3C 273 AND DA 193 MAPPED WITH CRUSTAL DYNAMICS VLBI DATA

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ABSTRACT. Hybrid maps of 3C 273 and DA 193 at 2.3 and 8.4 GHz have been produced with VLBI data acquired during a Crustal Dynamics campaign. By comparing to maps at previous epochs, superluminal components of 3C 273 are clearly detected. DA 193 is relatively compact. Structure corrections for the VLBI delay used in astrometry have been estimated from these maps. Some corrections are significant when compared with the precision of models used in astrometry and geodesy.

The Crustal Dynamics Program (CDP) kindly provided us with the VLBI data acquired during the experiment conducted on North Pacific baselines on 1985 May 15 with a 6-station VLBI array (Mojave, Vandenberg, Hatcreek, Gilmore Creek, Kauai, Kashima). Figure 1 shows the u-v plane for 3C 273 at 8.4 GHz. It is interesting that such coverage is more uniform than those provided by the other networks. Figure 2 shows the hybrid maps of DA 193 and 3C 273 made with these data.

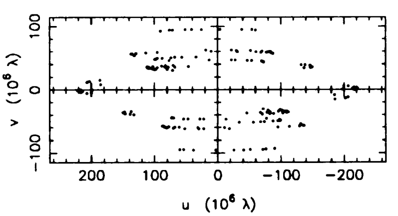

Figure 1. The u-v plane for 3C 273 at 8.4 GHz.

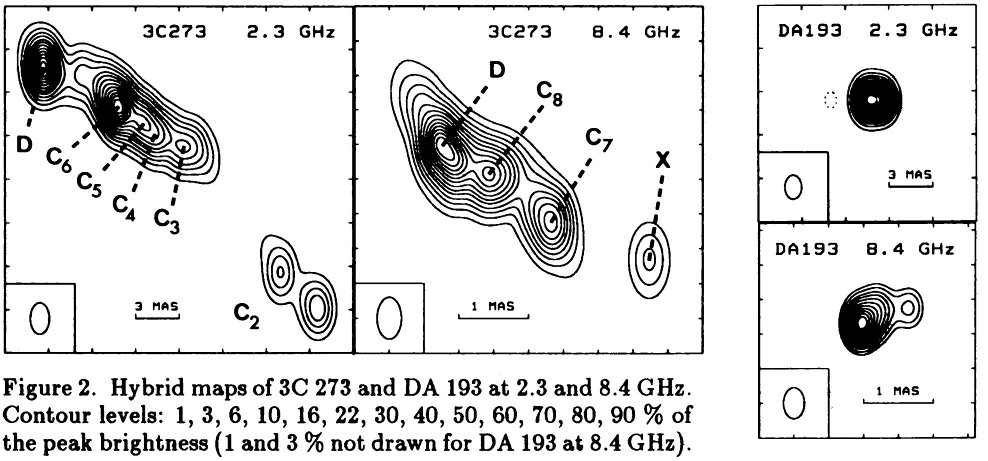

Figure 2. Hybrid maps of 3C 273 and DA 193 at 2.3 and 8.4 GHz. Contour levels: 1, 3, 6, 10, 16, 22, 30, 40, 50, 60, 70, 80, 90 % of the peak brightness (1 and 3 % not drawn for DA 193 at 8.4 GHz).

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Our maps of DA 193 are similar to the one found by Spangler *et al* (1983) at 5 GHz at epoch 1981.7. However we find a slight extension in the N-W direction that is not seen in their map. Our maps of 3C 273 are consistent with previous maps published by Unwin *et al* (1985), hereafter U85, Biretta *et al* (1985), and Cohen *et al* (1987), hereafter C87. The separations and proper motions of the components of 3C 273 are given by U85 and C87. We have used these values to predict the separations of the components at our epoch of observation (1985.37) in order to identify them. This comparison is summarized in Table I.

	Map at 2.3 GHz					Map at 8.4 GHz		
	C_2	C_3	C_4	C_5	C_6	X	C_7	C_8
U85 or C87 at 1985.37	20-25	11.9 ±0.5	9.3 ±2.2	7.8 ±0.2		3.6 ±0.2	2.1 ±0.2	0.7 ±0.2
Our maps	21-26	11.1	9.1	7.8	5.9	3.4	1.9	0.7

Table I. Separations between the core D and the components of 3C 273 (milliarcseconds).

In our 2.3 GHz map, the strongest component is assumed to be C_6. This component was first seen in 1981.10 at 10.7 GHz (U85) when its separation from D was 1.1 milliarcsecond. It is not seen in later maps at 10.7 GHz (C87), but it is visible in our 2.3 GHz map with a separation of 5.9 milliarcseconds from D. This implies a proper motion of 1.1 milliarcsecond per year. This proper motion is consistent with the measured proper motions of the other components. The weak emission region located between 21 and 26 milliarcseconds from the core may correspond to the fading component C_2.

The maps above can be used to derive astrometric corrections for the VLBI delays in order to refer the position of each source to a specific feature of its morphology (Thomas, 1980). Table II gives the magnitudes of these corrections at 2.3 and 8.4 GHz in the cases of the complex source 3C 273 and of the simple source DA 193. These corrections must be included for modelling the VLBI delay at the 0.1 nanosecond level.

	3C 273		DA 193	
	2.3 GHz	8.4 GHz	2.3 GHz	8.4 GHz
Maxi	1.44	0.44	< 0.01	0.02
Mean	0.38	0.08	< 0.01	0.01
RMS	0.57	0.15	< 0.01	0.01

Table II. Structure corrections in the delays (nanoseconds) for 3C 273 and DA 193 during the North Pacific CDP campaign on 1985 May 15.

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