VSOP in the early days, or how the three samurai - Hirax-san, Morimoto-san and Oda-san - conquered the space VLBI world

Richard Schilizzi

Tokyo, 5 December 2007

VSOP in the early days, or how the three samurai - Hirax-san, Morimoto-san and Oda-san - conquered the space VLBI world

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Tokyo, 5 December 2007

A bit more of the history of space VLBI

It wasn't a linear process

A bit more of the history of space VLBI

JET PROPULSION LABORATORY

ENGINEERING MEMORANDUM

315-16

11 February 1977

TO: Distribution

FROM: R. A. Preston RAP

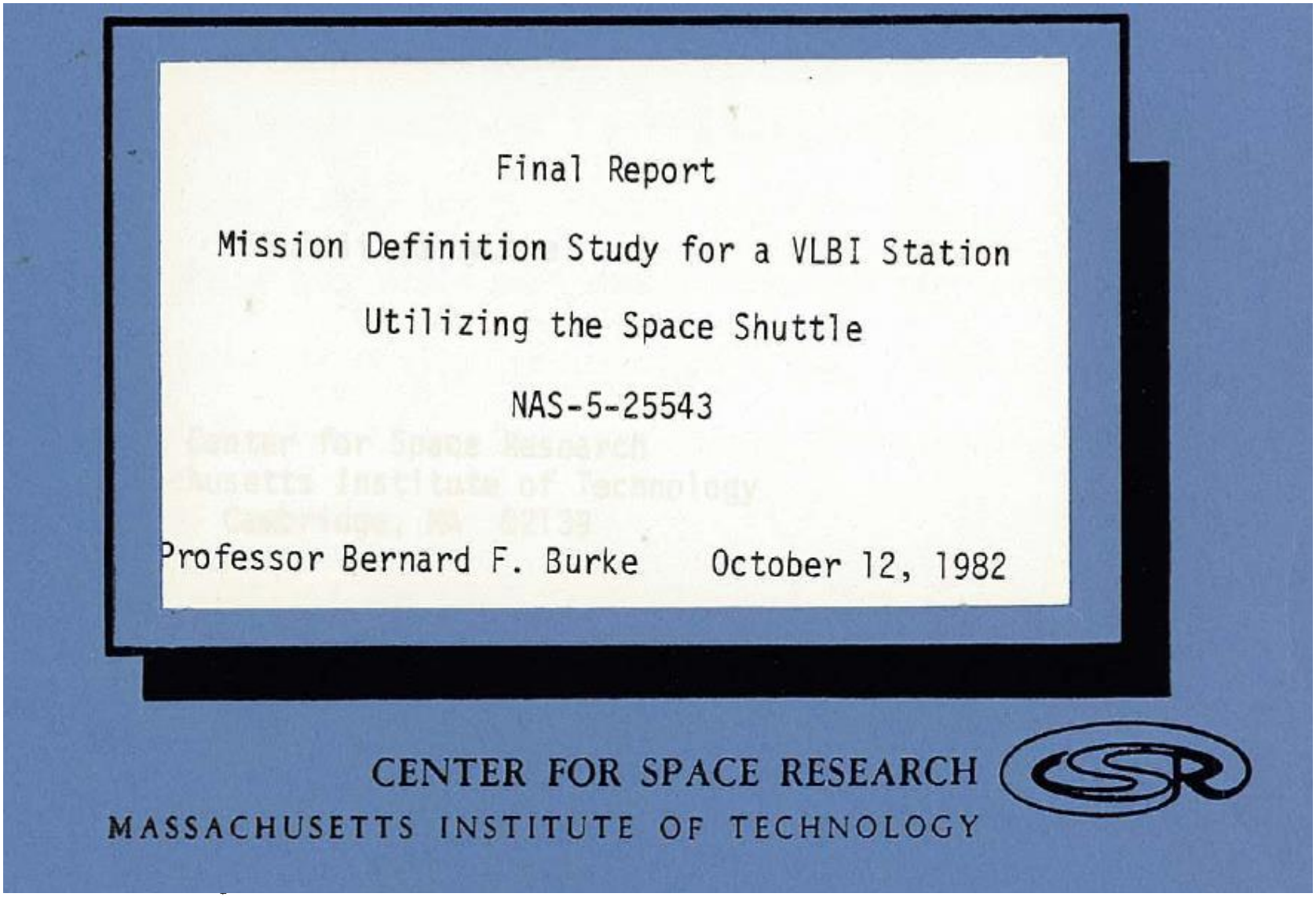
SUBJECT: VLBI with an Earth-Orbiting Antenna

ABSTRACT:

Satellite-borne VLBI terminals could be used to provide maps of compact celestial radio sources with finer resolution, less ambiguity, and more efficiency than earth-bound VLBI techniques. These maps and their time variability would help unravel the physical processes that govern some of the most enigmatic classes of celestial objects. Hence, VLBI should be one of the principle justifications for placing a large parabolic antenna in earth orbit. This memorandum explores the advantages, technical problems, and scientific goals associated with earth-orbiting VLBI.

RAP:tg

A bit more of the history of space VLBI



Final Report

Mission Definition Study for a VLBI Station

Utilizing the Space Shuttle

NAS-5-25543

Professor Bernard F. Burke October 12, 1982

CENTER FOR SPACE RESEARCH

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

A bit more of the history of space VLBI

SPACE VLBI

H. HIRABAYASHI, Y. CHIKADA, M. INOUE, M. MORIMOTO

Nobeyama Radio Observatory*, Tokyo Astronomical Observatory,
University of Tokyo, Nobeyama, Minamisaku-gun
Nagano-Ken 384-13, Japan

(Submitted to Space Station Symposium Tokyo)

Oct. 1982

A side-show - satellite-linked VLBI

1977

Real-Time, Very-Long-Baseline Interferometry Based on the Use of a Communications Satellite

Abstract. *The Hermes satellite, a joint Canadian-American program, has been used to provide a communication channel between radio telescopes in West Virginia and Ontario, for very-long-baseline interferometry (VLBI). This system makes possible instantaneous correlation of the data as well as a sensitivity substantially better than that of earlier VLBI systems, by virtue of a broader observational bandwidth. With the use of a geostationary communications satellite it is possible to eliminate the tape recorders and the most troublesome part of the postobservational data processing. A further possibility is the development of a phase-coherent interferometer.*

A side-show - satellite-linked VLBI

1977

Real-Time, Very-Long-Baseline Interferometry

Based on the Use of a Communications S

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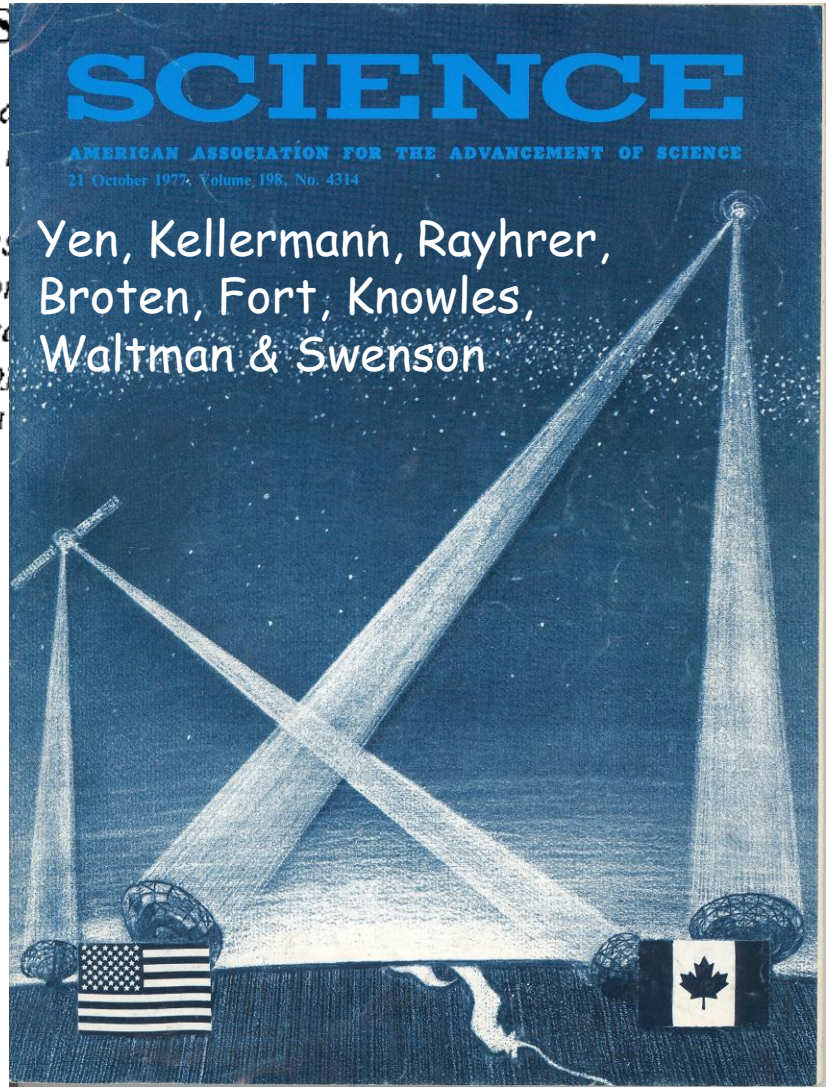

A side-show - satellite-linked VLBI

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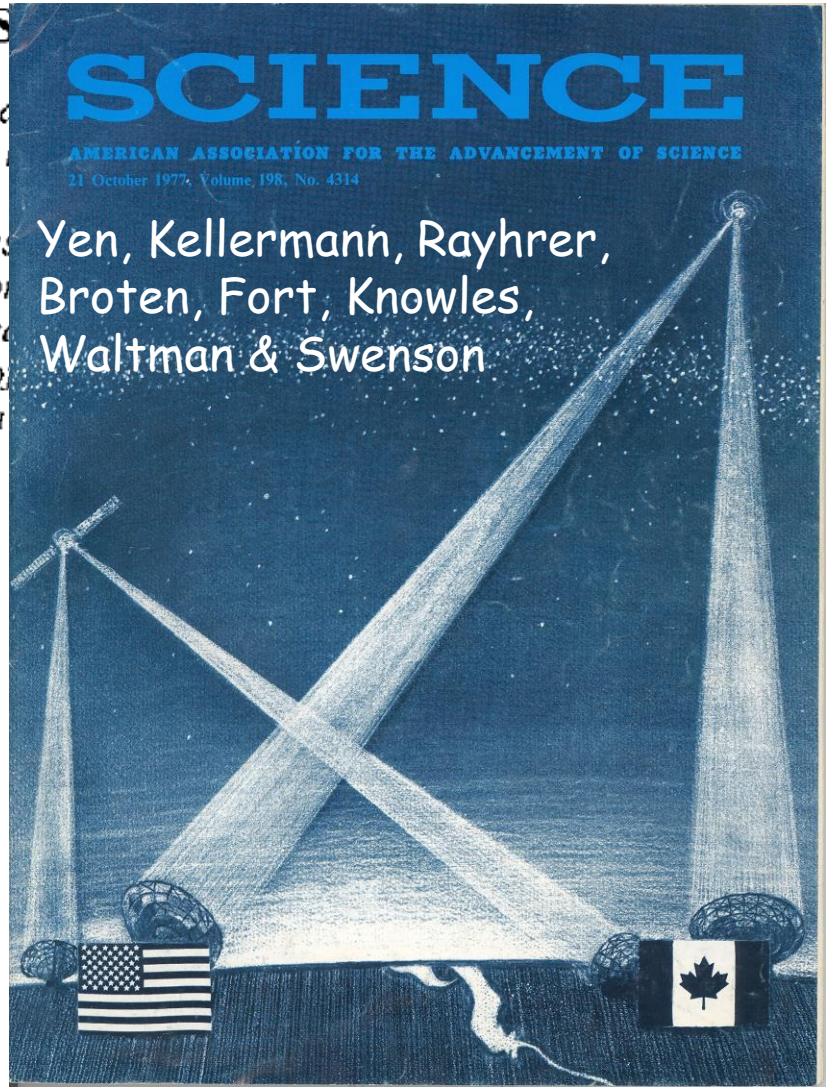


1978: ESA Feasibility Study of satellite-linked VLBI (Schilizzi et al)

1981: ESA Phase A study of satellite-linked VLBI using L-SAT (Schilizzi et al)

1982: Phase transfer via ESA's Orbital Test Satellite by van Ardenne et al

esa
european space agency

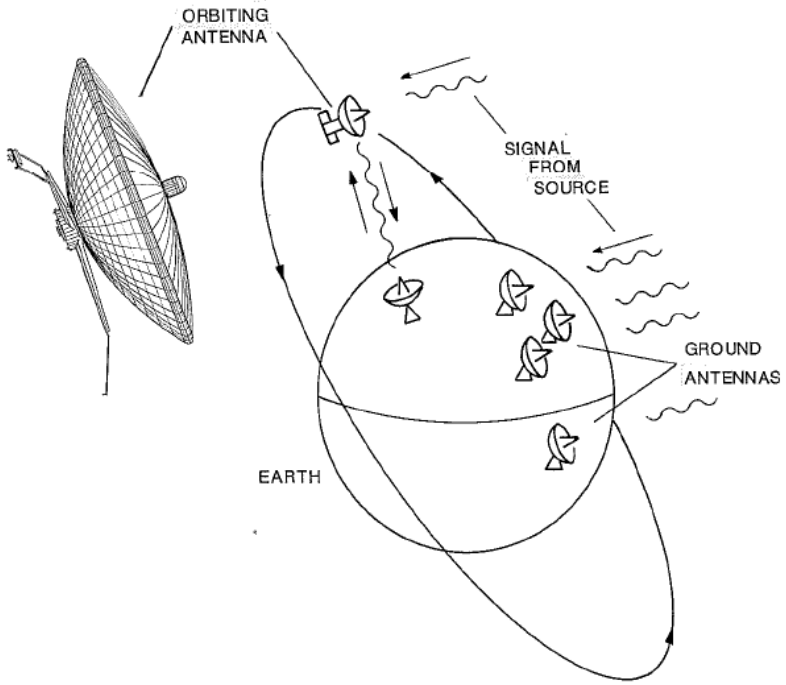
SCI(85)5
NOVEMBER 1985

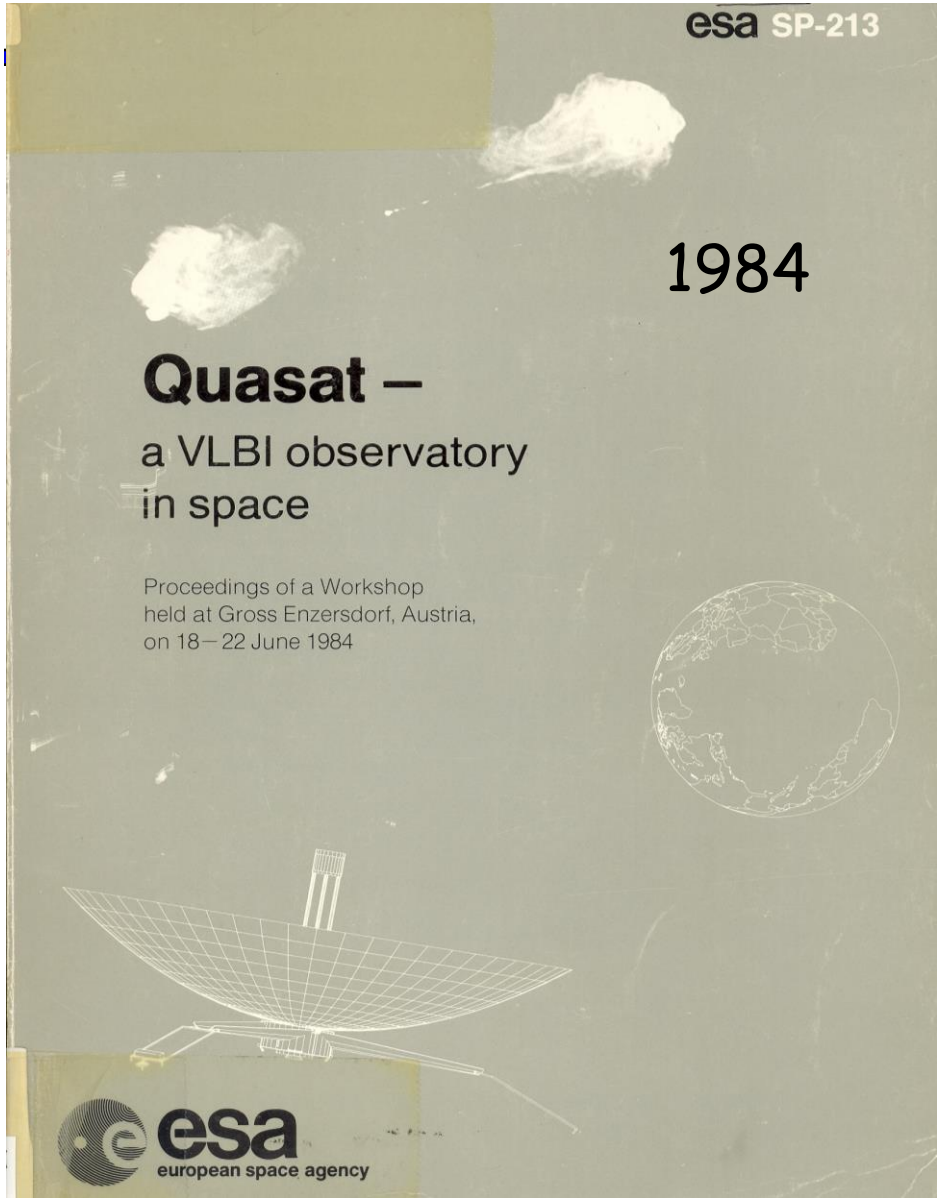
QUASAT

A SPACE VLBI SATELLITE

1983-1985

ASSESSMENT STUDY





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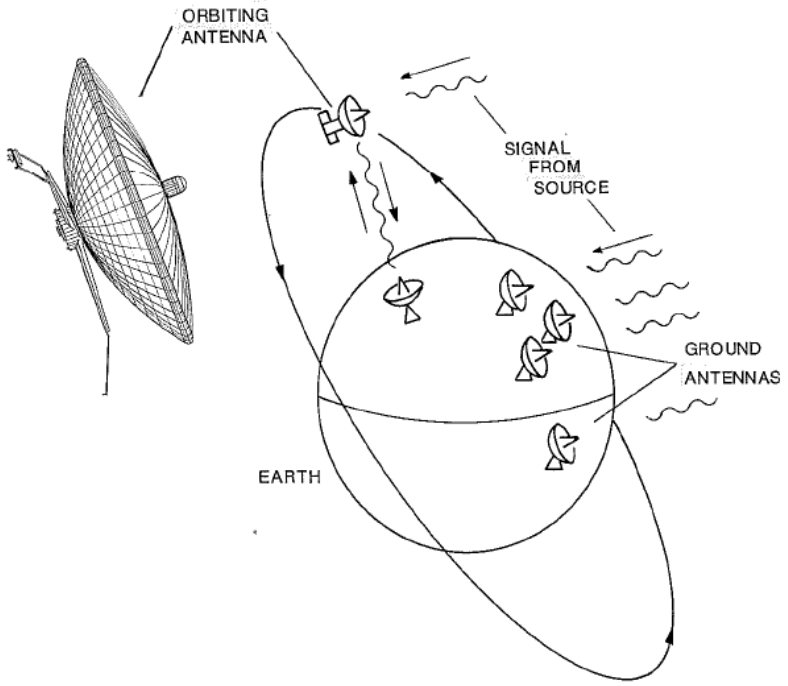


esa
european space agency
agence spatiale européenne

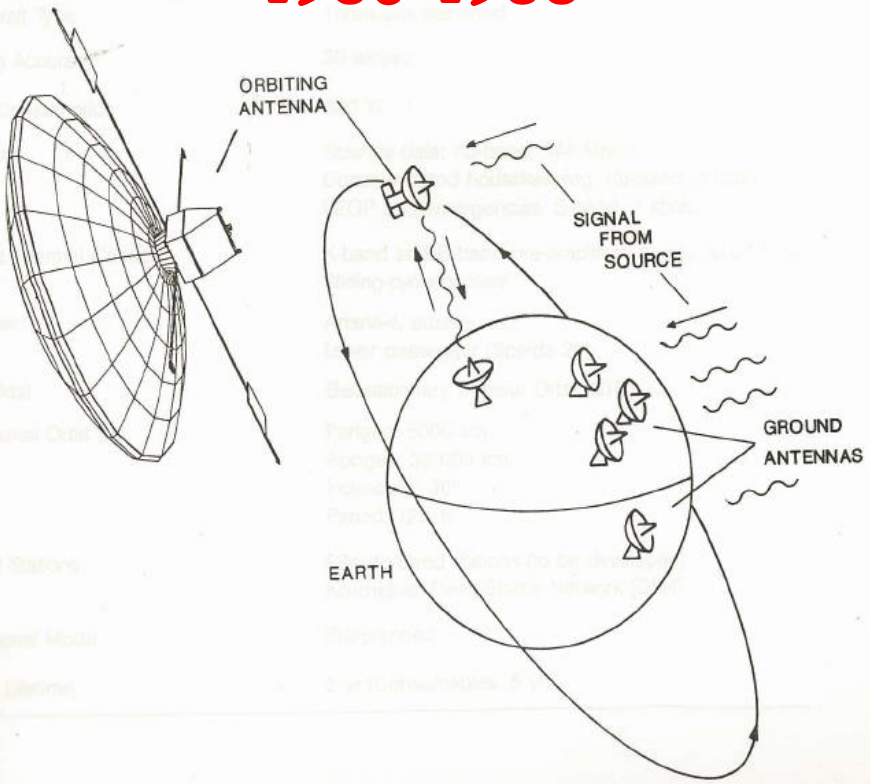
SCI(88)4
October 1988

QUASAT

A SPACE VLBI SATELLITE

REPORT ON THE PHASE A STUDY

1986-1988



esa
european space agency

esa
european space agency

ASC

1989-1991

QUA

A SPACE VI

19

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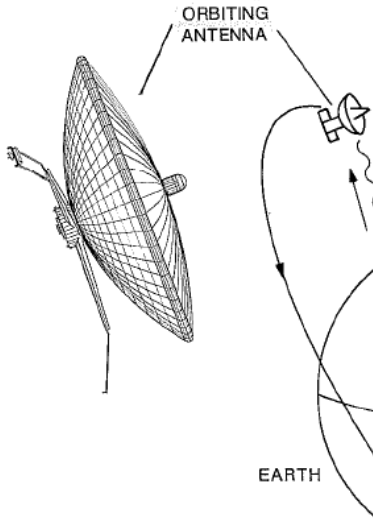

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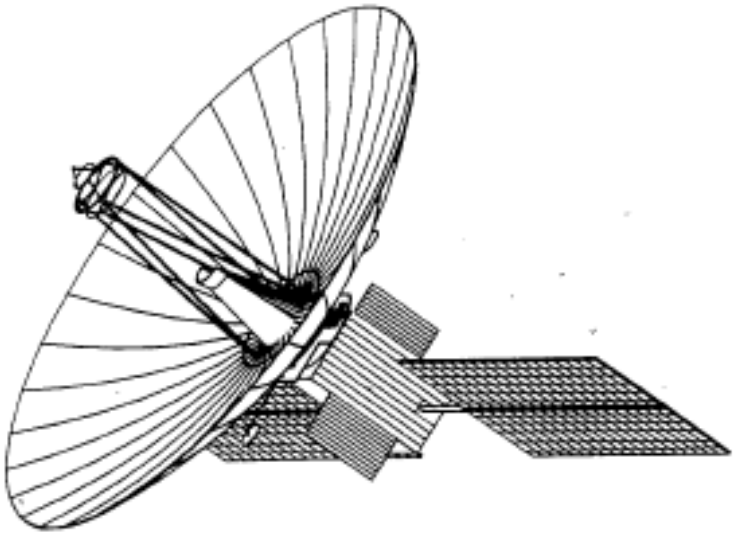
AN ORBITING RADIO TELESCOPE



REPORT ON THE ASSESSMENT STUDY

V.ALTUNIN, B.ANDERSON, J.W.M.BAARS, A.BAUDRY, R.S.BOOTH, B.E.CHERTOCK, J.CORNELISSE, YU.S.DENISOV, L.I.GURVITS, K.S.KARBASHEV, YA.P.KOLYANO, T.KUIPER, G.PELBRATT, R.A.PRESTON, R.T.SCHILIZZI, V.I.SLYSH, G.TOPRAC, S.VOLENTE, P.N.WILKINSON, T.L.WILSON

JANUARY 1991

SCI(91)2

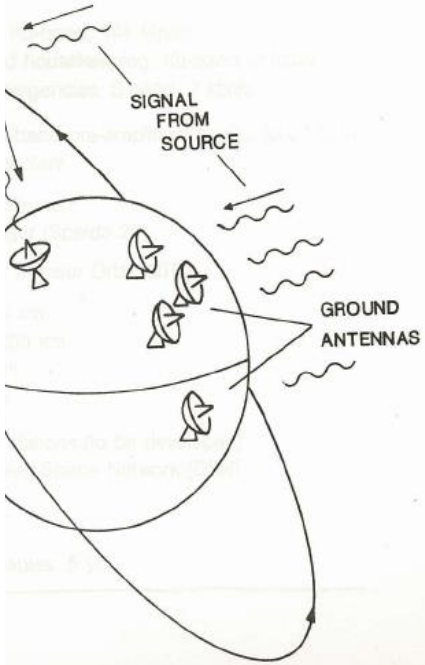
SCI(88)4
October 1988

SAT

ATELLITE

ASE A STUDY

1988



Ultimately, the ESA-NASA efforts were a sideshow too.

But they influenced the thinking of the three samurai who came to the rescue of global space VLBI, as we will see……

Cutting edge science -

a Japanese samurai
revealing our universe

The Hirax connection

NRO Nobeyama Radio Observatory
TOKYO ASTRONOMICAL OBSERVATORY, UNIVERSITY OF TOKYO
NOBEYAMA, MINAMISAKU, NAGANO 384-13, JAPAN
PHONE: 0267-98-2831 TELEX: 3329005 TAO NRO J

August 17 1983

Dr. R. T. Schilizzi

Radiosterrenwacht Dwingeloo
Oude Hoogeveensedijk 4
7991 PD Dwingeloo
Postbus 2
The Netherlands

Dear Dr. Schilizzi,

Thank you for your letter and the paper on QUASAT proposal. I am very interested in the status of your project and would like to hear any news youhave. Also, the people at the Institute of Space and Astronautical Science (ISAS) and Radio Research Laboratories (RRL) are interested in space VLBI, and we had an informal meeting at ISAS to seek the possibility of Japanese Space VLBI project.

1984: QUASAT Workshop

Space VLBI Studies in Japan

Presented by M. Morimoto

Nobeyama Radio Observatory,
Nobeyama, Minamisaku, Nagano 384-13, Japan

There are two more or less independent approaches being made in Japan.

One is related to Japan's participation in Space Platform Project of USA. A project team to make feasibility study of construction of large structure in space made a choice of a parabolic antenna for VLBI observations as a candidate structure for the study. Radio astronomers from Radio Research Laboratories (RRL) and Nobeyama Radio Observatory (NRO) are participating in the study.

The other is a joint study group in Institute for Space and Astronautical Science (ISAS), RRL and NRO, to study a possibility of having a small antenna in space to do VLBI experiments.

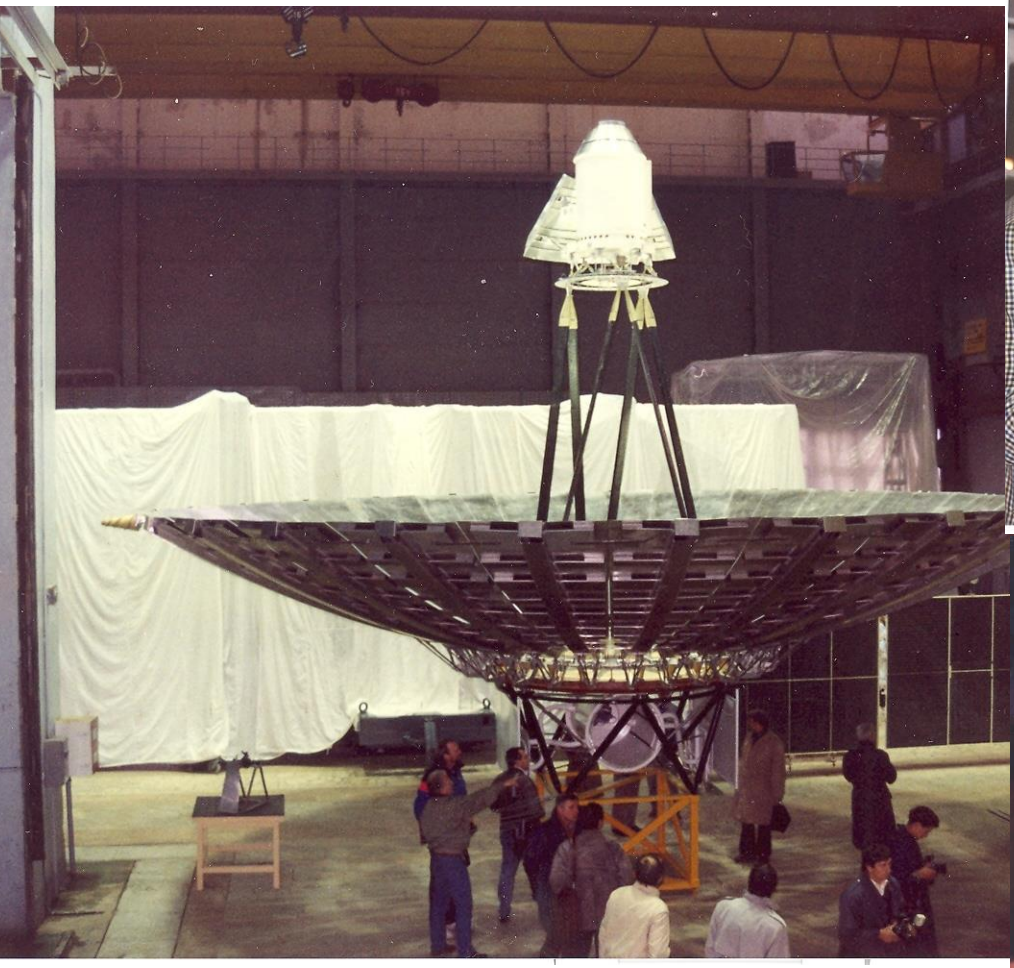
In both cases, only individual elements such as antennas, spacecraft orbits, launch capabilities etc have been studied and detailed analyses of missions are still to be done.

1984: QUASAT Workshop

Space VLBI Studies in Japan

The other is a joint study group in Institute for Space and Astronomical Science (ISAS), RRL and NRO, to study a possibility of having a small antenna in space to do VLBI experiments.

RadioAstron was announced in 1985

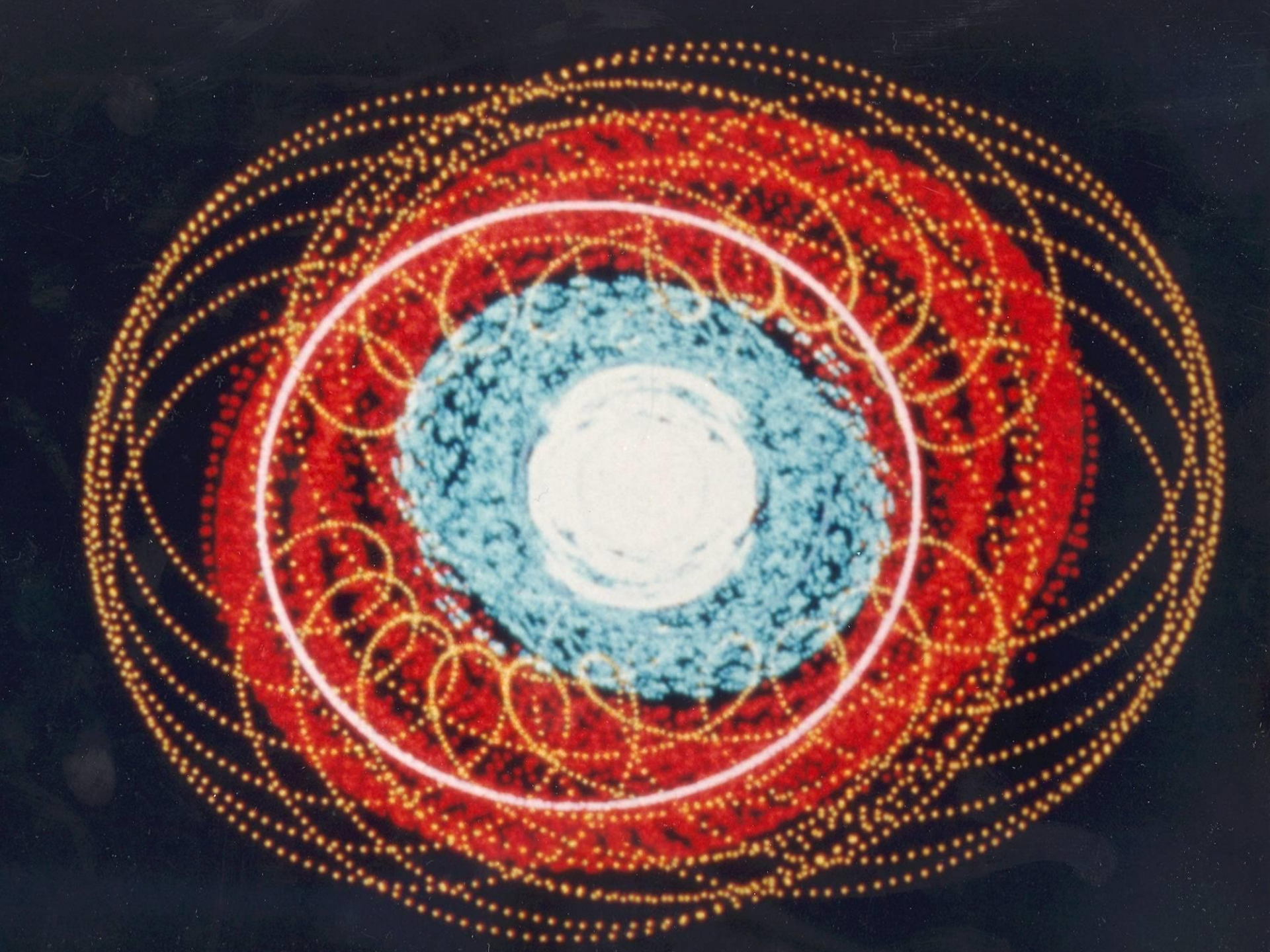


Dual-satellite space VLBI

It was becoming clear in 1985 that the uv-coverage with space VLBI was not perfect if you wanted a substantial jump in angular resolution over ground-based VLBI.

And there was a certain amount of healthy competition between the three concepts under study.

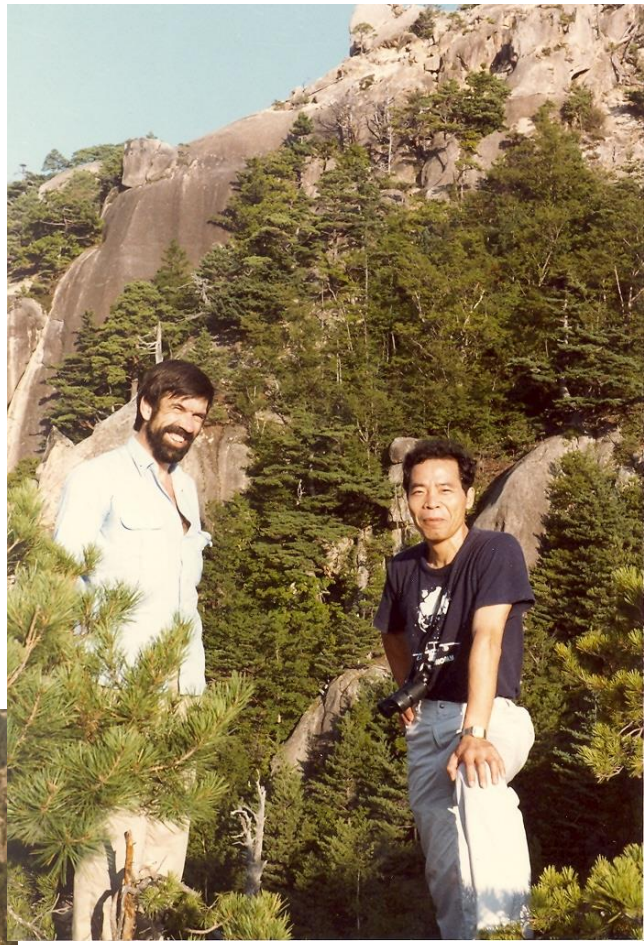
Solution: two satellites - QUASAT + ?



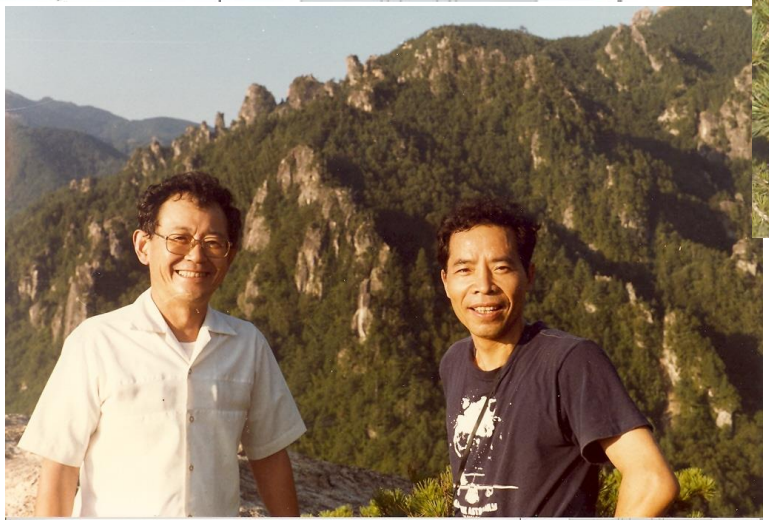
So I went to Japan……

And encountered Hirax

August 1985



and Mori



And his view of the world….

「子どもを食べる大きな木の話」より

To Richard :

FAX TRANSMISSION SHEET

from HIRAX, ISAS, Japan
File Name =

from: Prof. Hisashi Hirabayashi
The Institute of Space and Astronautical Science
3-1-1 Yoshinodai, Sagamihara,
Kanagawa 229, Japan
Fax: 0427-59-4251 or -4255
Phone: 0427-51-3911 ext. 2708
Telex: J27758 ISAS ERO

Date: 911012

Number of sheets: 3 including this cover

To: Dr. Richard T. Scilizzi
(Richard the Tiger-hearted)
Institute:Netherlands Foundation for Research in Astronomy
Postbus 2, 7990AA Dwingeloo, The Netherlands
Fax No.: 31 5219 7332

Subject: VSOP Report

I am sorry for the delay in responding you for the fax on Sep. 24 requesting recent news on VSOP. Below are the news which may help you.

1. Correlator funds requested from ISAS for 1992 FY not received by the Ministry of

Science , Education and Culture. The need for the correlator is understood in ISAS. New proposals for the funds for the Ministry from ISAS and NAO were rejected because the Ministry wants to give more money to the universities, while the total amount is reserved constant.

Even more history…

VSOP was approved in December 1988

QUASAT finally died in 1989

Working closely with the Soviet Union on RadioAstron still didn't have the seal of approval from you know who.

So we all took an oath of allegiance to the three samurai and…..

took a course in Japanese culture

"Once upon a time, 3 wise men and a Japanese businessman met in a ryokan in Nobeyama."

Bernie Burke (MIT)

Hirax Hirabayashi (NRO)

Richard Schilizzi (JIVE)

Quasat

Gerry Levy (JPL)

TDRSS

OVLBI

SKA
SQUARE KILOMETRE ARRAY

Mori in full swing!

And we learnt the language

ano, eto, sono,….

In the meantime, Hirax was….

getting all the help he could....

VSOP's secret recipe

1 chief cook,

9 assistant cooks, and

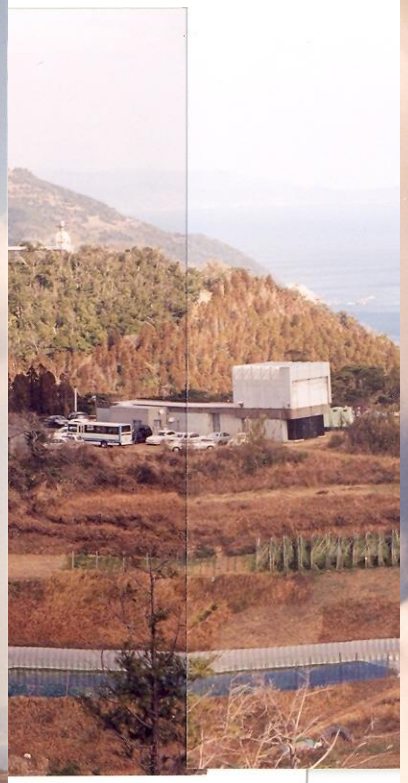
one bottle-washer

Quietly confident before the launch

And finally, the launch

nd finally, the launch

nd finall



"V" for Victory or VSOP or …

"V" for Victory or VSOP or …

Opera cast


DECCA
PAVAROTTI
Forever

Hirax

Gentleman
Samurai
Philosopher
Scholar
Man of culture
Poet
Cartoonist

Hirax

Enjoy your first retirement!