IN EUROPE

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

Richard Schilizzi

JIV-ERIC Symposium, Dwingeloo

20 April 2015

1975-1980 context

Genesis of the EVN

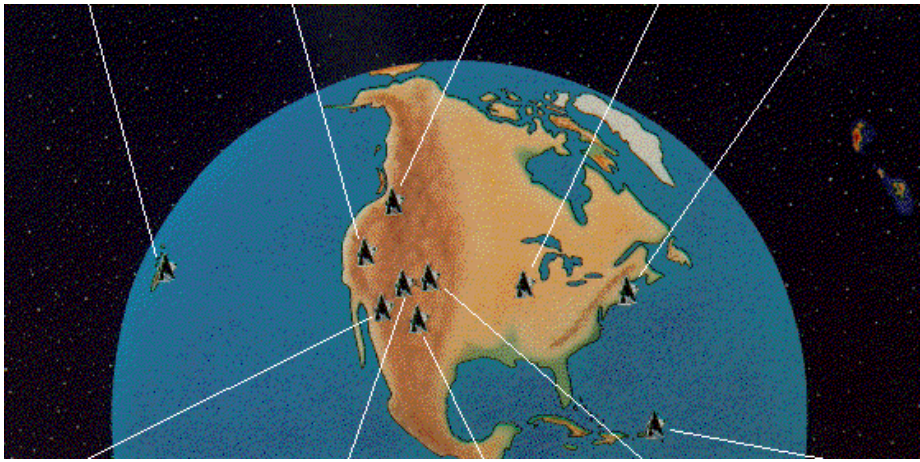
see talk by Roy Booth

US Network established in 1976

NRAO proposal for an

intercontinental array

See talk by Ken Kellermann



European discussions on (large) correlators

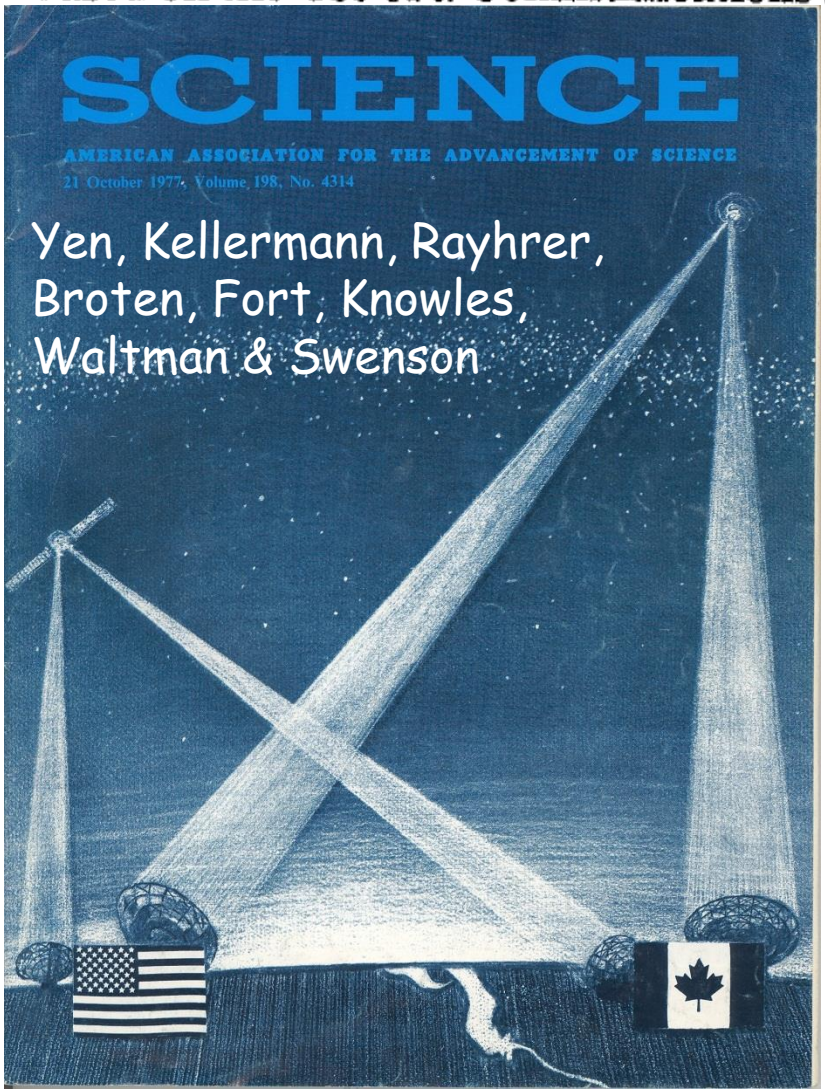
late 1970s Internal discussions in MPIfR, Jodrell Bank, and NFRA

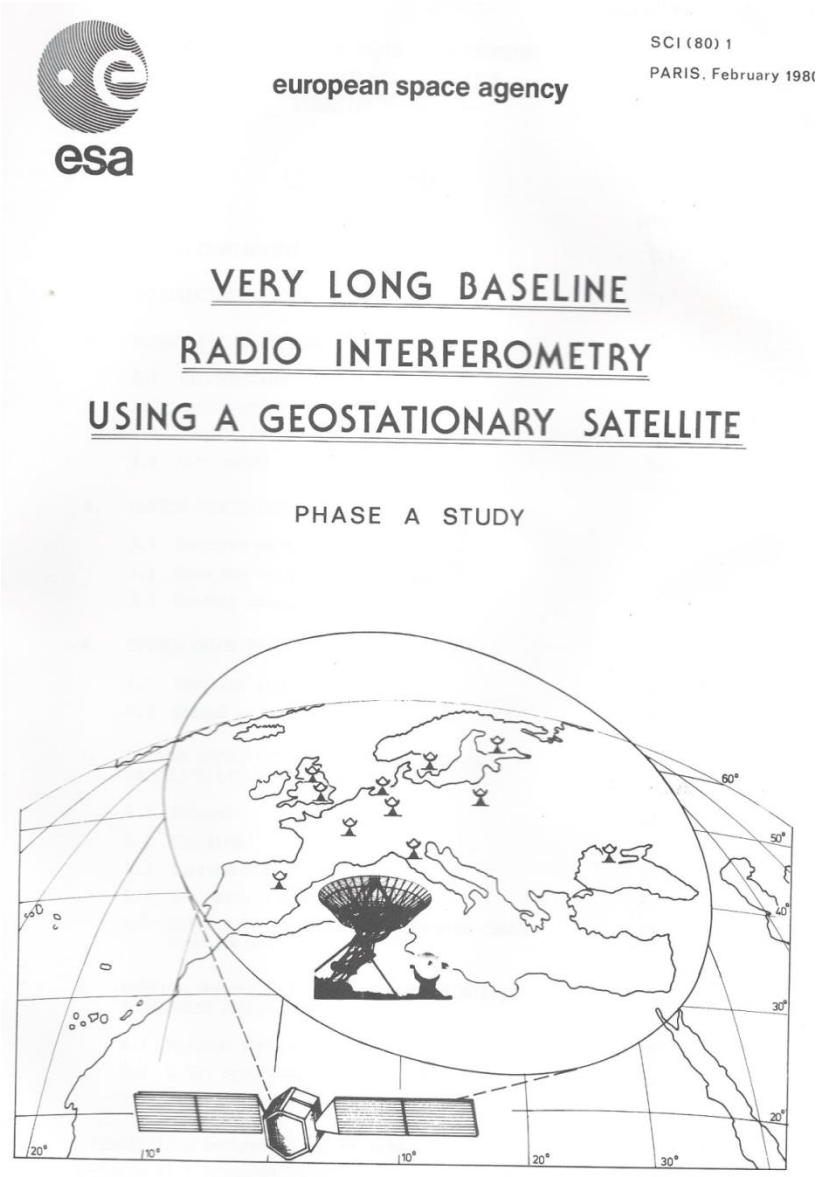
Nov 1979 MPIfR decision
- purchase 3-station Mk3 correlator from Haystack

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 **Real-Time, Very-Long-Baseline Interferometry Based on the Use of a Communications 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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Mar 1980	First meeting of Telescope Directors in Bonn discussed satellite-linked VLBI and data processing needs – 8 station real-time correlator
Mar 1980 – May 1981	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

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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

NATURE VOL. 337 23 FEBRUARY 1989

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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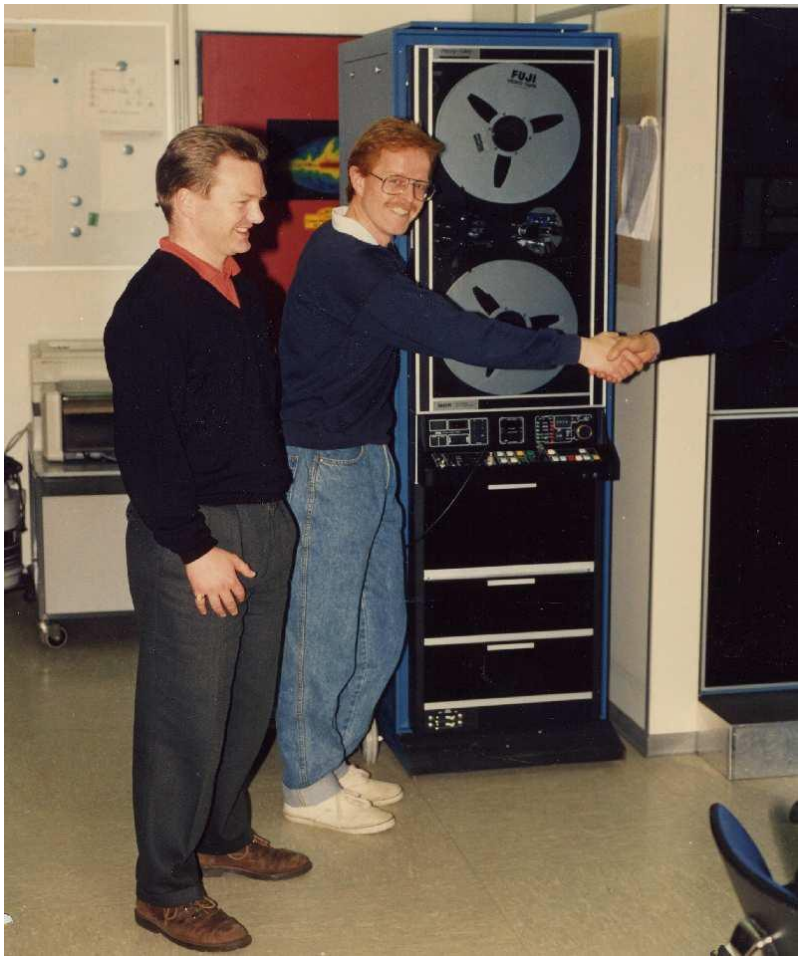
	Consortium delegation discussed future strategy with Director of Science Stimulation Programme in DGXII (Herbert Allgeier)
Feb89	Nature uses VLBI as an example of a project that should be funded by the CEC
Feb 89	NL Science Minister (Deetman) discusses VLBI with his French counterpart (Curien). Decided 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

Formal establishment of JIVE

21 Dec 1993

Wilfried Boland (NFRA Adjunct Director) + RTS went to the Dwingeloo Notary and Wilfried signed the Deed

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

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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

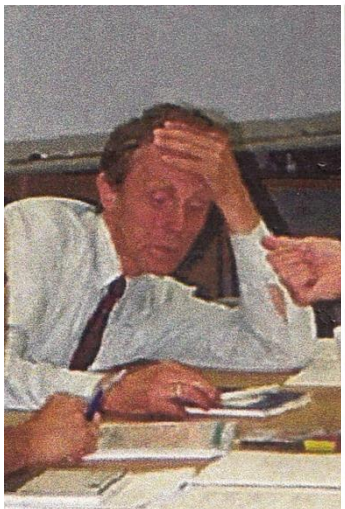
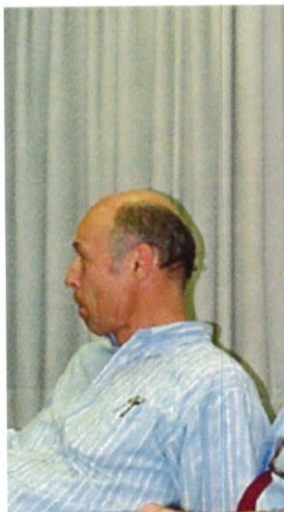
Bryan Anderson

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\varepsilon_0}$$

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

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

$$\nabla \times \mathbf{B} = \mu_0 \left(\mathbf{J} + \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right)$$

Responsibilities

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 Buiter

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

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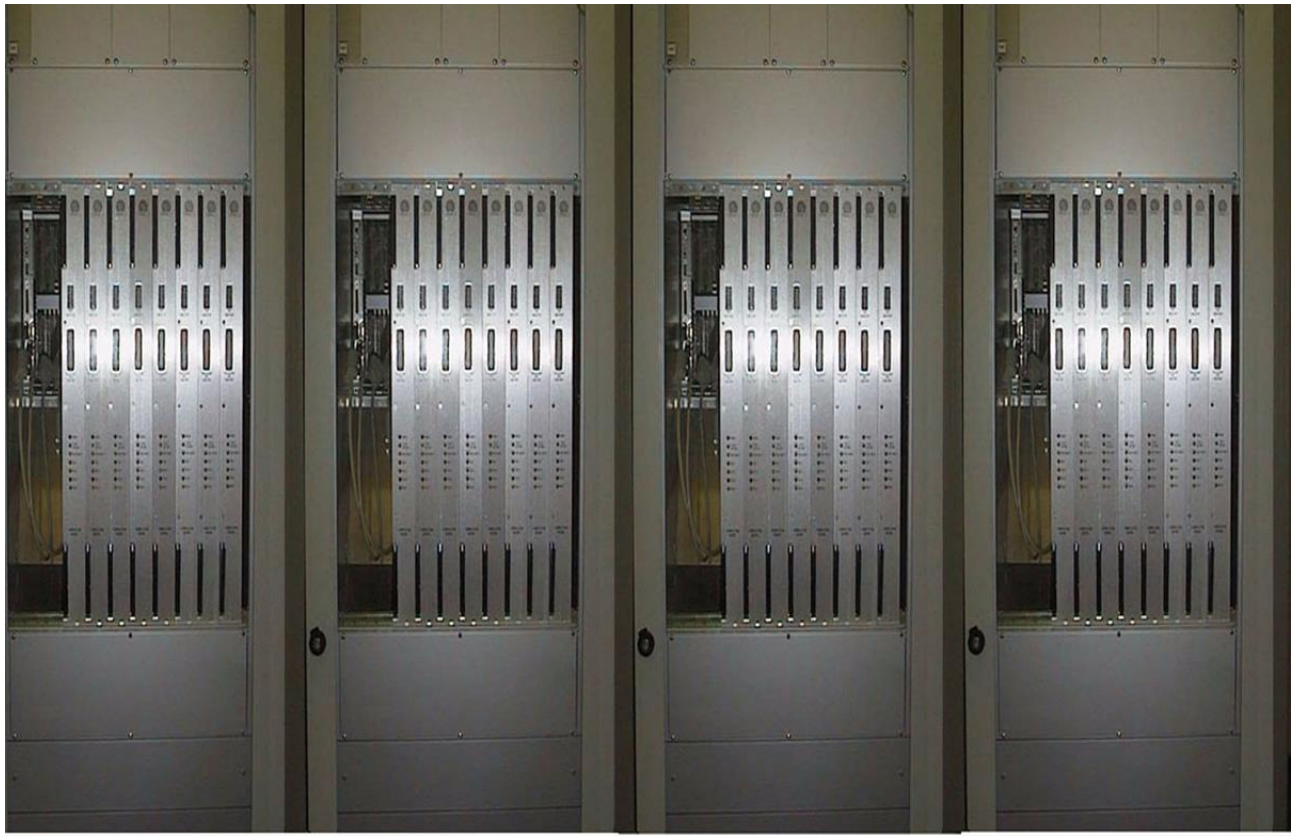
The correlator



Station Units

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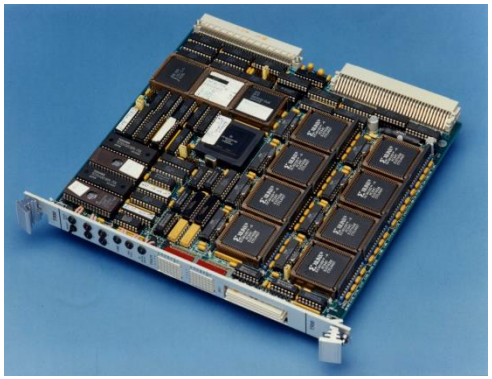
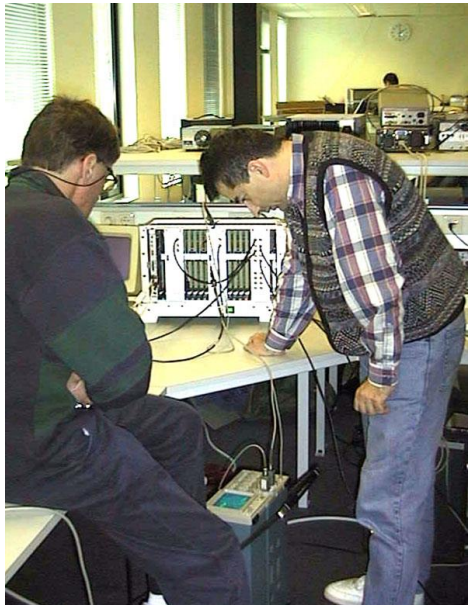
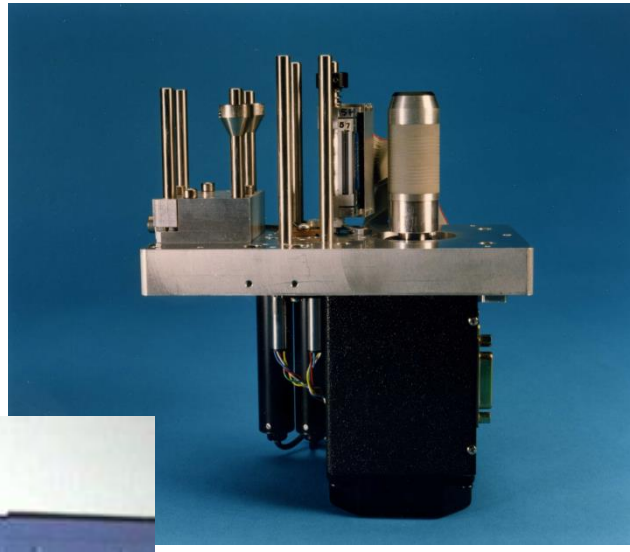




Playback drives



16 P&G
playback drives

Correlator control software

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

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

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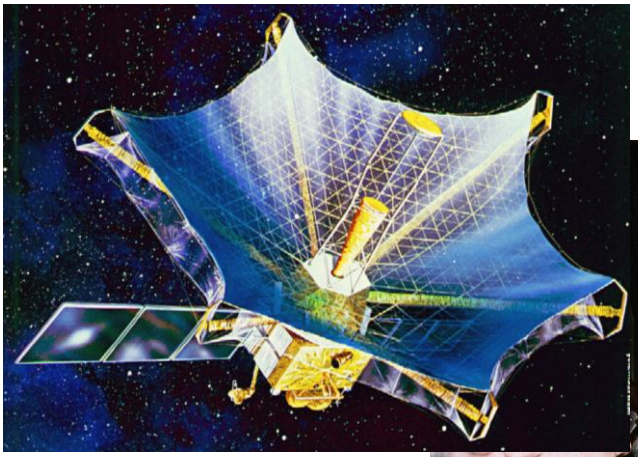
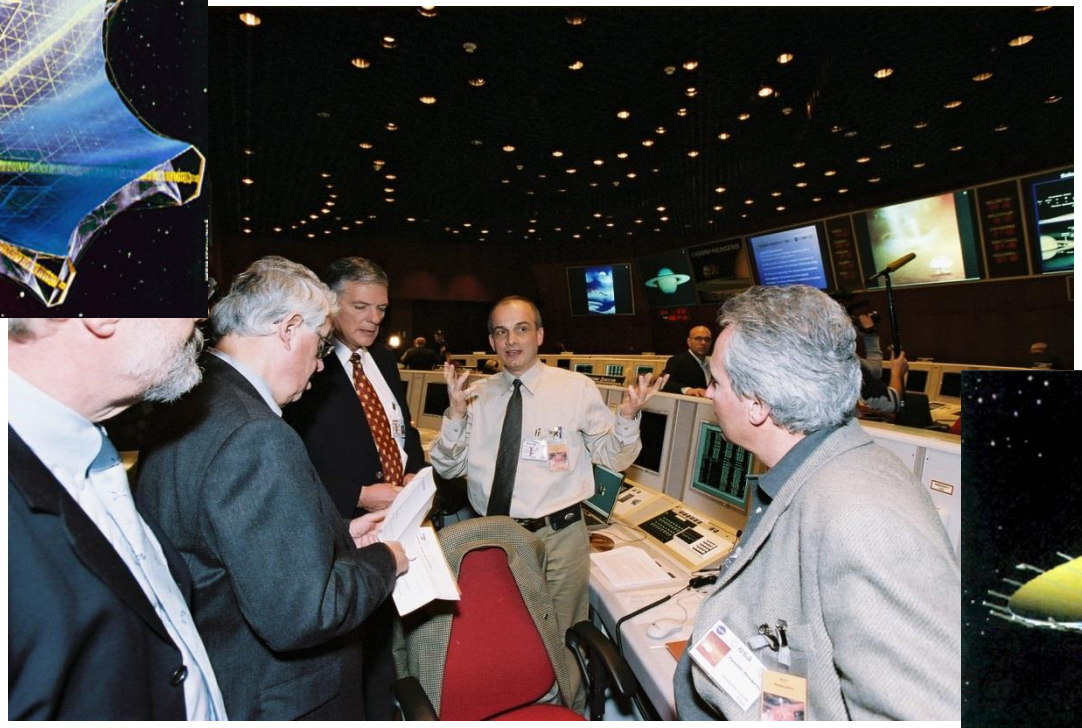
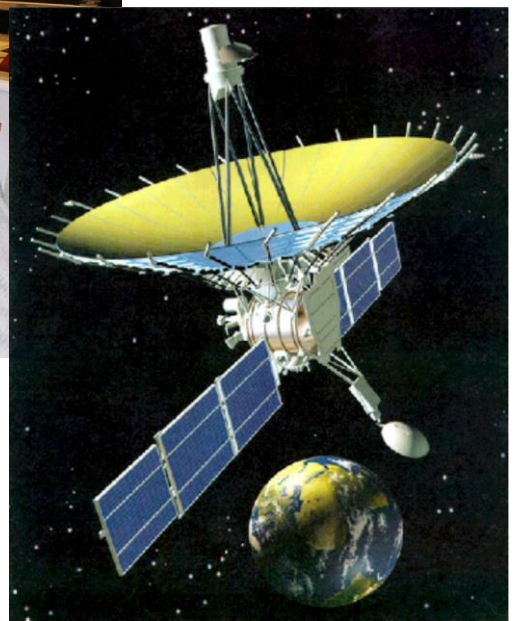
Space VLBI

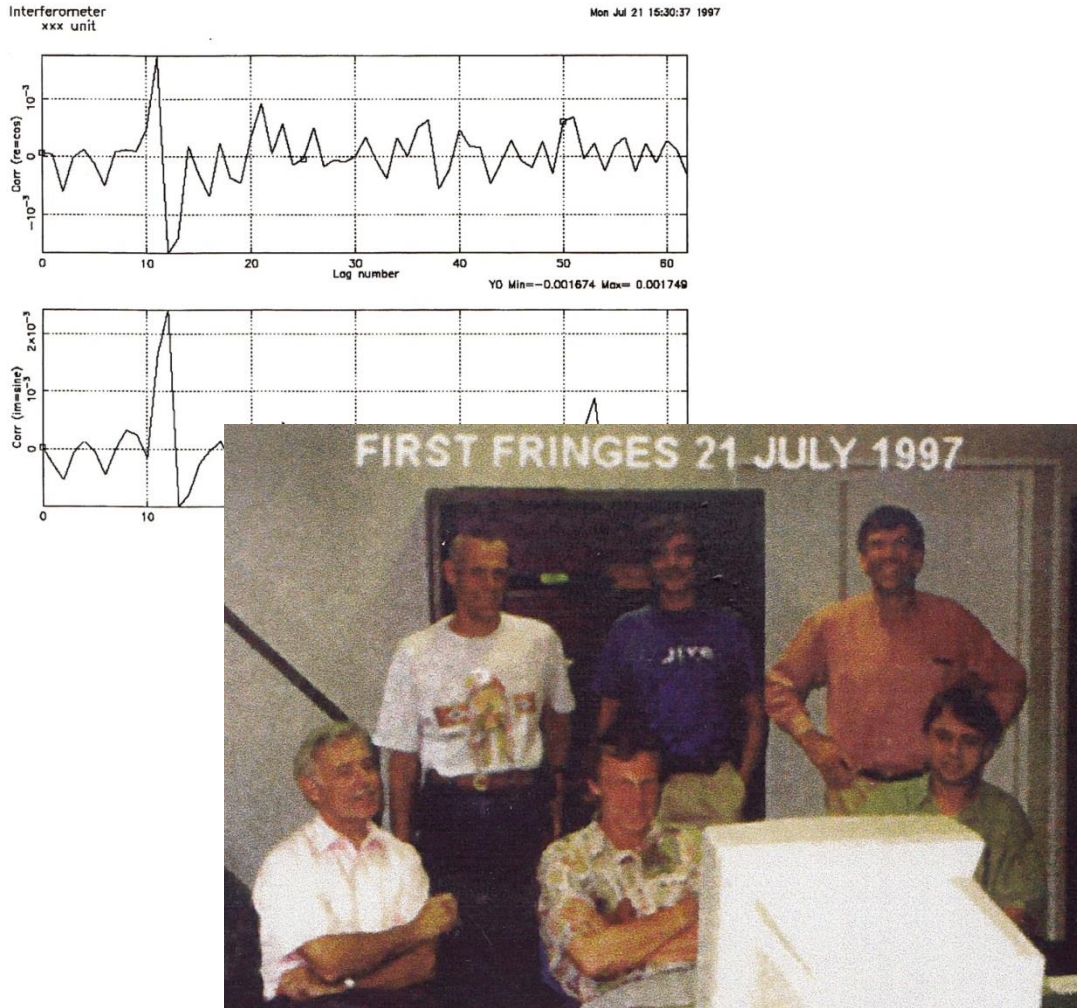




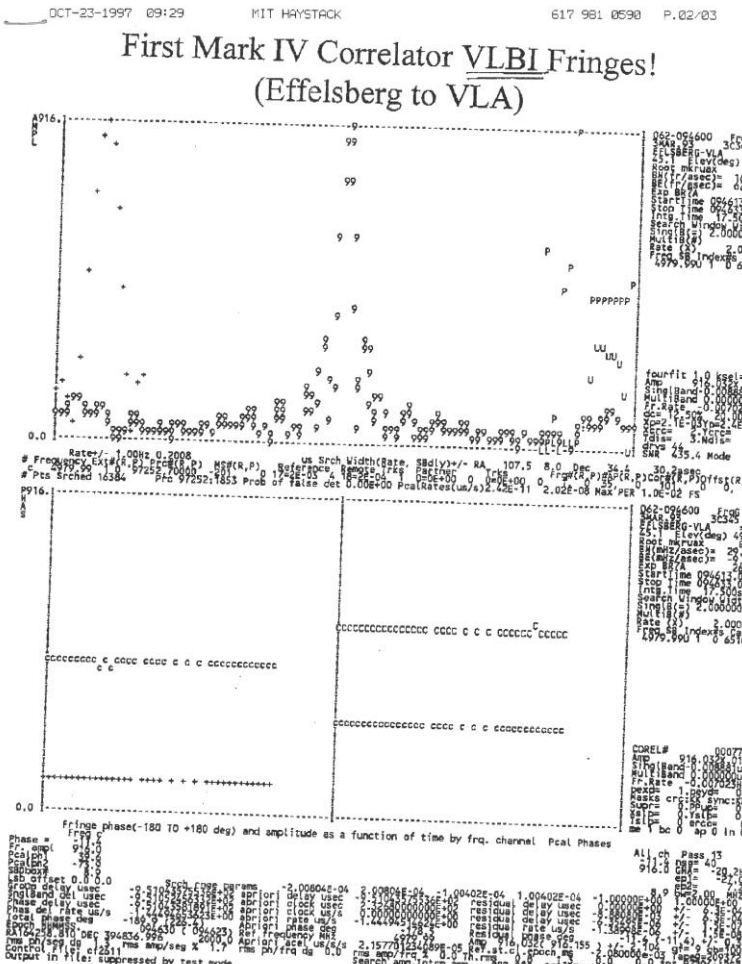


First fringes

JIVE on 21 July 1997 (MkIII)



Haystack first fully-tested VLBI fringes 20 Oct 1997



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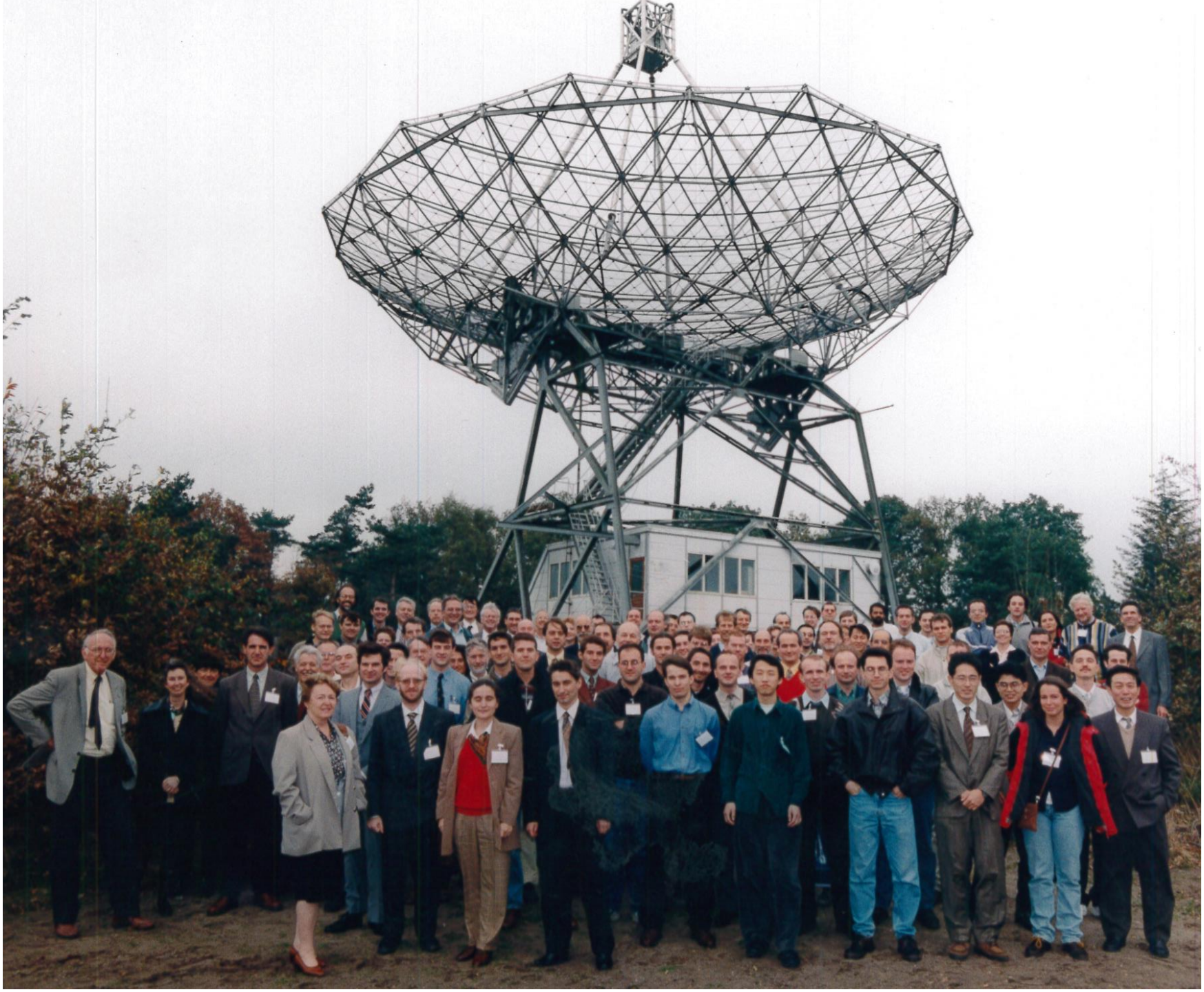
Official opening of the EVN Data processor at JIVE

22 October 1998


SIRIUS
SIRIUS



Postscript

First EVN correlation in ~ July 1999

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

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Correlator in operation

Postscript

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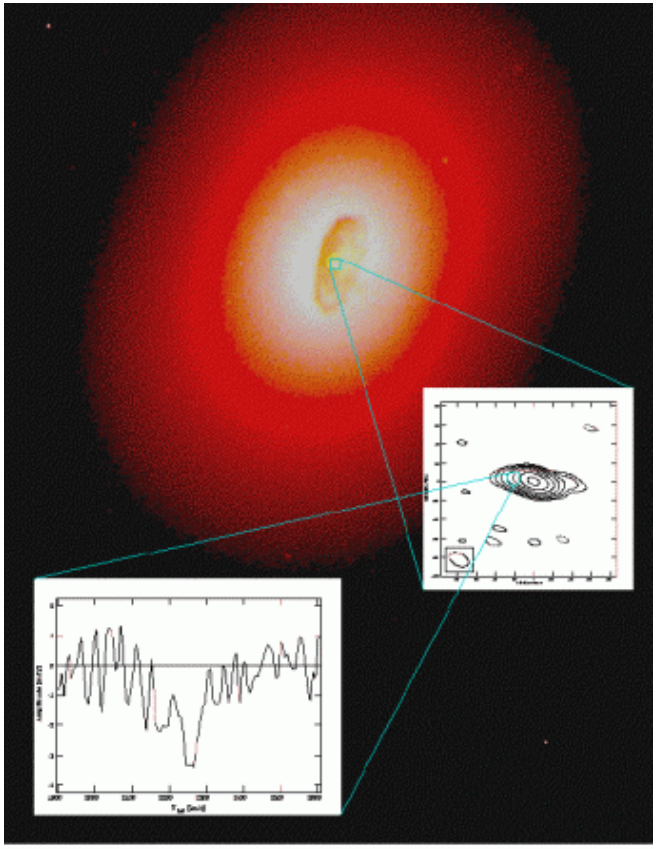
2000 - first science publication

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).

van Langevelde, Pihlström, Conway, Jaffe, Schilizzi, 2000, A&A 354, L45

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How lucky we were

The Biblical Deluge of 28 Oct 1998

Acknowledgements

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