

The origins of the EVN and JIVE: early VLBI developments in Europe

The earliest long baseline interferometry was at Jodrell Bank in the late '50s and '60s - with Radio links – Henry Palmer, Barry Rowson, Bryan Anderson + George Miley : >1 million wavelengths, JB-Defford at $\lambda 6$ cm;

1967 OH MASER observations JB-Defford – $700k\lambda$:
Davies, Rowson, Booth and Cooper (JB), Gent, Adgie,
Crowther (RRE).

Real interference fringes on the hydroxyl (OH) maser W3(OH) (Jodrell Bank – Defford baseline – 700,000 wavelengths, 1967)

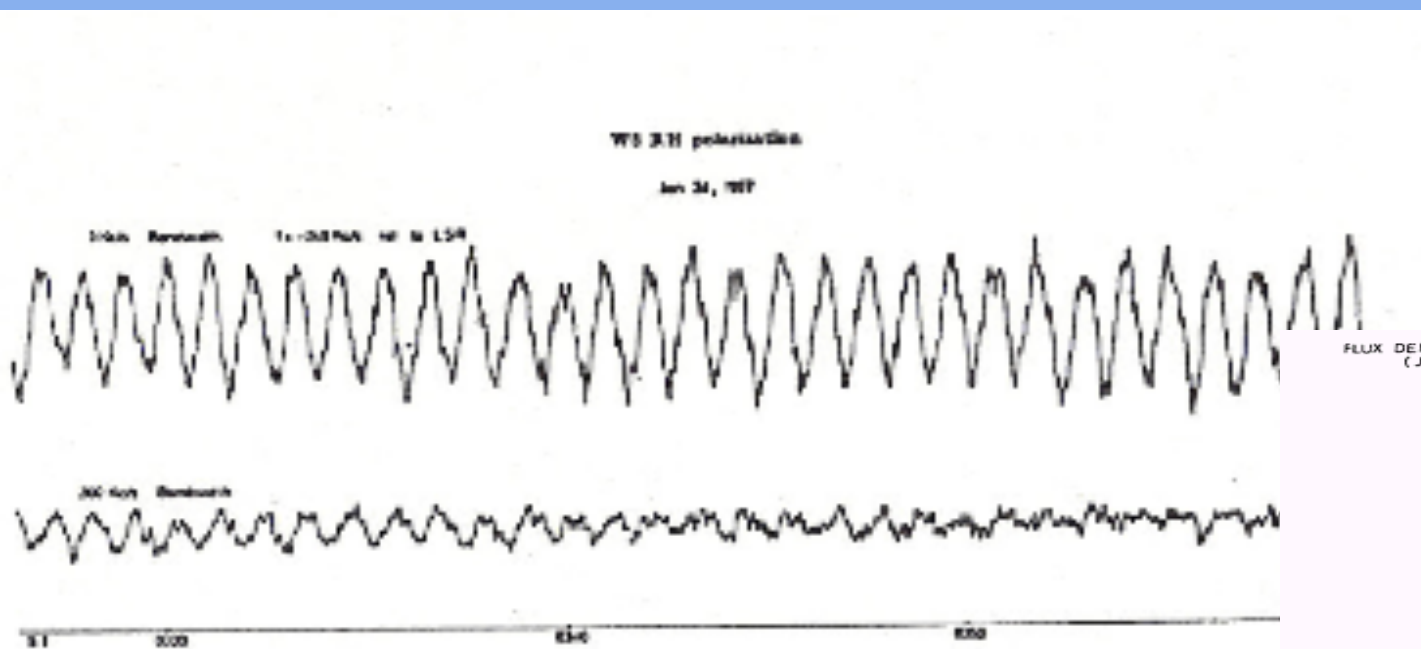


Figure 3.11

Fringe patterns produced by the OH maser, W3(OH), on the Jodrell Bank-baseline. The source consists of a multiplicity of point components, at a different frequency (velocity), see Fig. 6.3. The narrow, 3 kHz wide ferrometer channel contains just one point component and has constant amplitude. The wide band channel contains sinusoidal responses from all point components which beat together to give a varying fringe visibility

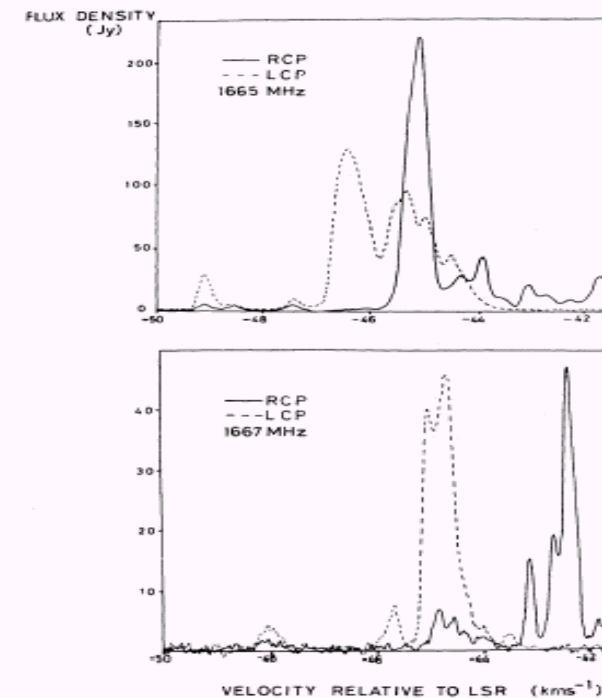


Figure 1. The 1665- and 1667-MHz spectra of W3OH, at epoch

Successful early VLBI using European telescopes and even transatlantic baselines

JB-Onsala 1968 (Anderson and Fort)

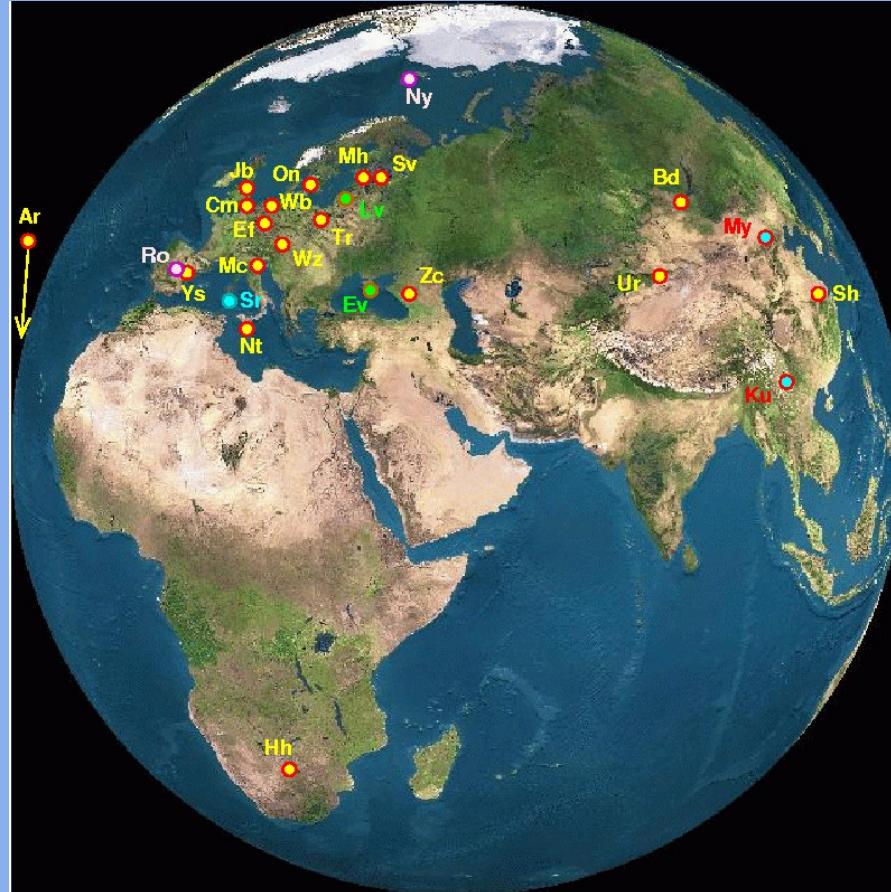
Westford, Green Bank, Hat Creek, Onsala 1968, (US VLBI system and **Onsala's 18cm maser receiver*** (Moran, Rydbeck et al, 1968 - OH)

US-Simeiz-Onsala (Kellermann et al, 1968)

Canada-JB using the Canadian system 1968 (Brotten, Clarke et al)

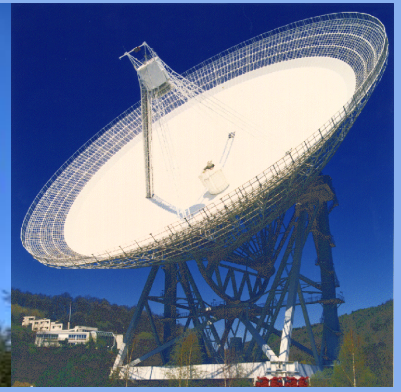
*Rydbeck had sent Bert Hansson to the US to hype the Onsala 18 cm receiver's MASER front end ($T_{\text{sys}} = 35\text{k}$) and suggest the use of US-Sweden baselines

The EVN Network today



- 20 telescopes in 15 institutes at 18 locations in 12 countries spanning 4 Continents (Porcas), 2011

The EVN as it began



The origin of the EVN

MPI-Onsala-Green Bank 1975 – now routine
Booth sabbatical at MPI, Bonn, 1974-75

7 Apr 1975:

MPIfR cafeteria Bonn (Pauliny-Toth, Preuss, Miley and Booth) discuss a European VLBI Network.

Decide to call a meeting of European radio astronomers. Booth to organise.

(Booth also spoke with Marshall Cohen about US view).

(According to Rydbeck's memoirs, he and Wielebinski had had earlier correspondence about correlator to be built by Onsala (Ronnang) and other /VLBI collaboration: MPI-Onsala).

1975-1979: The early days

Sep 1975

First meeting of interested astronomers, Bonn,
held after the IAU meeting in Grenoble

V.L.B.I. in EUROPE

On September 26th 1975 an informal meeting on the possibilities for very long baseline interferometry in Europe took place at the Max Planck Institut für Radioastronomie in Bonn. The following 8 point statement was agreed by the participants (list enclosed).

1. There is great interest in setting up a European VLBI network and several observatories are considering the installation of VLBI terminals.
2. The funding of these projects in individual observatories is not yet clear.
3. The possibility of approaching national and international bodies for support will be explored with the heads of individual observatories.
4. We should go ahead with the NRAO Mk II VLBI system at present, especially since Bonn and Onsala already have Mk II terminals.
5. We want to encourage the Onsala Observatory to complete their processor and we will examine ways of helping the venture.
6. We should keep in touch with MIT and NRAO in terms of Mk III development.
7. Some European VLBI projects have been started and we should continue with these and propose new ones.
8. We should meet again in a few months. Provisionally Friday, February 6th in Bonn.

R.S. Booth
October 1975

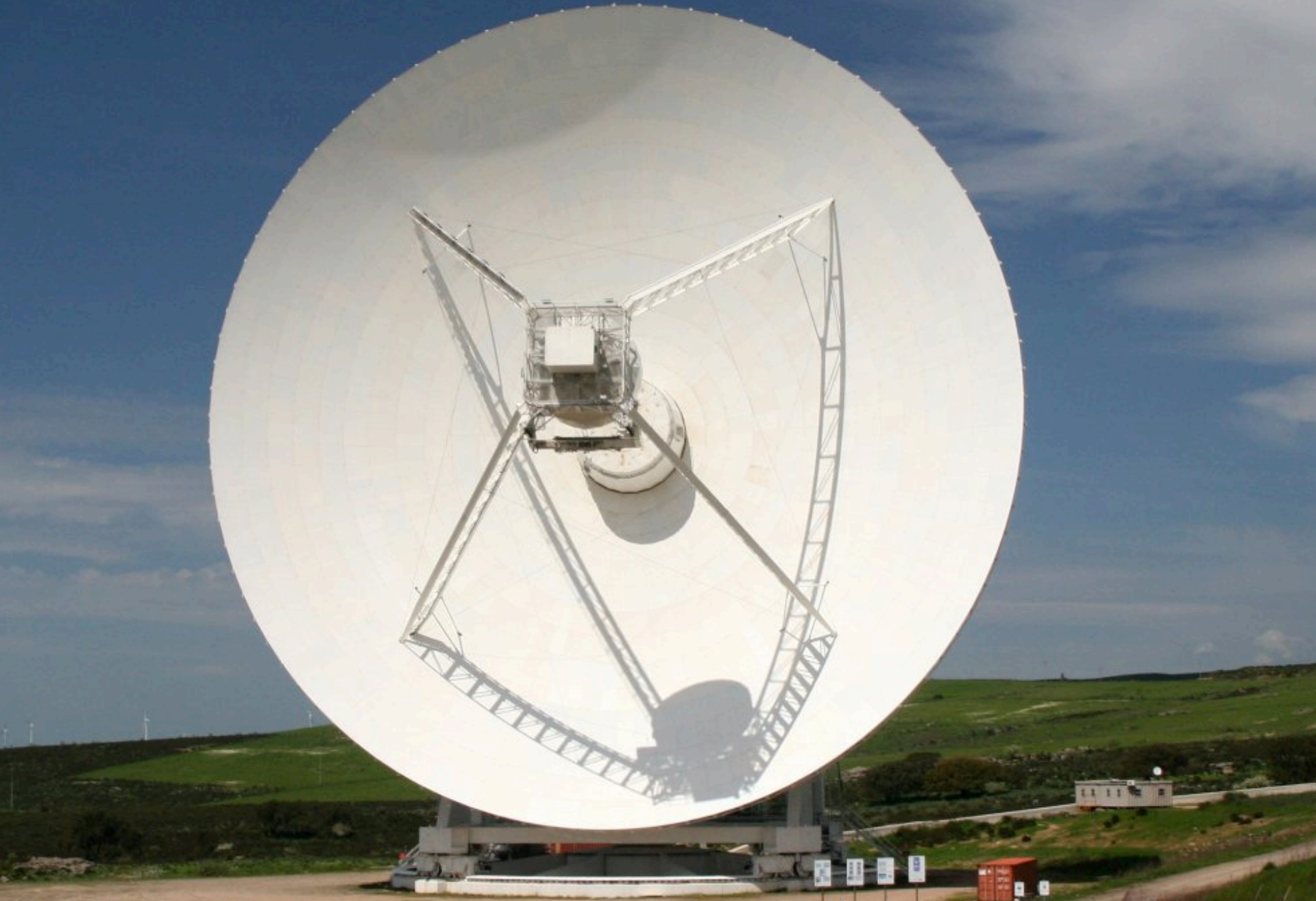
List of participants at informal meeting on European VLBI, October 1975

J.W.N. Baars	Bonn
B. Baud	Leiden
J. Bieging	Bonn
R.S. Booth	Jodrell Bank
W.N. Brouw	Dwingeloo
J.A. Casse	Dwingeloo
H.J. Habing	Leiden
H.E. Matthews	Munich
G.K. Miley	Leiden
I. Pauliny-Toth	Bonn
E. Preuss	Bonn
B. Rönnäng	Onsala
G. Setti	Bologna
W. Wiedenhöver	Bonn
R. Wielebinski	Bonn
A. Winnberg	Bonn
A. Witzel	Bonn
R. Wohlleben	Bonn
W. Zinz	Bonn

1975-1979: The early days

- Sep 1975 About 20 people each meeting. Germany ,Holland, Italy, UK.
- Giacarlo Setti (Bologna) attended and promised Italy would contribute 3 antennae, the 3rd of which was delivered recently
- Mar 1976 **Kellermann now in Bonn.** (Finnish interest (Tiuri + Sandel), + Geodesists
- Oct 1976 first intra-European observations Onsala-Dwingeloo-Effelsberg (ODE) on 3C236 and NML Cygnus
- RTS arrived, he observed and he published!**
- Oct 1976 third “EURO-VLBI” meeting in Onsala (most Onsala staff attend + Schilizzi, Quigly, Cambell (Bonn Geodesy)
- Discuss processor and suggestion that Onsala build.

Giancarlo's promise: the Cagliari 70m antenna



High Resolution Observations of the Compact Central Component in the Giant Radio Source 3C 236

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³ Onsala Space Observatory, Onsala, Sweden

⁴ Max Planck Institut für Radioastronomie, Auf dem Hügel 69, D-5300 Bonn 1, Federal Republic of Germany

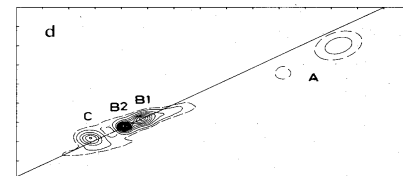
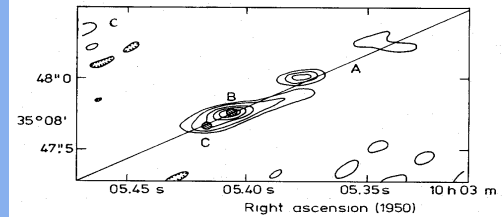
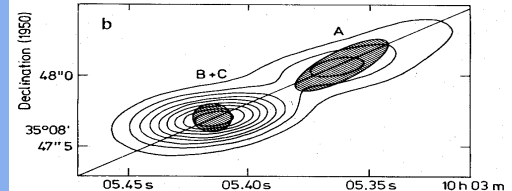
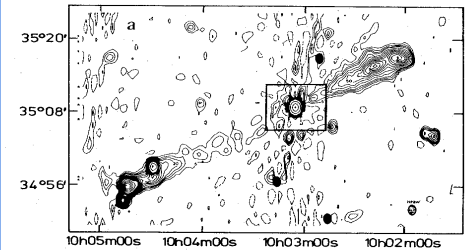
Received October 16, 1978

ODE EXPERIMENT

OCTOBER 1, 2

[A] CONTINUUM. F = 1610. MHz. BW = 2. MHz. STATION B = EFFELSBERG, C =

SOURCE	SCAN #	START			STOP	TAPES			SCAN TIMES		
		B	C	A		B	C	A	B-C	A-C	A-B
3C273	275-1530	15 02 32	14 59 55	15 00 00	15 30	MPI-151	MPI-76	OSO-1	27 1/2	30	27 1/2
3C315	-1600	15 36 45	15 35 55	15 33 10	16 00	"	"	"	23 1/2	24	23 1/2
4C39.25	276-0230	02 02 00	02 00 00	02 01 00	02 30	MPI-041	MPI-018	OSO-7	28	29	28
A00235	-0300	02 35 00	02 38 06	02 35 18	03 00	"	"	"	22	22	25
3C22	-0330	03 04 30	03 04 40	03 03 07	03 30	"	"	"	25 1/2	25 1/2	25 1/2
3C 84	-0400	03 35 00	03 35 15	03 33 15	04 00	"	"	"	25	25	25
3C263	-0430	04 07 06	04 08 05	04 06 20	04 30	MPI-042	MPI-019	OSO-8	22	22	23
4C39.25	-0500	04 40 15	04 34 33	04 32 15	05 00	"	"	"	20	25 1/2	20
3C236	-0600	05 02 30	05 04 11	05 01 14	06 00	"	"	"	56	56	57 1/2
"	-0700	06 06 10	06 07 46	06 05 42	07 00	MPI-043	MPI-025	OSO-9	52 1/2	52 1/2	54
"	-0800	07 02 10	07 02 33	07 00 27	08 00	"	"	"	57 1/2	57 1/2	58
"	-0900	08 05 00	08 08 25	08 05 18	09 00	MPI-053	MPI-012	OSO-10	51 1/2	51 1/2	55
"	-1000	09 00 00	09 02 39	09 00 25	10 00	"	"	"	57 1/2	57 1/2	59 1/2
"	-1100	10 06 30	10 09 33	10 05 00	11 00	MPI-055	MPI-013	OSO-11	50 1/2	50 1/2	53 1/2
"	-1200	11 00 00	11 03 44	11 00 48	12 00	"	"	"	56 1/2	56 1/2	59 1/2
"	-1300	12 05 30	12 07 00	12 06 07	13 00	MPI-056	MPI-014	OSO-12	53	53	54



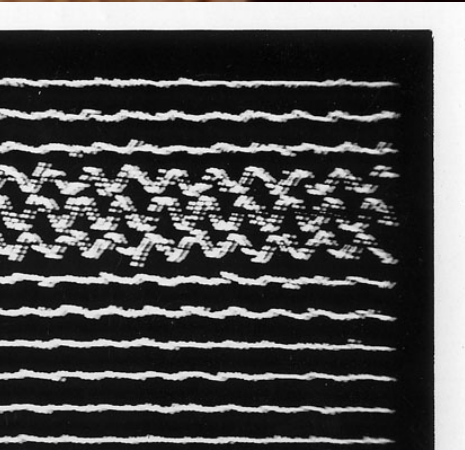


4th European VLBI meeting at
Jodrell Bank, September 1977



The early days (2)

- Sept 1977 Fourth informal meeting in Jodrell Bank – 25 participants
- Oct 1977 European Study of satellite linked VLBI using L-SAT (Olympus) initiated (Schilizzi, Ardenne)
- Jan 1978 Second observation session J-O-D-E (resulted in 2 x 2 baselines – crossed polarisations) and 2 publications
- Jun 1978 3-station Mk2 correlator in Bonn started operation
- Sept 1978 VLBI meeting in Heidelberg
- Nov 1979 Fifth meeting in Bonn. Future instrumental developments (MkIII, H-masers) discussed. MPIfR decides to buy a Mk3 processor





The Double Quasar (Walsh, Carswell and
Weyman, Nature 31 May, 1979)

VLBI structures of the images of the double QSO 0957+561

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Max-Planck-Institut für Radioastronomie, Auf dem Hugel 69, Bonn, FRG

R. S. Booth, I. W. A. Browne, D. Walsh & P. N. Wilkinson

University of Manchester, Nuffield Radio Astronomy Laboratories, Jodrell Bank, Macclesfield, Cheshire SK11 9DL, UK

Very long baseline interferometry (VLBI) observations of the double QSO 0957+561 have revealed radio fine structure in the two 'image' components A and B. The structures are similar, both of the 'core-jet' type typical of many compact extragalactic radio sources. The shapes of the images put strong constraints on the mass distribution responsible for the gravitational imaging.

Nature, 1979, 1982

VLBI Symposium, Heidelberg: August, 1978



1980-1985: initial expansion

- 1980 Bonn: first meeting of institute directors. Agreement on six observing sessions/year and setting up EVNPC. Mk3 terminals.
- 1981 Leiden: Director's Meeting discussed the data processor needs of the EVN in general terms.
- 1982 3 station Mk3 processor at MPIfR started operation
- QUASAT was born in Toulouse
- EVN Technical Working Group formed, Wolfgang Zinz first chair
- 1983 two alternative proposals for future processing needs in Europe
- upgrade Mk3 processor at MPIfR to 8 stations
 - develop new generation (12 station) data processor in Dwingeloo
- European Foundation for Radio Astronomy discussed
- Contact with ESF president Hubert Curien

1980-1985 (2)

- Jun 1984 EVN directors meet in Vienna before ESA QUASAT symposium in Grossenzersdorf (Austria), decide to establish Consortium
- Jul 1984 MoU establishing European Consortium for VLBI (Bologna, MPIfR, Jodrell Bank, Onsala, Westerbork)
- Feb 1985 Consortium meets for the first time in Bonn. Giancarlo Setti first chairman, Richard Wielebinski vice-chair.

Consortium agrees to seek funding for new generation processor in Dwingeloo as part of the EVN Upgrade Program
- May 1986 first contacts with EC in Brussels on funding

1. The European Radio Astronomy Institutes subscribing to this Agreement, recognising

- (i) the importance of international collaboration in the use of Very Long Baseline Interferometry (VLBI) for scientific research in astronomy and geophysics
- (ii) the need for coordinated observations using VLBI both within the European VLBI Network (EVN) and in conjunction with other radio astronomy institutes
- (iii) the need for a coordinated programme of technical development of VLBI in Europe

agree to establish a consortium to be known as the Consortium of European Radio Astronomy Institutes for VLBI.

The Consortium will foster the coordinated use and development of VLBI in European radio astronomy institutes.

2. The member institutes agree to dedicate at least 45 days per annum to coordinated observations within the framework of the EVN, including joint observations of the EVN with other VLBI networks.

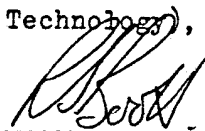
3. The Consortium shall agree a programme for the development of the scientific potential of the EVN and shall formulate proposals for new scientific and technological developments. These proposals may specify the member institutes in which such developments should be carried out. The Consortium may submit such proposals either to national or multi-national bodies.

Financial resources which may become available as a result of such concerted action shall be administered by one or more of the member

EVN Consortium founded in 1984, as signed by Observatory Directors

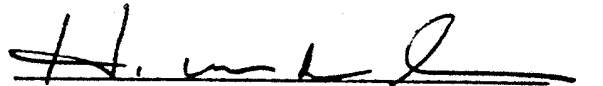
Onsala Space Observatory (Chalmers University of Technology), Sweden

July 24, 1984



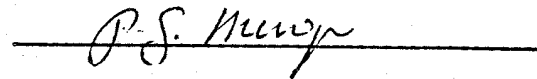
The Netherlands Foundation for Radio Astronomy (Westerbork), Netherlands

July 24, 1984



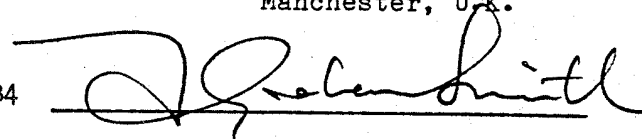
Max-Planck-Institut für Radioastronomie, Bonn, F.R.G.

July 24, 1984



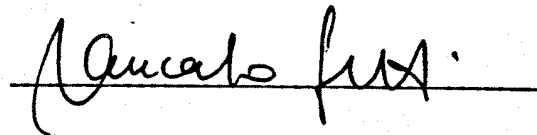
Nuffield Radio Astronomy Laboratories, Jodrell Bank, University of
Manchester, U.K.

July 24, 1984



Istituto di Radio Astronomia, Bologna, Italy

July 24, 1984



1980-1992 (2)

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- Jul 1984 MoU establishing European Consortium for VLBI (Bologna, MPIfR, Jodrell Bank, Onsala, Westerbork)
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Consortium agrees to seek funding for new generation processor in Dwingeloo as part of the EVN Upgrade Program
- Nov? 1985 EVN telescopes outfitted with Mk3
- May 1986 first contacts with EC in Brussels on funding

First formal meeting of the EVN Directors in Bonn, in Feb 1985



EVN Programme Committee meets in Onsala, 1985



Relaxing after the big decision at Grossenzersdorf.....

