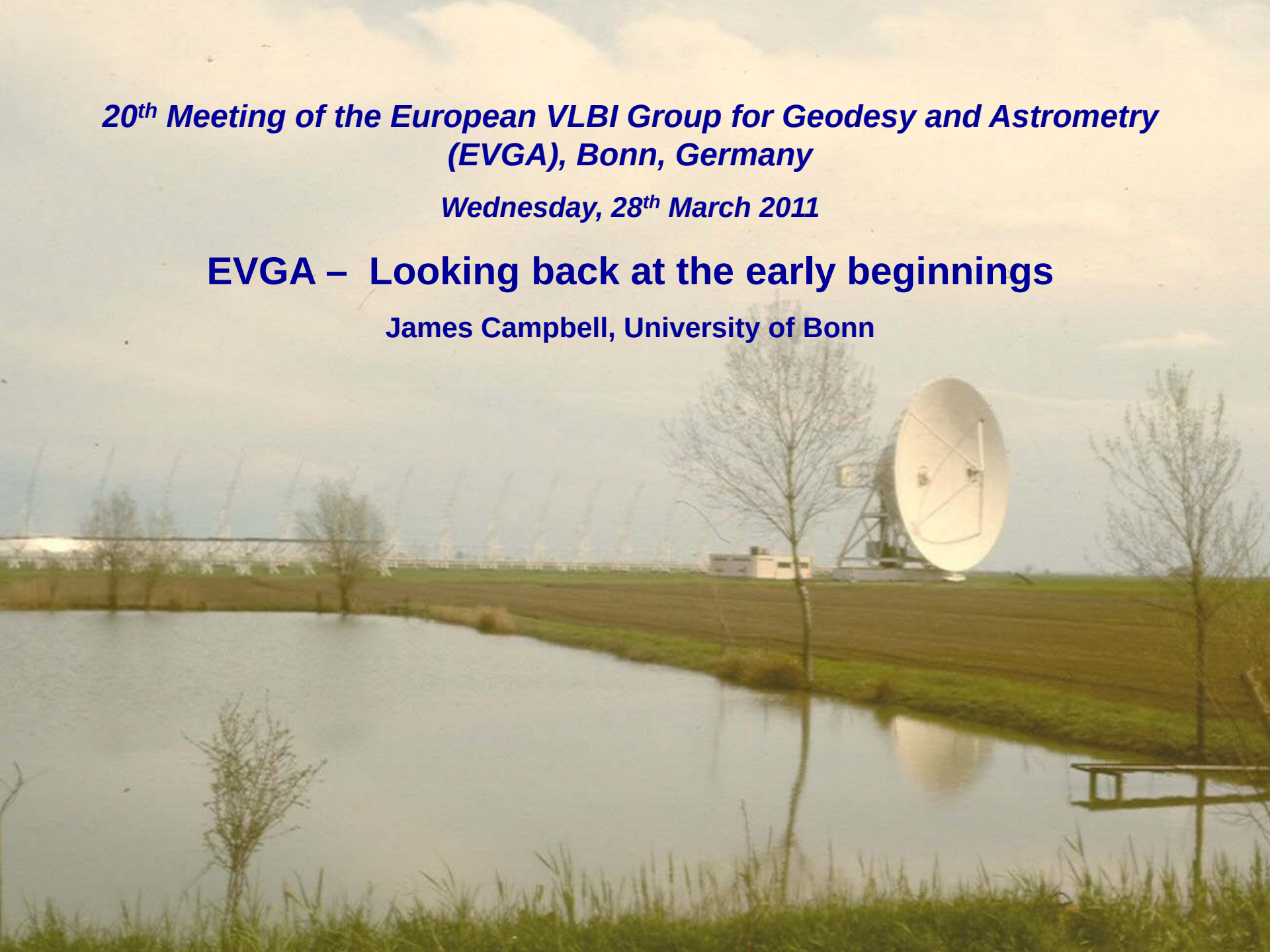
20th Meeting of the European VLBI Group for Geodesy and Astrometry (EVGA), Bonn, Germany

Wednesday, 28th March 2011

EVGA – Looking back at the early beginnings

James Campbell, University of Bonn



3rd

4th

ACCOUNT OF THE WORKING MEETING

ON

EUROPEAN VLBI FOR GEODESY AND ASTROMETRY

UNDER THE AUSPICES OF THE

NETHERLANDS GEODETIC COMMISSION

HELD AT THE

DEPARTMENT OF GEODESY

DELFT UNIVERSITY OF TECHNOLOGY

ON 3 - 4 NOVEMBER 1983

EDITED BY FRITS J.J. BROUWER

PROCEEDINGS OF THE 4th WORKING MEETING ON
EUROPEAN VLBI FOR GEODESY AND ASTROMETRY
HELD AT
ONSALA SPACE OBSERVATORY, SWEDEN
3 JUNE 1985

Edited by B. Rönnäng and G. Tang

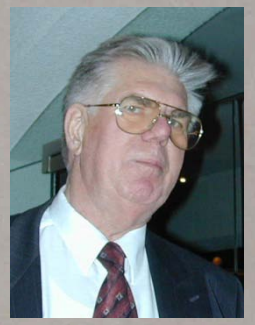
Nov. 1983

June 1985

1st Meeting

European VLBI for Geodesy and Astrometry

Informal Meeting held at the Geodetic Institute in Bonn 28-29 April 1980



I. Introduction and general Status, Projects

1. At the opening of the meeting Prof. H. Seeger, director of the Bonn Geodetic Institute, summarized the status of the project of a dedicated geodetic VLBI telescope, which is to be built at the satellite tracking station of Wettzell in Southern Germany. This project will be supported jointly by geodesists in Munich, Francfort and Bonn with a combined funding by the German Science Foundation (Deutsche Forschungsgemeinschaft) and the Federal Government. The 20-25 m telescope will be equipped with receivers for the commonly used VLBI frequencies including the NASA S- and X-bands. A Mk III recording terminal has been ordered and a H-maser frequency standard for Wettzell is under construction at Ebauches S.A. in Switzerland. The principal activities of the future VLBI station will be concentrated on the participation in global as well as regional geodynamics programs.

2. A brief overview concerning the situation of geodetic and astrometric VLBI in Europe was given by J. Campbell. Since the inception of VLBI about 10 years ago there have been some sporadic geodetic VLBI activities in Europe; in particular the close cooperation between the Onsala Space Observatory (Sweden) and the MIT-Haystack-Group using the Mk I bandwidth synthesis system: this resulted e.g. in the measurement of the baseline Haystack-Onsala with an accuracy of half a decimenter in length.

2nd Meeting

European VLBI meeting for Geodesy and Astrometry

Madrid 3-4 December 1981

Geodetic VLBI Using the MkII-BWS-Technique

1. Geodetic VLBI-Experiments

a) Observed experiments:
- MEO 1 (Madrid - Effelsberg - Onsala) 27/28 July '80 at X-Band 8.4 GHz, 40 MHz BWS (failed due to technical problems).
- MEO 2 (Madrid - Effelsberg - Onsala) 26/27 Sept. '80 at X-Band 8.4 GHz, 40 MHz BWS (partial success on Madrid-Onsala-baseline. To be recorrelated at MPI processor).
- WEJO 1 (Effelsberg - Metsähovi) 5/6 Oct. '80 at 5 GHz, 20 MHz BWS (data reduction completed).
- WEJO 2 (Westerbork - Effelsberg - Jodrell Bank - Onsala - Chilbolton) 12/13 April '81 at 5 GHz (Chilbolton and Onsala lost ~ 50 % of time due to equipment mal-function. Correlation at MPI and JPL completed. Final reduction in progress). 40 MHz BWS.

b) Planned experiments:
- WEJO 3 (Westerbork - Effelsberg - Jodrell Bank - Onsala) 12/13 Dec. '81 at 5 GHz, 40 MHz BWS.
- MEO 3 (Madrid - Weilheim - Johannesburg - Onsala) 1982 at S-Band.
- WEJO 4 (Westerbork - Effelsberg - Jodrell Bank - Onsala) Dec. '82 at 5 GHz, 40 MHz BWS.

2. Processing

EVGA- Precursors

1976, Oct. 22: Onsala, Sweden: Third European VLBI Meeting (European Radio Astronomy Observatories)

1977, March 9: Bonn, Germany: AGRAM (Astrometrische und geodätisch-geophysikalische Nutzung radioastronomischer Methoden) **Meeting on the astrometric and geodetic-geophysical use of radioastronomic techniques**

1978, Nov. 28: Bonn, Germany: Second AGRAM Meeting **(including participants from neighboring European countries)**

The AGRAM meetings were organised by P. Brosche, Astronomical Institute and J. Campbell, Geodetic Institute of the Bonn University

Aspects of European VLBI for Astrometry and Geodynamics

- Create a permanent network of fixed stations: observations on a regular basis for
  - astrometry (extragalactic inertial system)
  - Earth rotation (Polar motion & UT1-variations)
  - Earth tides
  - Crustal motions (plate stability)
  - Reference for mobile stations

- Look at available geodetic VLBI instrumentation at the European VLBI observatories
  - Dual band receivers (S/X) Compatibility with astro observations?
  - MkIII wide band backends and recording High cost, funding?
  - H - maser frequency standards High cost, funding?
  - Alternatives: MkII BWS?
  - Water vapour radiometry

(2nd AGRAM, Nov. 1978)

European astrogeodetic VLBI Net (1980)

- operational
- planned

Plans for MkIII Correlator at MPIfR Bonn (3 stations completed end of 1982)

Early VLBI experiments in Europe with astro-geodetic background			
Date	Proposed and set up by	Network and Experiment "Name"	Remarks
European baselines/networks			
24 - 26 Nov. 1979	Haystack-MIT, Onsala, MPIfR	**Effelsberg-Onsala**-Haystack-Greenbank-Owens Valley	First full MkIII S/X Continental Drift
	(+ Bonn geodetic VLBI group)		experiment
19 - 21 Feb. 1980	Bonn astro-geodetic VLBI group	**Effelsberg-Onsala**-Green Bank-Johannesburg	MkII 18 cm astro-geodetic pilot
		"JOEN"	experiment
26 - 27 July 1980	Haystack-MIT, Onsala, MPIfR	**Effelsberg-Onsala**-Haystack-Fort Davis-Owens Valley	Second MkIII S/X Continental Drift
	(+ Bonn geodetic VLBI group)		experiment
26 July 1980	Bonn geodetic VLBI group	**Effelsberg - Onsala** - Madrid	MkII-X-band BWS
		"MEO 1"	experiment
26 -29 Sept. 1980	Haystack-MIT, Onsala, MPIfR	**Effelsberg-Onsala**-Haystack-Fort Davis-Owens Valley	First intercontinental MkIII S/X
	(+ Bonn geodetic VLBI group)	"MERIT 1"	Earth Rotation experiment
26 -27 Sept. 1980	Bonn geodetic VLBI group	**Effelsberg - Onsala - Madrid**	MkII-X-band BWS
		"MEO 2"	experiment
4 Oct. 1980	Bonn geodetic VLBI group,	**Werthhoven** - Haystack	MkIII- X-band fast slewing experiment
	Haystack-MIT, NASA GSFC		(test of Werthhoven facility FGAN)
5 - 6 Oct. 1980	Bonn geodetic VLBI group	**Effelsberg-Westerbork-Jodrell Bank-Metsähovi**	MkII-6 cm BWS experiment
		"WEJO 1"	(Project ERIDOC)
12-13 Apr. 1981	Bonn geodetic VLBI group	**Effelsberg-Onsala-Westerbork-Jodrell Bank-Chilbolton**	MkII-6 cm BWS experiment
	(+Geodetic Institute Delft)	"WEJO 2"	(Project ERIDOC)
20 July 1983	Bonn geodetic VLBI group,	First baseline **Wettzell-Onsala**	MkIII- X-band experiment
	Haystack-MIT, NASA GSFC		
Local baselines/networks			
15 Nov. 1979/81/82	NASA/JPL + INTA + IGM	Madrid DSN Complex, DSS-61, DSS-62, DSS-63	MkII S/X and S BWS experiments
13 Jan. 1981	Onsala VLBI team	600m baseline between OSO 26.5m and OSO 20m	Mk III X-band

Major Projects in Geodesy/Geodynamics

Global:

MERIT (IAU/IAG) *G.A. Wilkins (RGO) et al.*

POLARIS (NGS) *W.E.Carter et al.*

CDP (NASA/GSFC) *W. Coates, T.A. Clark et al.*

TEMPO (NASA/JPL) *J. Fanselow et al.*

Regional (Europe):

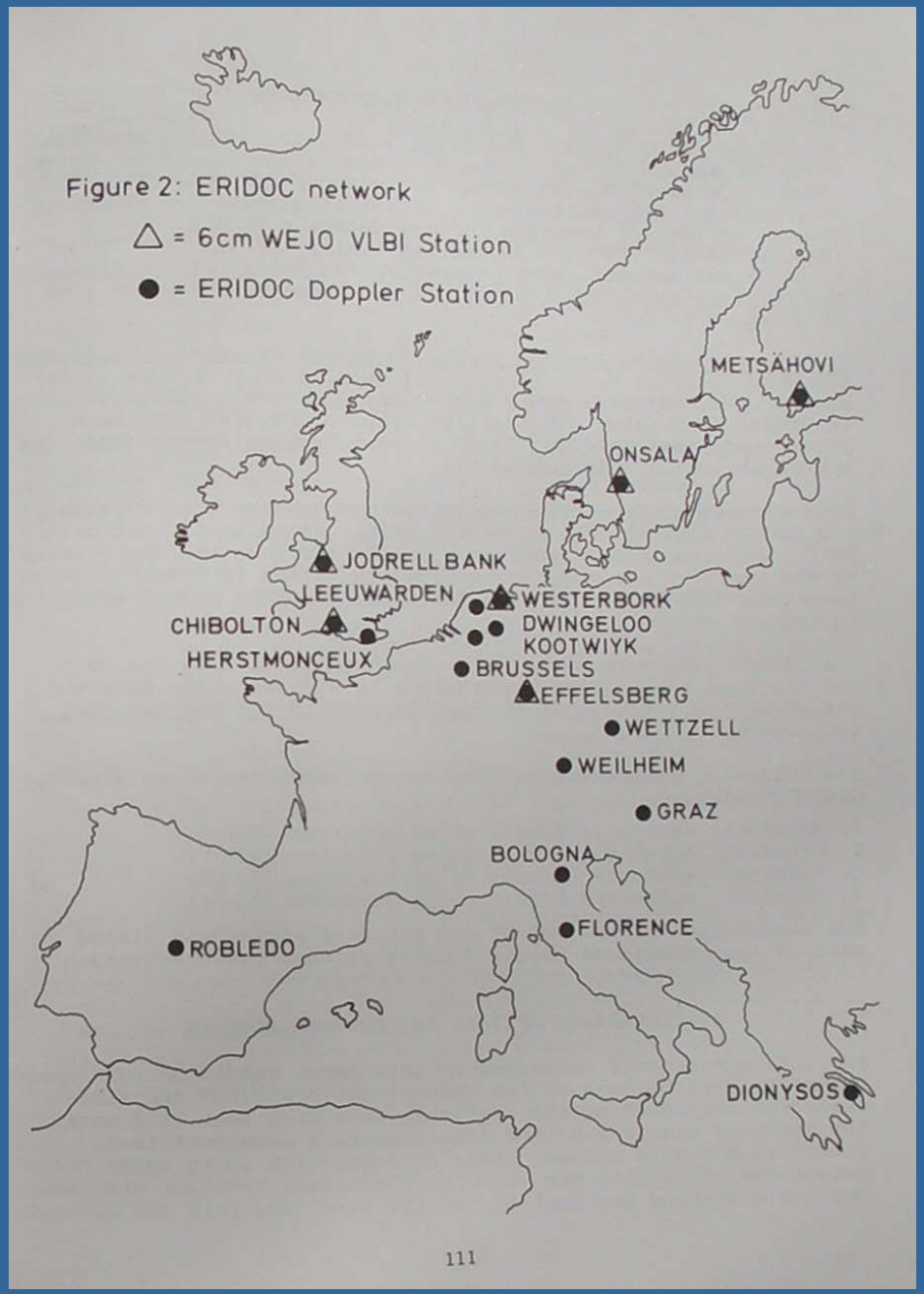
ERIDOC (Delft, Bonn) *F.J.J. Brouwer, J. Campbell et al.*

1980

EUROPE (Bonn) *J. Campbell et al.*

1983

1980 1985



ERIDOC (Delft, Bonn)

Oct. 1980, April 1981

6 cm MkII 40 MHz BWS

6 VLBI sites, 18 Doppler stations

Processing at Caltech correlator

Geodetic analysis at Bonn and Delft

Decimeter accuracy in comparison Doppler/VLBI

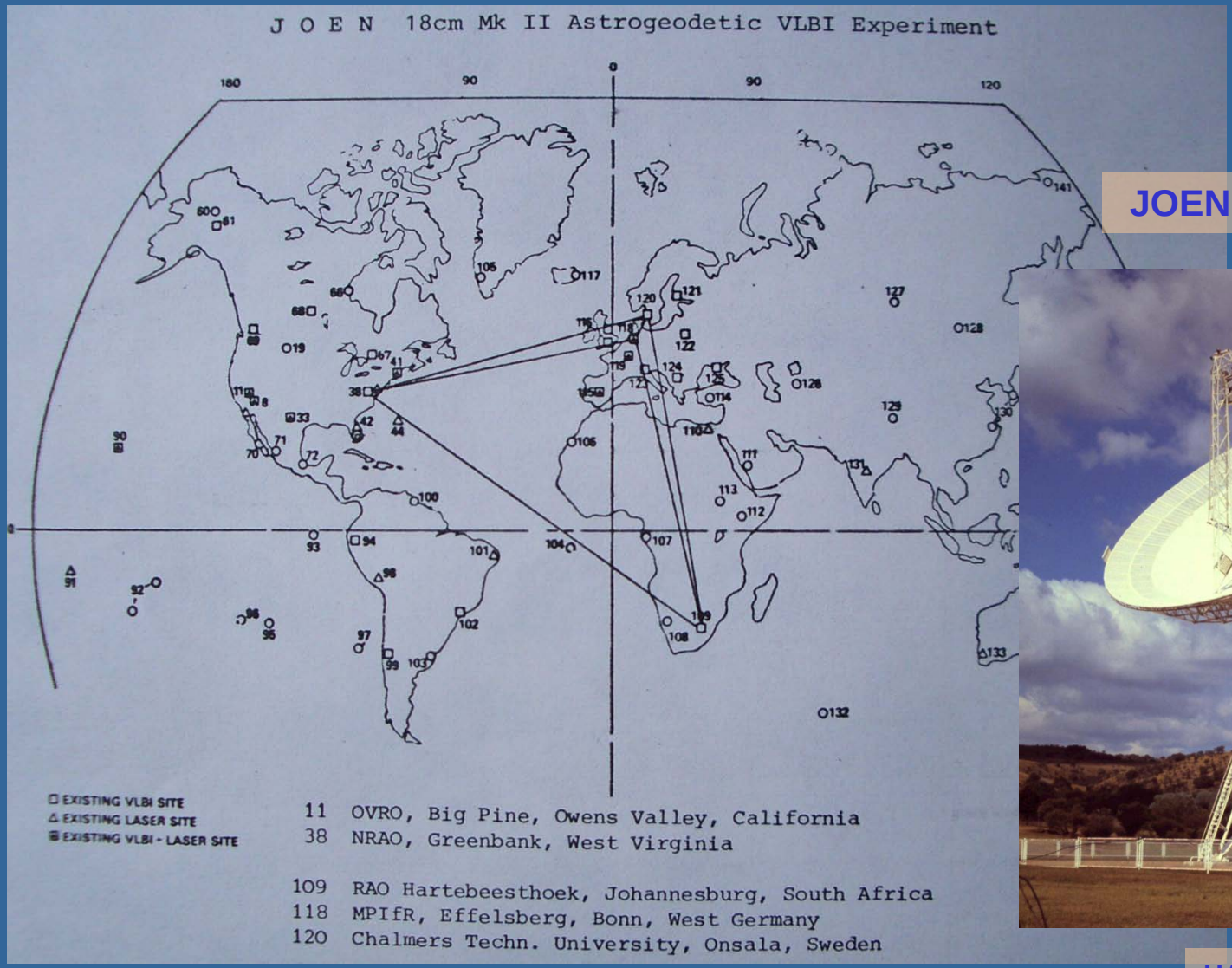
F.J.J. Brouwer, J. Campbell et al.

G.D. Nicolson
A. Nothnagel

The South-African connection

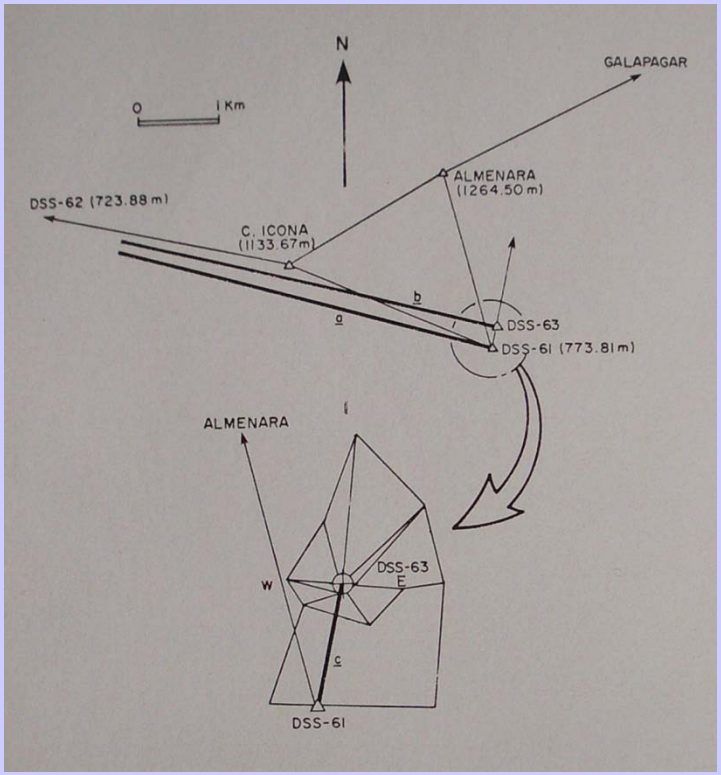
JOEN 19-21 Feb 1980

J O E N 18cm Mk II Astrogeodetic VLBI Experiment



HARTRAO Johannesburg

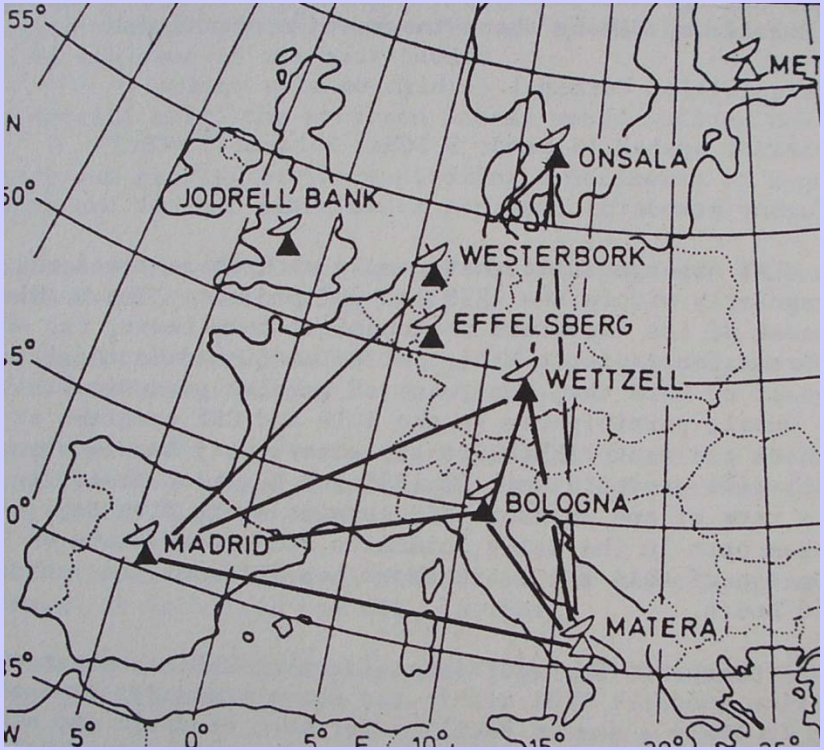
Local networks at telscope sites



Madrid/Robledo: E. Calero, A. Rius 1980

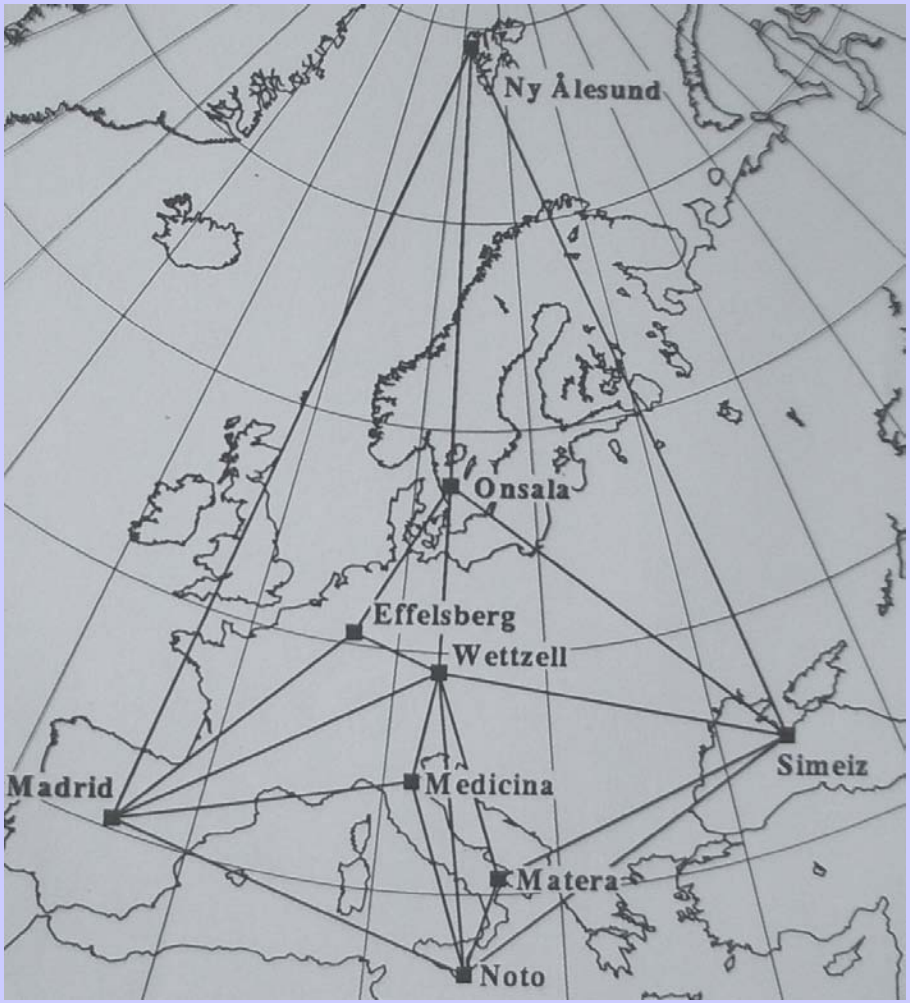
Effelsberg: J. Campbell et al. 1980

Onsala: G. Lundquist 1981



1985

Further evolution of the European astrogeodetic VLBI Net



1991

Wettzell:

Concept of a „fundamental station“, i.e. combining different geodetic space techniques on one site

E.Flinn (NASA), H. Seeger (BKG), M. Schneider (TUM)

Wettzell RT 1983

Strong support by MPIfR for Geodetic VLBI (Correlator Agreement for joint use and investment) ***R. Wielebinski, W. Alef, A. Witzel***

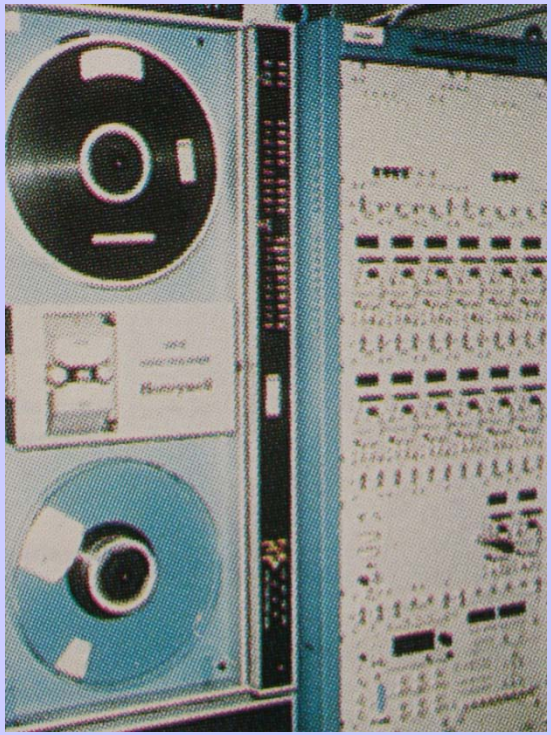
O. Lochner (MPIfR), G. Reichert (GIUB), R. Kilger, R. Zeitlhöfler (TUM/BKG) at Wettzell , 06/1983

Standard geodetic VLBI equipment defined:

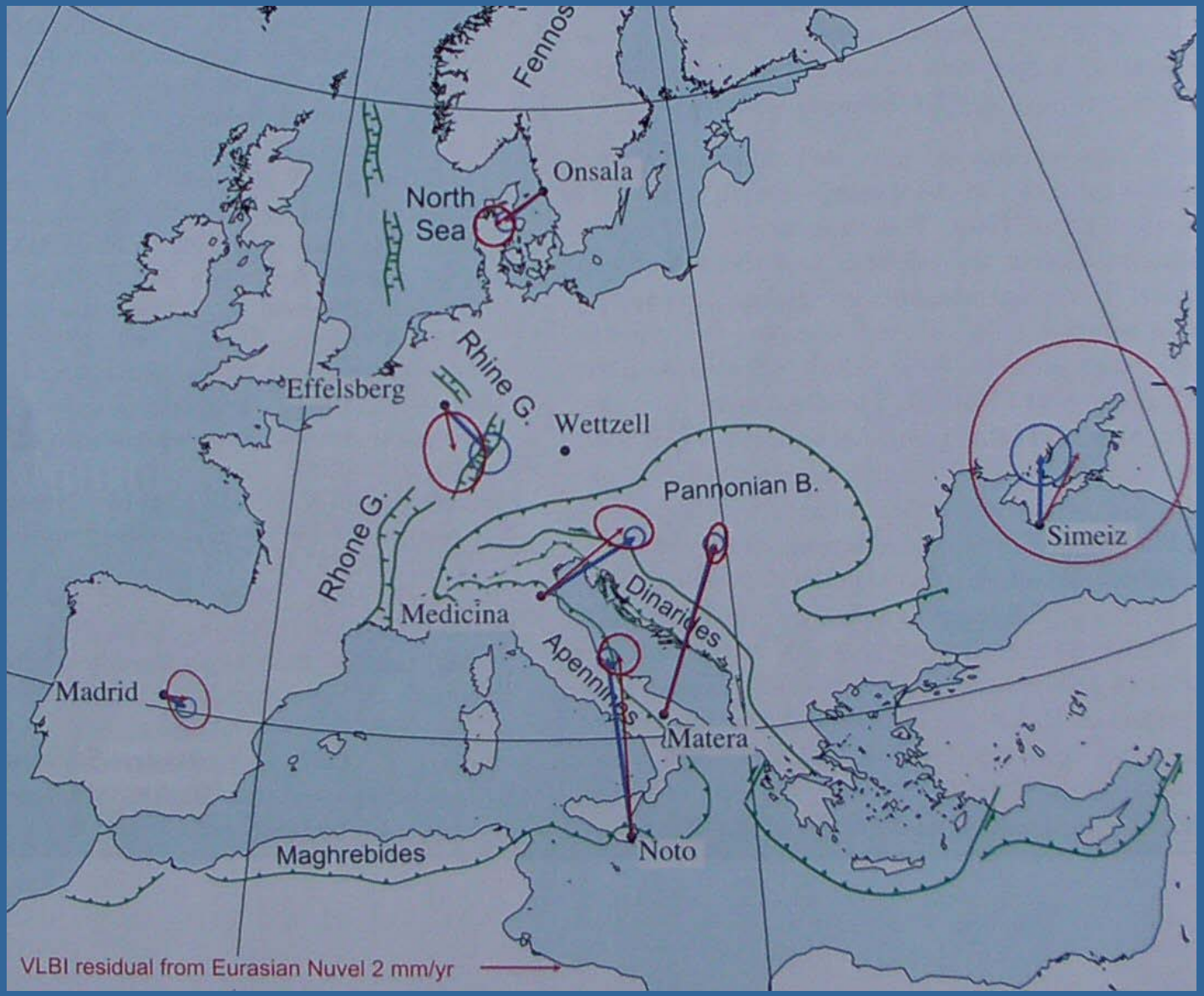
S/X receivers

MkIII Data Acquisition Terminals

H-Maser frequency standards



MkIII DAT



European site velocity vectors (Wettzell fixed)

TMR European Commission publication on crustal motion (2002)

Participants in the 1985 Onsala meeting

Participants list in Proceedings of 4th EVGA 1985