18 cm VLBI NETWORK

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The Soviet VLBI network includes parabolic 70-m antennas located near Usuriisk and Eupatoria, a 64-m antenna in Bear Lake, 22-m antennas in Pushino and Simeiz, and a 25-m antenna near Ulan-Ude. The maximum baseline length in the E–W direction is equal to about 7000 km, and in the N–S direction is equal to 1300 km. The minimum baseline length is equal to about 100 km.

Each 70-m antenna has a Gregorian system of illumination, the 22-m antenna has a Cassegrain system at 1.35 cm and a prime focus system at 18 cm, and the 25-m and 64-m antennas have Cassegrain systems. Each antenna has been equipped with a hydrogen frequency standard (H) or a rubidium standard (Rb), a low noise cooled 18-cm parametric or transistor preamplifier, and a 2-MHz digital recording system with a video recorder. The system noise temperatures (T_{sys}) of the radio telescopes at 18 cm are 50–70 K, and the aperture efficiencies (η) are equal to 0.45–0.57 (see Table 1).

Table 1

Station	Antenna Diameter (M)	$\lambda = 18$ cm		$\lambda = 1.35$ cm		Frequency Standard
		η	T_{sys} (K)	η	T_{sys} (K)	
Usuriisk	70	0.55	60	(40)	(60)	H
Ulan-Ude	25	0.45	65	–	–	Rb
Bear Lake	64	0.55	50	–	–	H
Pushino	22	0.49	65	0.30	100	H
Eupatoria	70	0.57	50	0.40	60	H
Simeiz	22	0.56	70	0.48	65	H

The antennas in Simeiz, Eupatoria, and Pushino have been equipped with 1.35-cm radiometers having maser preamplifiers. The fractional-frequency stability of the local oscillators is $< 5 \times 10^{-14}$ for 1000 sec. The system noise temperature and the efficiency of the radio telescopes are shown in Table 1 (Matveyenko *et al.* 1983). A three-station processor is used for the processing of continuum sources,

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and a two-station processor is used for spectral line objects. The processor has 96 scalar channels, and the integration time is in the interval 0.2 to 2.0 sec.

In 1985, balloon probes in the Venus atmosphere were observed with the global VLBI network, which included our antennas. The preliminary results of the balloon motion for June 11 and June 15 – Vega 1 and Vega 2, respectively – are shown in Figure 1. The power of the balloon transmitter was ~ 5 watts and of the spacecraft was ~ 45 watts. The trajectories of balloons are measured relative to the spacecraft on the antennas at Usuriisk, Ulan-Ude, and Eupatoria.

We are now observing radio sources. The fringe spectrum of the Seyfert galaxy NGC1275 on the Eupatoria–Usuriisk baseline is shown in Figure 2.

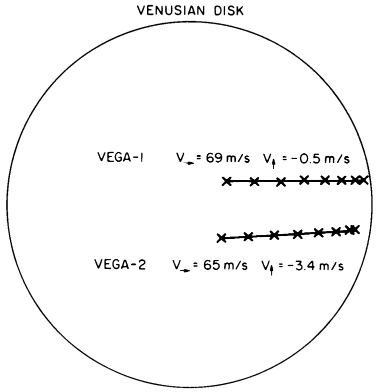

Figure 1. Tracks of the Vega 1 and Vega 2 probes projected on the Venusian disk. The time between data points is 4 hours.

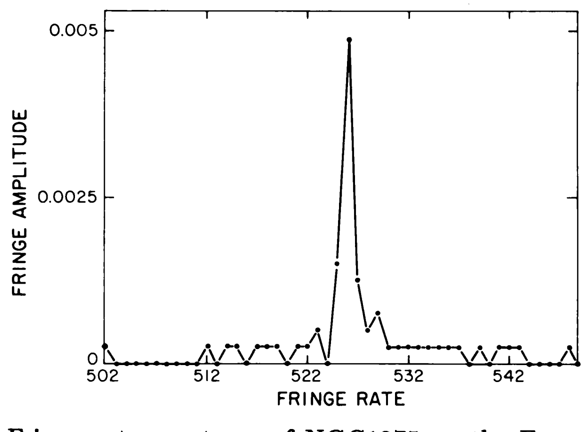

Figure 2. Fringe rate spectrum of NGC1275 on the Eupatoria–Usuriisk baseline. The fringe rate resolution is 4.8 mHz.

REFERENCES

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