METHODS

The age model for Site 984 is based on linear interpolation between 11 *G. bulloides* accelerator mass spectrometer radiocarbon dates which were converted to calendar age using CALIB 5.01 (Stuiver and Reimer, 1993), the calibration dataset of Hughen *et al*. (Hughen et al., 2004), and a reservoir correction of 400 years. The converted ages reveal a near constant elevated sedimentation rate of ~29 cm/kyr during the last 10 kyr (Table DR1; Figure DR1-A), making it a suitable core for the study of suborbital climate variability.

Foraminiferal tests were picked from the narrow size fraction of 150-212 microns. Each Mg/Ca sample consisted of approximately 50 individuals, which were crushed and cleaned using the full trace metal method, with a reversal of the oxidative and reductive steps (Boyle and Keigwin, 1985/6; Boyle and Rosenthal, 1996). Each stable isotope sample consisted of 7-10 individuals.

Mg/Ca data were generated using a Thermo-Finnigan Element2 sector field single collector ICP-MS, following the protocol of Rosenthal *et al*. (Rosenthal et al., 1999). In order to assess the precision of measurements on the ICP-MS, three consistency standards were treated as samples in each of 9 runs (including the two runs in which the data were generated). Mean Mg/Ca for the three consistency standards were 1.7 mmol mol^{-1}, 3.3 mmol mol^{-1} and 5.0 mmol mol^{-1}. Standard deviations were ±0.02 mmol mol^{-1} (n=9), ±0.03 mmol mol^{-1} (n=9), and ±0.04 mmol mol^{-1} (n=9), respectively. Average Mg/Ca in our samples range from 0.91 to 2.31 mmol mol^{-1}. Using the Mg/Ca-temperature relationship [Mg/Ca] = 0.51 exp 0.10 T (von Langen et al., 2005), the resulting temperature errors range from ±0.2°C at our highest Mg/Ca values, to ±0.4°C at our lowest values. Stable isotope data were generated using a Finnegan-MAT 253. Calibration to the VPDB scale was made using NBS-19 ($\delta^{18}O$ = -2.20‰). Long-term reproducibility (1σ; n=461) of NBS-19 for this mass spectrometer is ±0.08‰.

FORAMINIFERAL DATA VS. DEPTH

Very good agreement exists between most replicate analyses, especially at the interval around 225 cm, which corresponds to the 8.2 kyr event (Figure DR1-B).

Foraminiferal weights are shown in Figure DR1-C. We present these data because post-depositional dissolution is a potential problem in foraminiferal analyses (Brown and Elderfield, 1996) due to the preferential removal of Mg from carbonates (Lorens et al., 1977; Rosenthal and Boyle, 1993). To monitor dissolution, we weighed each sample of 50 individual foraminiferal tests and obtained average foraminiferal weights. Low foraminiferal weights do not coincide with low Mg/Ca values, making it unlikely that carbonate dissolution drives the Mg/Ca variability at Site 984. Therefore, we chose the conservative approach of not applying a dissolution correction based on foraminiferal weights (Rosenthal and Lohmann, 2002), which would only exaggerate the Mg/Ca-derived temperature signal.

REGIONAL δ^{18}O-SALINITY RELATIONSHIP

The modern-day, regional δ^{18}O-salinity relationship was determined using data obtained from the Global Seawater Oxygen-18 Database (Schmidt et al., 1999). We limited data selection to the following area: 54-68ºN, 18-32ºW, and 10-50 meters water depth. All δ^{18}O and salinity data are presented in Table DR2 and in Figure DR2. Using the modern-day relationship shown in Figure DR2, a 0.1‰ change in δ^{18}O is equivalent to a salinity change of ~0.13.

COHERENCE ESTIMATES

In order to assess the influence of solar variability, we generated coherence estimates for our Mg/Ca temperature data and the atmospheric Δ^{14}C data of Stuiver *et al*. (Stuiver et al., 1998). While coherence within a broad millennial band does exist between Mg/Ca-derived temperatures and atmospheric Δ^{14}C, it lies well below the 95% confidence limits (Figure DR3-A). In addition, we generated several age models for Site 984, using randomly selected age control points from within the 2σ range of calibrated radiocarbon dates, and a linear interpolation between those control points. The different age models yield radically different coherence estimates, making it difficult to draw conclusions about the influence of solar variability on the temperatures at our site (Figure DR3-B).

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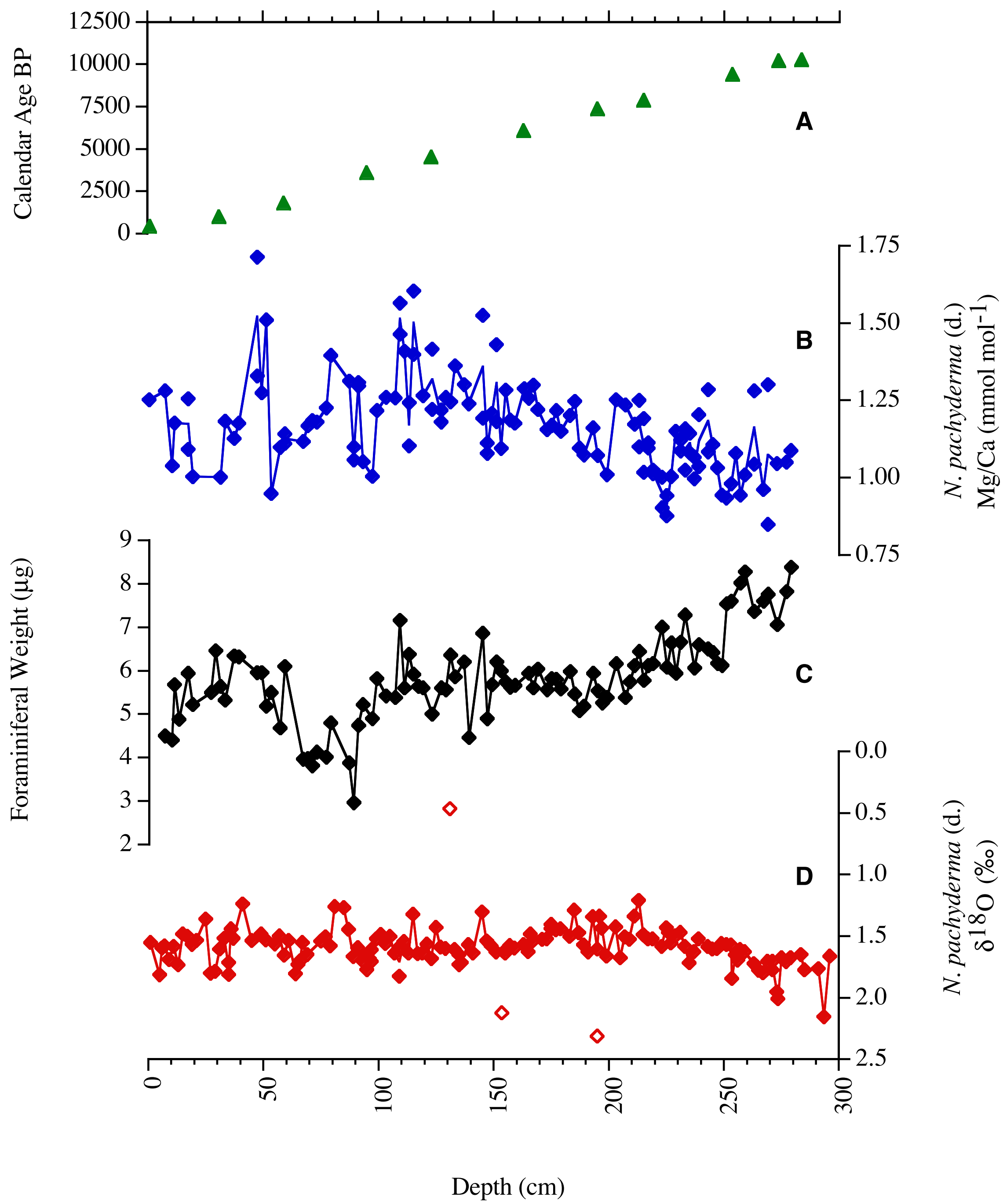

Figure DR1. *N. pachyderma* (d.) data from ODP Site 984 *vs*. depth. **A.)** Accelerator mass spectrometer radiocarbon dates (green triangles). **B.)** All Mg/Ca data (blue diamonds), with average Mg/Ca where replicates exist (solid blue line). **C.)** Average test weight (black diamonds). **D.)** All $\delta^{18}O$ data (red diamonds), with average $\delta^{18}O$ where replicates exist (solid red line), and omitted data (open red diamonds).

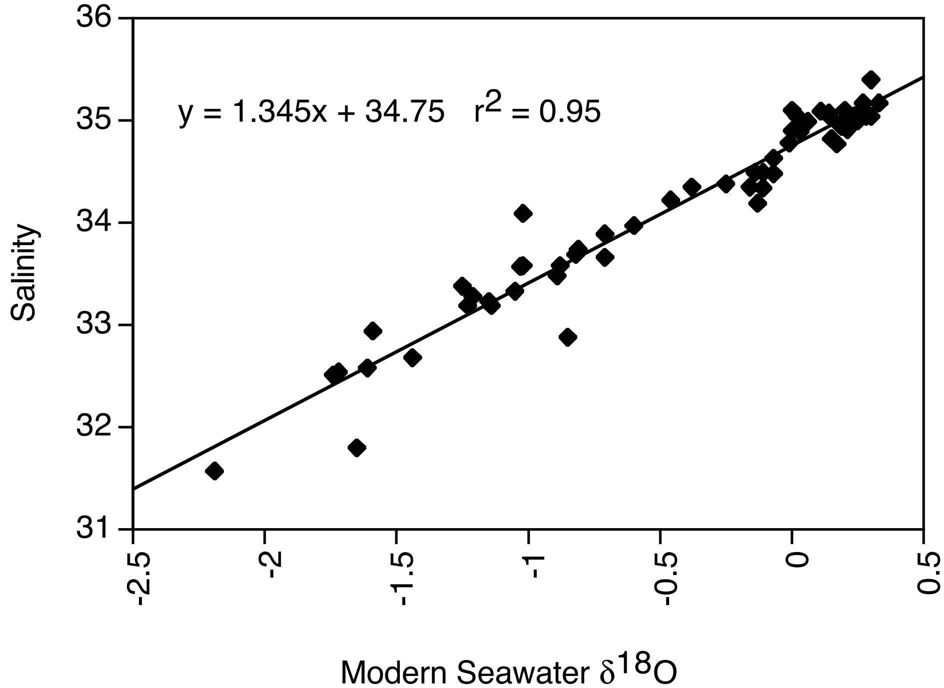

Figure DR2. Modern-day $\delta^{18}O$-salinity relationship for Site 984. Temperature and salinity data were obtained from the Global Seawater Oxygen-18 Database (Schmidt et al., 1999). Data are from 54-68ºN, 18-32ºW, and 10-50 meters depth.

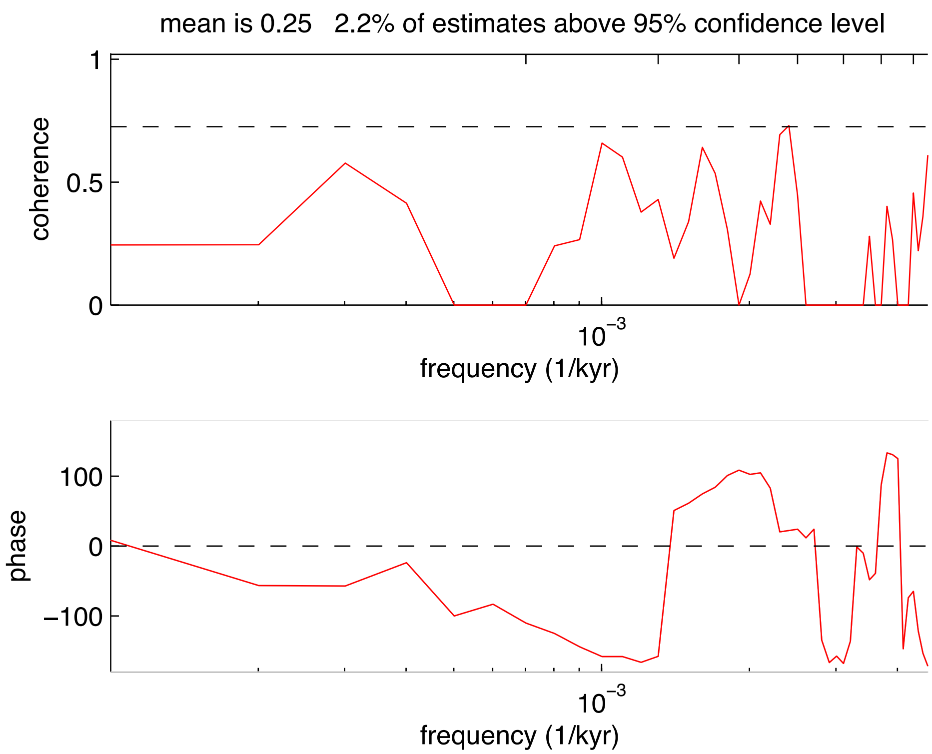

Figure DR3-A. Multi-taper coherence for Mg/Ca-derived temperatures and atmospheric $\Delta^{14}C$. **A.)** 554-10,423 years BP. Atmospheric $\Delta^{14}C$ linearly de-trended. Mean time step = 107.3 years, with linear interpolation of temperature and atmospheric $\Delta^{14}C$ data. Time-bandwidth product = 3. Dashed line denotes the 95% confidence interval.

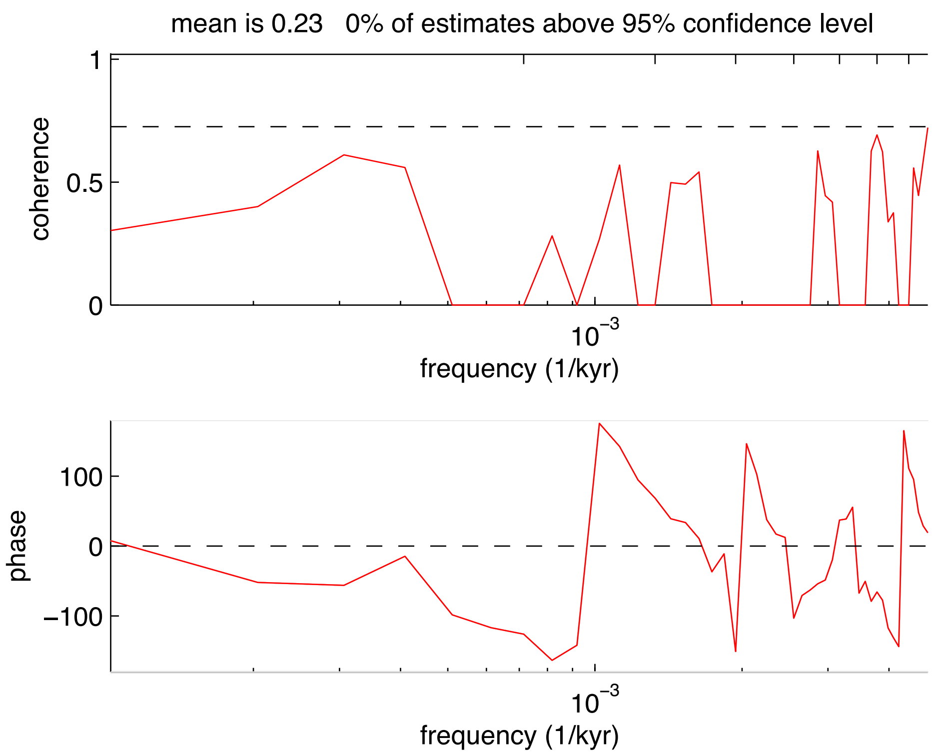

Figure DR3-B.) Same as in **A.)**, except using a different age model for the Mg/Ca time series, which was based on randomly selected age control points from within the 2σ range of calibrated radiocarbon dates. Matlab code courtesy of Peter Huybers.

Table DR1. AMS dates and calendar ages.

Core	Depth (cm)	MCD (cm)	Species	NOSAMS #	AMS Date	AMS Error	1 or 2 sigma	Age lower (yrs BP)	Age upper (yrs BP)	Age (yrs BP)
984C-1H-01	0-2	1	*G. bulloides*	OS-19325	805	40	1	415	489	446
							2	333	506	
984C-1H-01	30-32	31	*G. bulloides*	OS-36742	1,440	35	1	940	1,029	985
							2	906	1,072	
984C-1H-01	58-60	59	*G. bulloides*	OS-36743	2,200	40	1	1,743	1,854	1,798
							2	1,689	1,900	
984C-1H-01	94-96	95	*G. bulloides*	OS-19326	3,690	40	1	3,550	3,667	3,604
							2	3,470	3,716	
984C-1H-01	122-124	123	*G. bulloides*	OS-36744	4,380	40	1	4,441	4,576	4,524
							2	4,406	4,655	
984C-1H-02	12-14	163	*G. bulloides*	OS-36745	5,670	45	1	6,009	6,148	6,075
							2	5,942	6,190	
984C-1H-02	44-46	195	*G. bulloides*	OS-19322	6,830	65	1	7,293	7,412	7,350
							2	7,228	7,471	
984C-1H-02	64-66	215	*G. bulloides*	OS-36746	7,390	50	1	7,808	7,919	7,857
							2	7,733	7,956	
984C-1H-02	103-104	253.5	*G. bulloides*	OS-22738	8,730	55	1	9,354	9,473	9,408
							2	9,276	9,508	
984C-1H-02	123-124	273.5	*G. bulloides*	OS-22943	9,360	45	1	10,161	10,237	10,204
							2	10,116	10,326	
984C-1H-02	133-134	283.5	*G. bulloides*	OS-22740	9,410	55	1	10,187	10,319	10,259
							2	10,152	10,407	

Table DR2

Lon (ºE)	Lat (ºN)	Depth (m)	Salinity	δ18O (‰)	Year	Month	Reference
-18.38	55	10	35.4	0.3	**	**	Schmidt et al (1997)
-18.38	55	10	35.4	0.3	**	**	Schmidt et al (1997)
-27.45	65.93	18	31.57	-2.19	1972	8	GEOSECS Ostlund et al (1987)
-24.22	64.3	18	35.04	0.02	**	**	Azetsu-Scott and Tan (1997)
-24.22	64.3	38	35.1	0	**	**	Azetsu-Scott and Tan (1997)
-30.22	65.03	10	34.9	0	**	**	Azetsu-Scott and Tan (1997)
-30.22	65.03	20	35	0.25	**	**	Azetsu-Scott and Tan (1997)
-30.22	65.03	30	34.94	0.19	**	**	Azetsu-Scott and Tan (1997)
-30.22	65.03	40	34.96	0.18	**	**	Azetsu-Scott and Tan (1997)
-30.22	65.03	50	35.07	0.14	**	**	Azetsu-Scott and Tan (1997)
-30.48	65.43	10	33.57	-1.03	**	**	Azetsu-Scott and Tan (1997)
-30.48	65.43	30	34.09	-1.02	**	**	Azetsu-Scott and Tan (1997)
-30.48	65.43	50	34.63	-0.07	**	**	Azetsu-Scott and Tan (1997)
-30.82	67.15	30	32.54	-1.72	**	**	Azetsu-Scott and Tan (1997)
-30.82	67.15	50	32.88	-0.85	**	**	Azetsu-Scott and Tan (1997)
-22.25	57.78	11	35.05	0.27	1991	8	CONVEX (Frew et al 2000)
-22.25	57.78	33	35.17	0.33	1991	8	CONVEX (Frew et al 2000)
-24.42	58.05	16	35.04	0.28	1991	8	CONVEX (Frew et al 2000)
-24.42	58.05	16	35.04	0.3	1991	8	CONVEX (Frew et al 2000)
-24.42	58.05	37	35.17	0.27	1991	8	CONVEX (Frew et al 2000)
-23.25	67.67	20	34.19	-0.13	1998	10	VEINS (Meredith et al 2001)
-23.25	67.67	30	34.34	-0.11	1998	10	VEINS (Meredith et al 2001)
-23.25	67.67	49	34.35	-0.16	1998	10	VEINS (Meredith et al 2001)
-23.15	67.33	10	34.22	-0.46	1998	10	VEINS (Meredith et al 2001)
-23.15	67.33	19	34.49	-0.11	1998	10	VEINS (Meredith et al 2001)
-23.15	67.33	29	34.48	-0.07	1998	10	VEINS (Meredith et al 2001)
-23.15	67.33	49	34.49	-0.14	1998	10	VEINS (Meredith et al 2001)
-23.05	67	18	33.28	-1.21	1998	10	VEINS (Meredith et al 2001)
-23.05	67	49	33.69	-0.82	1998	10	VEINS (Meredith et al 2001)
-22.98	66.73	20	35.03	0.25	1998	10	VEINS (Meredith et al 2001)
-22.98	66.73	30	35.03	0.26	1998	10	VEINS (Meredith et al 2001)
-22.98	66.73	47	35.04	0.23	1998	10	VEINS (Meredith et al 2001)
-24.98	65.98	20	34.82	0.15	1998	10	VEINS (Meredith et al 2001)
-24.98	65.98	49	34.91	0.21	1998	10	VEINS (Meredith et al 2001)
-25.72	66.12	29	35.1	0.2	1998	10	VEINS (Meredith et al 2001)
-26.13	66.18	29	35.05	0.24	1998	10	VEINS (Meredith et al 2001)
-26.52	66.25	49	33.38	-1.25	1998	10	VEINS (Meredith et al 2001)
-26.9	66.32	50	32.51	-1.74	1998	10	VEINS (Meredith et al 2001)
-27.27	66.38	50	33.23	-1.15	1998	10	VEINS (Meredith et al 2001)
-27.65	66.38	48	32.94	-1.59	1998	10	VEINS (Meredith et al 2001)
-27.98	66.5	11	32.58	-1.61	1998	10	VEINS (Meredith et al 2001)
-27.98	66.5	49	33.58	-1.02	1998	10	VEINS (Meredith et al 2001)
-29.25	66.48	49	34.38	-0.25	1998	10	VEINS (Meredith et al 2001)
-29.87	66.5	49	34.35	-0.38	1998	10	VEINS (Meredith et al 2001)
-30.45	66.48	29	33.48	-0.89	1998	10	VEINS (Meredith et al 2001)
-30.45	66.48	48	33.97	-0.6	1998	10	VEINS (Meredith et al 2001)

Table DR2 (cont.)

Lon (ºE)	Lat (ºN)	Depth (m)	Salinity	$\delta^{18}O$ (‰)	Year	Month	Reference
-30.87	66.5	18	33.33	-1.05	1998	10	VEINS (Meredith et al 2001)
-30.87	66.5	30	33.58	-0.88	1998	10	VEINS (Meredith et al 2001)
-30.87	66.5	50	33.89	-0.71	1998	10	VEINS (Meredith et al 2001)
-31.22	66.5	30	33.19	-1.23	1998	10	VEINS (Meredith et al 2001)
-31.22	66.5	50	33.66	-0.71	1998	10	VEINS (Meredith et al 2001)
-31.75	66.5	30	31.8	-1.65	1998	10	VEINS (Meredith et al 2001)
-31.75	66.5	50	32.68	-1.44	1998	10	VEINS (Meredith et al 2001)
-31.9	65.78	29	33.19	-1.14	1998	10	VEINS (Meredith et al 2001)
-31.9	65.78	49	33.74	-0.81	1998	10	VEINS (Meredith et al 2001)
-31.23	65.5	30	34.89	0.03	1998	10	VEINS (Meredith et al 2001)
-31.23	65.5	49	34.99	0.06	1998	10	VEINS (Meredith et al 2001)
-30.43	65.48	49	34.78	-0.01	1998	10	VEINS (Meredith et al 2001)
-30.03	65.48	48	35.09	0.11	1998	10	VEINS (Meredith et al 2001)
-29.78	65.57	48	34.77	0.17	1998	10	VEINS (Meredith et al 2001)
-30.68	64.98	48	35.04	0.25	1998	10	VEINS (Meredith et al 2001)
-30.4	64.75	49	35.05	0.14	1998	10	VEINS (Meredith et al 2001)