NOAA Data Report ERL AOML-11

DRIFTING BUOY DATA FROM THE EQUATORIAL PACIFIC FOR THE PERIOD JANUARY 1, 1984 THROUGH MAY 31, 1985

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DRIFTING BUOY DATA FROM THE EQUATORIAL PACIFIC FOR THE PERIOD JANUARY 1, 1984 THROUGH MAY 31, 1985

INTRODUCTION

This report contains satellite-tracked drifting buoy data collected in the eastern tropical Pacific Ocean during the period of January 1, 1984 through May 31, 1985. Table 1 details deployment times, locations and characteristics of each buoy.

DATA ACQUISITION

The buoy data are collected by the ARGOS system. The NOAA satellites are equipped with receivers that receive and record messages transmitted by buoys located anywhere on the Earth's surface. This information is then transmitted to a ground station at Suitland (Maryland) where the data that concerns the ARGOS system are separated and sent to the ARGOS Data Processing Center, Toulouse, France. A magnetic tape with all buoy data for the previous month is received at AOML once a month where further data reduction and smoothing is done.

BUOY CONSTRUCTION AND HARDWARE

We have two different types of buoys in this report. The earlier ones were of the FGGE design, constructed by the Polar Research Laboratory, Inc., in cooperation with the NOAA Data Buoy Office. These buoys carried a variety of sensors such as sea surface temperature, wind speed, drogue tension, and a battery voltage. Details of their buoy hardware can be found in Pazos and Acero (1985).

More recently, a smaller buoy designed and constructed at AOML (Bitterman and Hansen, 1986) has been used. These buoys are identified in Table 1. Both buoy designs were released with a 10 m length subsurface drogue, centered at a depth of 15 meters. Windowshade drogues were used on the FGGE buoys and holey socks were used on the smaller buoys (Fig. 3). Some of them were constructed with no drogue (Fig. 4).

DESCRIPTION OF SENSOR

Sea Surface Temperature. Water temperature is measured with a precision thermistor near the lower end of the tube and held against the inside wall by the urethane foam. Its temperature versus resistance characteristics are known to within + .1 degrees Celsius, and the overall accuracy of the measurement is estimated at + .2 degrees Celsius, not taking into consideration any heating effects on the tube by incident sunlight.

DATA PROCESSING

After separating the buoys by hemisphere and whether drogued or undrogued, the first step was to eliminate positions that imply accelerations

greater than 0.00134 cm/sec^2. The temperatures are edited by first discarding those that are less than 17°C and greater than 35°C, and also temperature changes greater than 3.0°C per day. The second step is to interpolate locations and temperatures at equal six-hour intervals using a method of interpolation known as Kriging.

Kriging is extensively used in application to two and three-dimensional analyses in mining, engineering, and other terrestrial applications. It is similar in philosophy to the method frequently used in analyses of meteorological and oceanic fields, and is discussed briefly by Gandin (1963), but also has some significant differences. An extensive discussion of Kriging can be found in Journel and Huijbregts (1978).

Each of our variables, latitude, longitude, and sea surface temperature is treated as an independent sequence of values in time. Values of these parameters are interpolated at uniform six-hour intervals as a linear combination of nearly observed values, i.e.,

$$x_o^* = \sum_{i=1}^{n} w_i \, x_i, \tag{1}$$

in which x_o^* is an estimated value at a time to be interpolated for, x_i are the values observed at nearby times, and w_i are weights to be selected in such a way as to obtain the best interpolated values. "Best" can be qualified in many ways. The weights used in Kriging are determined so as to obtain estimates that have zero mean difference, and minimum mean square difference relative to the true field values. That is

$$E(x - x^*) = 0 \tag{2}$$

$$E(x - x^*)^2 = \text{minimum}. \tag{3}$$

Use of equations (1) and (2) leads to

$$\sum_{i=1}^{n} w_i = 1. \tag{4}$$

Similarly, substitution of (1) into (3) and differentiating with respect to the coefficients leads to the set of equations

$$\sum_{j=1}^{n} w_j \, \gamma_{ij} + \lambda = \gamma_{oi}, \qquad (i = 1,2,\ldots n), \tag{5}$$

in which λ is the Lagrange multiplier associated with minimizing (3) subject to the unbias constraint (4), and

$$\gamma_{ij} = \frac{1}{2} E(x_i - x_j)^2 . \qquad (6)$$

The function γ_{ij}, expressed as a function of the time difference between points of interest is called the variogram, but is more familiar to oceanographers and meteorologists as the structure function. It is presumed to be known or to be determinable from the data to be interpolated. As a practical matter, a single structure function is taken to represent all parts of a particular data element.

A useful feature of the method is that together with the interpolated series it provides with each interpolated value a quality measure in the form of a "Kriging variance," or mean square uncertainty of the analysis,

$$\sigma_k^2 = E(x - x^*)^2 = \sum_{i=1}^{n} w_i \quad \gamma_{oi} - \lambda. \qquad (7)$$

Software packages are commercially available to perform the matrix operations. For this work we used KRIGPAG subroutine GKRIGQ. KRIGPAK is a UNIRAS corporation product. The functional representation of the structure functions needed for this procedure were taken from Hansen and Herman (1988).

DATA DISPLAY

Table 2 shows conversion from Julian day to day, month and year. Bar charts that illustrate buoy lifetimes are shown in Fig. 1 and Fig. 2. Monthly displacement of buoys are shown from page 15-20. Trajectory and time series plots for each buoy are displayed from page 21 to 100. Trajectory plots are marked with a star to denote the beginning of buoy life or beginning for this period, open circles denote end of trajectory, closed circles show loss of drogue. On the time series plots some temperature records are shorter than velocity records on a particular buoy. This occurs mostly when the battery voltage becomes low, resulting in erroneous temperature data, although temperature data are still reliable. The temperature data judged to be in error were deleted.

BIBLIOGRAPHY

Bitterman, D. S., and D. V. Hansen (1986). Proceedings, NDS '86 Marine Data Systems International Symposium, April 30-May 2, 1986 New Orleans, LA, pp. 575-581.

Gandin, L. S. (1963). Objective analysis of meteorological fields. Israel Program for Scientific Translation, Jerusalem, 1965, 184 pp.

Hansen, D. V., and A. Herman (1988). Temporal sampling requirements for surface currents in the tropical Pacific (in preparation).

Journel, A. G., and C. S. Huijbregts (1978). Mining Geostatistics. Academic Press, New York, 600 pp.

Pazos, M. C., and C. E. Acero (1985). Drifting buoy data from the equatorial Pacific Ocean for the period November 1, 1981 through December 31, 1983. NOAA Data Report ERL AOML-7.

Table 1: Drift Buoy History

Buoy #	Deployment Day	Deployment Latitude	Deployment Longitude	Last Message Day(1)	Drogue Lost Day(1)	# Days Buoy Lasted	# Days Drogue was ON
2080	1887	1.79S	84.15W	1913	1913	26	26 (2) (7)
2081	1887	1.80S	84.15W	1990	1990	103	103 (2) (7)
2084	2006	0.74S	84.99W	2495	2006	489	0 (3) (6) (7)
2085	2007	0.74S	84.99W	2086	2086	79	80 (2) (7)
2086	2005	4.46S	85.05W	2476	2005	471	0 (3) (6) (7)
2087	2005	4.46S	85.05W	2494	2494	489	489 (2) (6) (7)
2088	2172	1.52S	88.98W	2236	2171	64	0 (3) (7)
2089	2172	1.35N	84.65W	2206	2172	34	0 (3) (7)
2090	2172	0.06N	85.09W	2180	2172	8	0 (3) (7)
2177	1352	12.62S	78.54W	1944	1467	592	115 (4) (5) (8)
2180	1384	13.02S	79.09W	1962	1489	578	105 (4) (5) (8)
2184	1780	1.04N	82.57W	1926	1926	146	146 (4) (5) (8)
2185	1660	10.50S	80.94W	2229	1910	569	250 (4) (5) (8)
2186	1663	4.96S	83.01W	1944	1764	281	101 (4) (5) (8)
2189	1888	1.85S	84.09W	1957	1957	69	69 (4) (8)
2192	1423	10.48S	82.21W	1920	1480	497	57 (4) (5) (8)
2193	1887	1.79S	84.15W	1945	1887	58	0 (3) (7)
4400	1414	3.77S	82.81W	2115	1557	701	143 (4) (5) (8)
4403	1768	2.75S	82.53W	2096	1836	328	68 (4) (5) (8)
4404	1408	0.01S	92.55W	1955	1778	547	370 (4) (5) (8)
4405	1413	0.09N	85.00W	1871	1629	458	216 (4) (5) (8)
4406	1636	15.03S	78.50W	2096	1750	460	114 (4) (5) (8)
4408	1556	10.51S	82.47W	1857	1686	301	130 (4) (5) (8)
4414	1552	5.12S	82.52W	2048	1732	496	180 (4) (5) (8)
4415	1603	1.95N	84.98W	2048	1948	445	348 (4) (5) (8)
4416	1544	4.50N	85.28W	2126	1844	582	300 (4) (5) (8)
4418	2172	1.20N	84.73W	2214	2172	42	0 (3) (8)
4419	2172	0.08N	85.09W	2179	2172	7	0 (3) (8)
4421	2172	1.04S	85.29W	2335	2172	163	0 (3) (8)

(1) Base date for all buoys is January 1,1979. Table 2 shows conversion from Julian day to: day, month and year.

(2) These buoys had drogue tethers attached, but no drogue sensor.

(3) These buoys had no drogue tethers attached.

(4) These buoys had drogue tethers 10 meters long.

(5) These buoys were discussed in NOAA Data Report ERL AOML-7, therefore, we only cover here the period of buoy life not included then.

(6) Buoy cut off at day 2343 for the purpose of this report, but they were still transmitting.

(7) These are "mini" buoys built at AOML.

(8) These are FGGE design buoys, constructed by PRL.

Table 2. Julian Day Conversion

1827	1 JAN 84	1883	26 FEB 84
1828	2 JAN 84	1884	27 FEB 84
1829	3 JAN 84	1885	28 FEB 84
1830	4 JAN 84	1886	29 FEB 84
1831	5 JAN 84	1887	1 MAR 84
1832	6 JAN 84	1888	2 MAR 84
1833	7 JAN 84	1889	3 MAR 84
1834	8 JAN 84	1890	4 MAR 84
1835	9 JAN 84	1891	5 MAR 84
1836	10 JAN 84	1892	6 MAR 84
1837	11 JAN 84	1893	7 MAR 84
1838	12 JAN 84	1894	8 MAR 84
1839	13 JAN 84	1895	9 MAR 84
1840	14 JAN 84	1896	10 MAR 84
1841	15 JAN 84	1897	11 MAR 84
1842	16 JAN 84	1898	12 MAR 84
1843	17 JAN 84	1899	13 MAR 84
1844	18 JAN 84	1900	14 MAR 84
1845	19 JAN 84	1901	15 MAR 84
1846	20 JAN 84	1902	16 MAR 84
1847	21 JAN 84	1903	17 MAR 84
1848	22 JAN 84	1904	18 MAR 84
1849	23 JAN 84	1905	19 MAR 84
1850	24 JAN 84	1906	20 MAR 84
1851	25 JAN 84	1907	21 MAR 84
1852	26 JAN 84	1908	22 MAR 84
1853	27 JAN 84	1909	23 MAR 84
1854	28 JAN 84	1910	24 MAR 84
1855	29 JAN 84	1911	25 MAR 84
1856	30 JAN 84	1912	26 MAR 84
1857	31 JAN 84	1913	27 MAR 84
1858	1 FEB 84	1914	28 MAR 84
1859	2 FEB 84	1915	29 MAR 84
1860	3 FEB 84	1916	30 MAR 84
1861	4 FEB 84	1917	31 MAR 84
1862	5 FEB 84	1918	1 APR 84
1863	6 FEB 84	1919	2 APR 84
1864	7 FEB 84	1920	3 APR 84
1865	8 FEB 84	1921	4 APR 84
1866	9 FEB 84	1922	5 APR 84
1867	10 FEB 84	1923	6 APR 84
1868	11 FEB 84	1924	7 APR 84
1869	12 FEB 84	1925	8 APR 84
1870	13 FEB 84	1926	9 APR 84
1871	14 FEB 84	1927	10 APR 84
1872	15 FEB 84	1928	11 APR 84
1873	16 FEB 84	1929	12 APR 84
1874	17 FEB 84	1930	13 APR 84
1875	18 FEB 84	1931	14 APR 84
1876	19 FEB 84	1932	15 APR 84
1877	20 FEB 84	1933	16 APR 84
1878	21 FEB 84	1934	17 APR 84
1879	22 FEB 84	1935	18 APR 84
1880	23 FEB 84	1936	19 APR 84
1881	24 FEB 84	1937	20 APR 84
1882	25 FEB 84	1938	21 APR 84
1939	22 APR 84		
1940	23 APR 84		
1941	24 APR 84		
1942	25 APR 84		
1943	26 APR 84		
1944	27 APR 84		
1945	28 APR 84		
1946	29 APR 84		
1947	30 APR 84		
1948	1 MAY 84		
1949	2 MAY 84		
1950	3 MAY 84		
1951	4 MAY 84		
1952	5 MAY 84		
1953	6 MAY 84		
1954	7 MAY 84		
1955	8 MAY 84		
1956	9 MAY 84		
1957	10 MAY 84		
1958	11 MAY 84		
1959	12 MAY 84		
1960	13 MAY 84		
1961	14 MAY 84		
1962	15 MAY 84		
1963	16 MAY 84		
1964	17 MAY 84		
1965	18 MAY 84		
1966	19 MAY 84		
1967	20 MAY 84		
1968	21 MAY 84		
1969	22 MAY 84		
1970	23 MAY 84		
1971	24 MAY 84		
1972	25 MAY 84		
1973	26 MAY 84		
1974	27 MAY 84		
1975	28 MAY 84		
1976	29 MAY 84		
1977	30 MAY 84		
1978	31 MAY 84		
1979	1 JUN 84		
1980	2 JUN 84		
1981	3 JUN 84		
1982	4 JUN 84		
1983	5 JUN 84		
1984	6 JUN 84		
1985	7 JUN 84		
1986	8 JUN 84		
1987	9 JUN 84		
1988	10 JUN 84		
1989	11 JUN 84		
1990	12 JUN 84		
1991	13 JUN 84		
1992	14 JUN 84		
1993	15 JUN 84		
1994	16 JUN 84		

Table 2. (continued)

1995	17	JUN 84	2051	12	AUG 84	2107	7	OCT 84
1996	18	JUN 84	2052	13	AUG 84	2108	8	OCT 84
1997	19	JUN 84	2053	14	AUG 84	2109	9	OCT 84
1998	20	JUN 84	2054	15	AUG 84	2110	10	OCT 84
1999	21	JUN 84	2055	16	AUG 84	2111	11	OCT 84
2000	22	JUN 84	2056	17	AUG 84	2112	12	OCT 84
2001	23	JUN 84	2057	18	AUG 84	2113	13	OCT 84
2002	24	JUN 84	2058	19	AUG 84	2114	14	OCT 84
2003	25	JUN 84	2059	20	AUG 84	2115	15	OCT 84
2004	26	JUN 84	2060	21	AUG 84	2116	16	OCT 84
2005	27	JUN 84	2061	22	AUG 84	2117	17	OCT 84
2006	28	JUN 84	2062	23	AUG 84	2118	18	OCT 84
2007	29	JUN 84	2063	24	AUG 84	2119	19	OCT 84
2008	30	JUN 84	2064	25	AUG 84	2120	20	OCT 84
2009	1	JUL 84	2065	26	AUG 84	2121	21	OCT 84
2010	2	JUL 84	2066	27	AUG 84	2122	22	OCT 84
2011	3	JUL 84	2067	28	AUG 84	2123	23	OCT 84
2012	4	JUL 84	2068	29	AUG 84	2124	24	OCT 84
2013	5	JUL 84	2069	30	AUG 84	2125	25	OCT 84
2014	6	JUL 84	2070	31	AUG 84	2126	26	OCT 84
2015	7	JUL 84	2071	1	SEP 84	2127	27	OCT 84
2016	8	JUL 84	2072	2	SEP 84	2128	28	OCT 84
2017	9	JUL 84	2073	3	SEP 84	2129	29	OCT 84
2018	10	JUL 84	2074	4	SEP 84	2130	30	OCT 84
2019	11	JUL 84	2075	5	SEP 84	2131	31	OCT 84
2020	12	JUL 84	2076	6	SEP 84	2132	1	NOV 84
2021	13	JUL 84	2077	7	SEP 84	2133	2	NOV 84
2022	14	JUL 84	2078	8	SEP 84	2134	3	NOV 84
2023	15	JUL 84	2079	9	SEP 84	2135	4	NOV 84
2024	16	JUL 84	2080	10	SEP 84	2136	5	NOV 84
2025	17	JUL 84	2081	11	SEP 84	2137	6	NOV 84
2026	18	JUL 84	2082	12	SEP 84	2138	7	NOV 84
2027	19	JUL 84	2083	13	SEP 84	2139	8	NOV 84
2028	20	JUL 84	2084	14	SEP 84	2140	9	NOV 84
2029	21	JUL 84	2085	15	SEP 84	2141	10	NOV 84
2030	22	JUL 84	2086	16	SEP 84	2142	11	NOV 84
2031	23	JUL 84	2087	17	SEP 84	2143	12	NOV 84
2032	24	JUL 84	2088	18	SEP 84	2144	13	NOV 84
2033	25	JUL 84	2089	19	SEP 84	2145	14	NOV 84
2034	26	JUL 84	2090	20	SEP 84	2146	15	NOV 84
2035	27	JUL 84	2091	21	SEP 84	2147	16	NOV 84
2036	28	JUL 84	2092	22	SEP 84	2148	17	NOV 84
2037	29	JUL 84	2093	23	SEP 84	2149	18	NOV 84
2038	30	JUL 84	2094	24	SEP 84	2150	19	NOV 84
2039	31	JUL 84	2095	25	SEP 84	2151	20	NOV 84
2040	1	AUG 84	2096	26	SEP 84	2152	21	NOV 84
2041	2	AUG 84	2097	27	SEP 84	2153	22	NOV 84
2042	3	AUG 84	2098	28	SEP 84	2154	23	NOV 84
2043	4	AUG 84	2099	29	SEP 84	2155	24	NOV 84
2044	5	AUG 84	2100	30	SEP 84	2156	25	NOV 84
2045	6	AUG 84	2101	1	OCT 84	2157	26	NOV 84
2046	7	AUG 84	2102	2	OCT 84	2158	27	NOV 84
2047	8	AUG 84	2103	3	OCT 84	2159	28	NOV 84
2048	9	AUG 84	2104	4	OCT 84	2160	29	NOV 84
2049	10	AUG 84	2105	5	OCT 84	2161	30	NOV 84
2050	11	AUG 84	2106	6	OCT 84	2162	1	DEC 84

Table 2. (continued)

2163	2	DEC 84	2219	27	JAN 85	2275	24	MAR 85
2164	3	DEC 84	2220	28	JAN 85	2276	25	MAR 85
2165	4	DEC 84	2221	29	JAN 85	2277	26	MAR 85
2166	5	DEC 84	2222	30	JAN 85	2278	27	MAR 85
2167	6	DEC 84	2223	31	JAN 85	2279	28	MAR 85
2168	7	DEC 84	2224	1	FEB 85	2280	29	MAR 85
2169	8	DEC 84	2225	2	FEB 85	2281	30	MAR 85
2170	9	DEC 84	2226	3	FEB 85	2282	31	MAR 85
2171	10	DEC 84	2227	4	FEB 85	2283	1	APR 85
2172	11	DEC 84	2228	5	FEB 85	2284	2	APR 85
2173	12	DEC 84	2229	6	FEB 85	2285	3	APR 85
2174	13	DEC 84	2230	7	FEB 85	2286	4	APR 85
2175	14	DEC 84	2231	8	FEB 85	2287	5	APR 85
2176	15	DEC 84	2232	9	FEB 85	2288	6	APR 85
2177	16	DEC 84	2233	10	FEB 85	2289	7	APR 85
2178	17	DEC 84	2234	11	FEB 85	2290	8	APR 85
2179	18	DEC 84	2235	12	FEB 85	2291	9	APR 85
2180	19	DEC 84	2236	13	FEB 85	2292	10	APR 85
2181	20	DEC 84	2237	14	FEB 85	2293	11	APR 85
2182	21	DEC 84	2238	15	FEB 85	2294	12	APR 85
2183	22	DEC 84	2239	16	FEB 85	2295	13	APR 85
2184	23	DEC 84	2240	17	FEB 85	2296	14	APR 85
2185	24	DEC 84	2241	18	FEB 85	2297	15	APR 85
2186	25	DEC 84	2242	19	FEB 85	2298	16	APR 85
2187	26	DEC 84	2243	20	FEB 85	2299	17	APR 85
2188	27	DEC 84	2244	21	FEB 85	2300	18	APR 85
2189	28	DEC 84	2245	22	FEB 85	2301	19	APR 85
2190	29	DEC 84	2246	23	FEB 85	2302	20	APR 85
2191	30	DEC 84	2247	24	FEB 85	2303	21	APR 85
2192	31	DEC 84	2248	25	FEB 85	2304	22	APR 85
2193	1	JAN 85	2249	26	FEB 85	2305	23	APR 85
2194	2	JAN 85	2250	27	FEB 85	2306	24	APR 85
2195	3	JAN 85	2251	28	FEB 85	2307	25	APR 85
2196	4	JAN 85	2252	1	MAR 85	2308	26	APR 85
2197	5	JAN 85	2253	2	MAR 85	2309	27	APR 85
2198	6	JAN 85	2254	3	MAR 85	2310	28	APR 85
2199	7	JAN 85	2255	4	MAR 85	2311	29	APR 85
2200	8	JAN 85	2256	5	MAR 85	2312	30	APR 85
2201	9	JAN 85	2257	6	MAR 85	2313	1	MAY 85
2202	10	JAN 85	2258	7	MAR 85	2314	2	MAY 85
2203	11	JAN 85	2259	8	MAR 85	2315	3	MAY 85
2204	12	JAN 85	2260	9	MAR 85	2316	4	MAY 85
2205	13	JAN 85	2261	10	MAR 85	2317	5	MAY 85
2206	14	JAN 85	2262	11	MAR 85	2318	6	MAY 85
2207	15	JAN 85	2263	12	MAR 85	2319	7	MAY 85
2208	16	JAN 85	2264	13	MAR 85	2320	8	MAY 85
2209	17	JAN 85	2265	14	MAR 85	2321	9	MAY 85
2210	18	JAN 85	2266	15	MAR 85	2322	10	MAY 85
2211	19	JAN 85	2267	16	MAR 85	2323	11	MAY 85
2212	20	JAN 85	2268	17	MAR 85	2324	12	MAY 85
2213	21	JAN 85	2269	18	MAR 85	2325	13	MAY 85
2214	22	JAN 85	2270	19	MAR 85	2326	14	MAY 85
2215	23	JAN 85	2271	20	MAR 85	2327	15	MAY 85
2216	24	JAN 85	2272	21	MAR 85	2328	16	MAY 85
2217	25	JAN 85	2273	22	MAR 85	2329	17	MAY 85
2218	26	JAN 85	2274	23	MAR 85	2330	18	MAY 85

Table 2. (continued)

2331	19 MAY 85	2387	14 JUL 85	2443	8 SEP 85
2332	20 MAY 85	2388	15 JUL 85	2444	9 SEP 85
2333	21 MAY 85	2389	16 JUL 85	2445	10 SEP 85
2334	22 MAY 85	2390	17 JUL 85	2446	11 SEP 85
2335	23 MAY 85	2391	18 JUL 85	2447	12 SEP 85
2336	24 MAY 85	2392	19 JUL 85	2448	13 SEP 85
2337	25 MAY 85	2393	20 JUL 85	2449	14 SEP 85
2338	26 MAY 85	2394	21 JUL 85	2450	15 SEP 85
2339	27 MAY 85	2395	22 JUL 85	2451	16 SEP 85
2340	28 MAY 85	2396	23 JUL 85	2452	17 SEP 85
2341	29 MAY 85	2397	24 JUL 85	2453	18 SEP 85
2342	30 MAY 85	2398	25 JUL 85	2454	19 SEP 85
2343	31 MAY 85	2399	26 JUL 85	2455	20 SEP 85
2344	1 JUN 85	2400	27 JUL 85	2456	21 SEP 85
2345	2 JUN 85	2401	28 JUL 85	2457	22 SEP 85
2346	3 JUN 85	2402	29 JUL 85	2458	23 SEP 85
2347	4 JUN 85	2403	30 JUL 85	2459	24 SEP 85
2348	5 JUN 85	2404	31 JUL 85	2460	25 SEP 85
2349	6 JUN 85	2405	1 AUG 85	2461	26 SEP 85
2350	7 JUN 85	2406	2 AUG 85	2462	27 SEP 85
2351	8 JUN 85	2407	3 AUG 85	2463	28 SEP 85
2352	9 JUN 85	2408	4 AUG 85	2464	29 SEP 85
2353	10 JUN 85	2409	5 AUG 85	2465	30 SEP 85
2354	11 JUN 85	2410	6 AUG 85	2466	1 OCT 85
2355	12 JUN 85	2411	7 AUG 85	2467	2 OCT 85
2356	13 JUN 85	2412	8 AUG 85	2468	3 OCT 85
2357	14 JUN 85	2413	9 AUG 85	2469	4 OCT 85
2358	15 JUN 85	2414	10 AUG 85	2470	5 OCT 85
2359	16 JUN 85	2415	11 AUG 85	2471	6 OCT 85
2360	17 JUN 85	2416	12 AUG 85	2472	7 OCT 85
2361	18 JUN 85	2417	13 AUG 85	2473	8 OCT 85
2362	19 JUN 85	2418	14 AUG 85	2474	9 OCT 85
2363	20 JUN 85	2419	15 AUG 85	2475	10 OCT 85
2364	21 JUN 85	2420	16 AUG 85	2476	11 OCT 85
2365	22 JUN 85	2421	17 AUG 85	2477	12 OCT 85
2366	23 JUN 85	2422	18 AUG 85	2478	13 OCT 85
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2369	26 JUN 85	2425	21 AUG 85	2481	16 OCT 85
2370	27 JUN 85	2426	22 AUG 85	2482	17 OCT 85
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2373	30 JUN 85	2429	25 AUG 85	2485	20 OCT 85
2374	1 JUL 85	2430	26 AUG 85	2486	21 OCT 85
2375	2 JUL 85	2431	27 AUG 85	2487	22 OCT 85
2376	3 JUL 85	2432	28 AUG 85	2488	23 OCT 85
2377	4 JUL 85	2433	29 AUG 85	2489	24 OCT 85
2378	5 JUL 85	2434	30 AUG 85	2490	25 OCT 85
2379	6 JUL 85	2435	31 AUG 85	2491	26 OCT 85
2380	7 JUL 85	2436	1 SEP 85	2492	27 OCT 85
2381	8 JUL 85	2437	2 SEP 85	2493	28 OCT 85
2382	9 JUL 85	2438	3 SEP 85	2494	29 OCT 85
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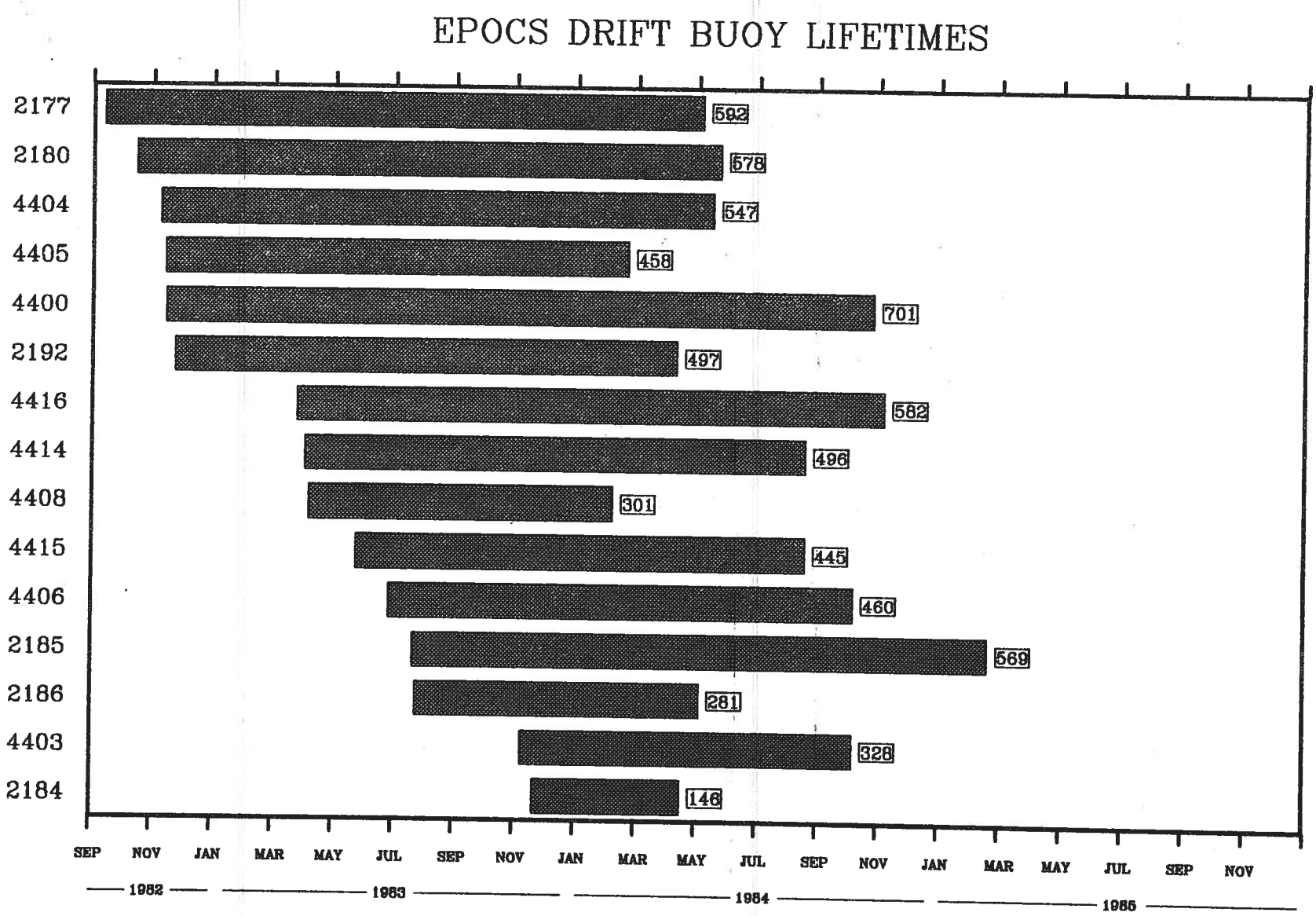


Figure 1. Time span of data from drifting buoys included in this report.

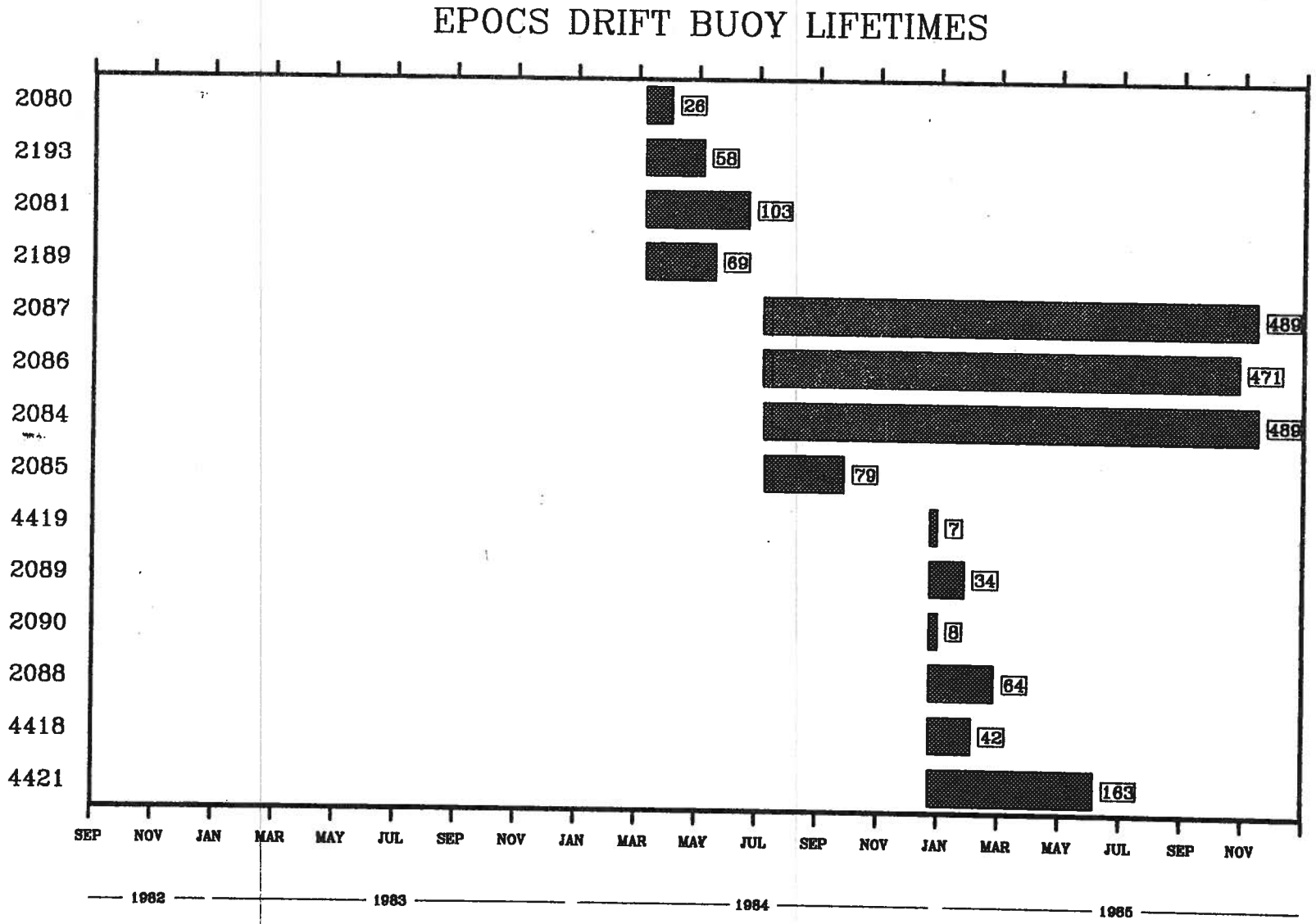


Figure 2. Time span of data from drifting buoys included in this report.

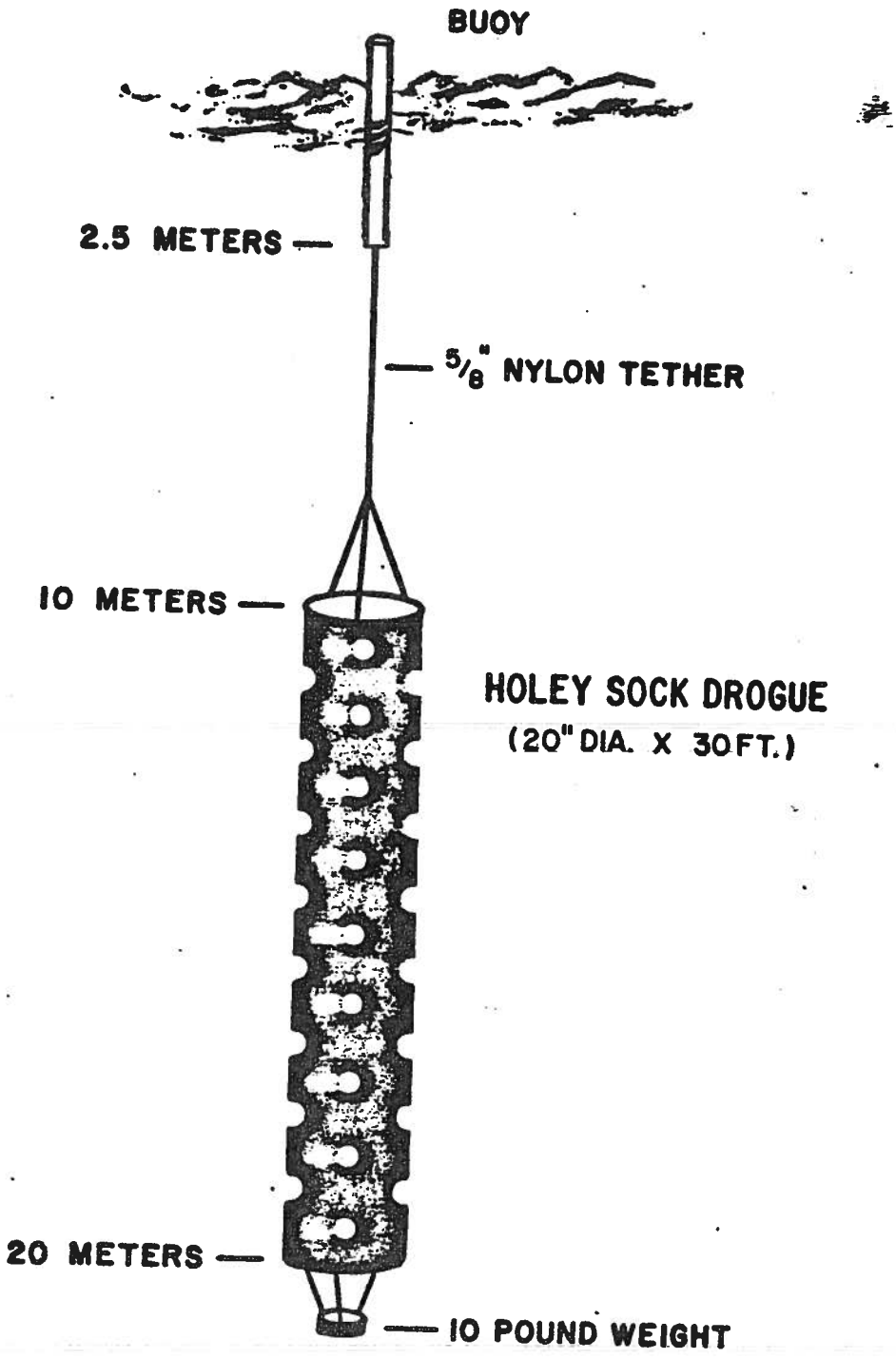


Figure 3. Buoy with drogue

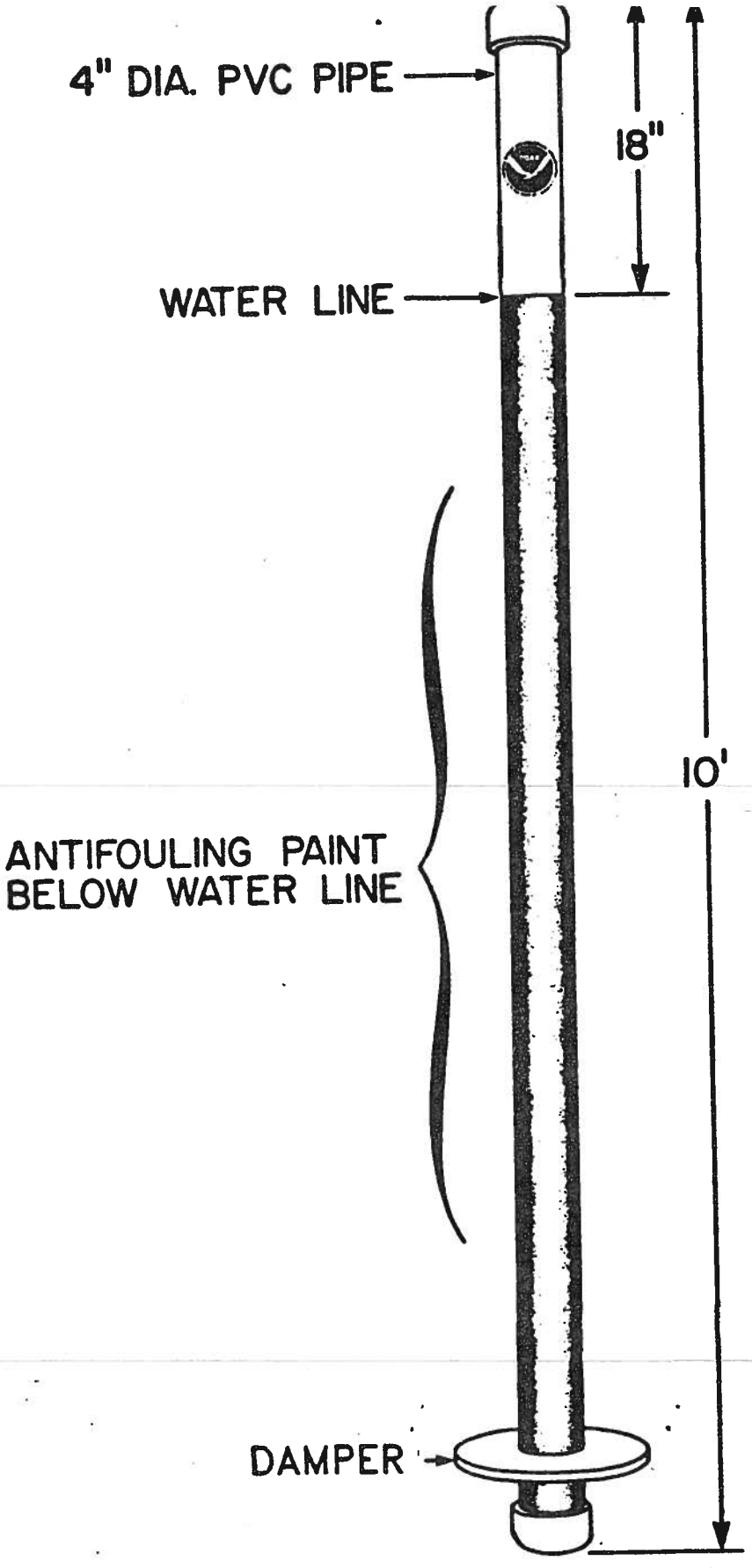
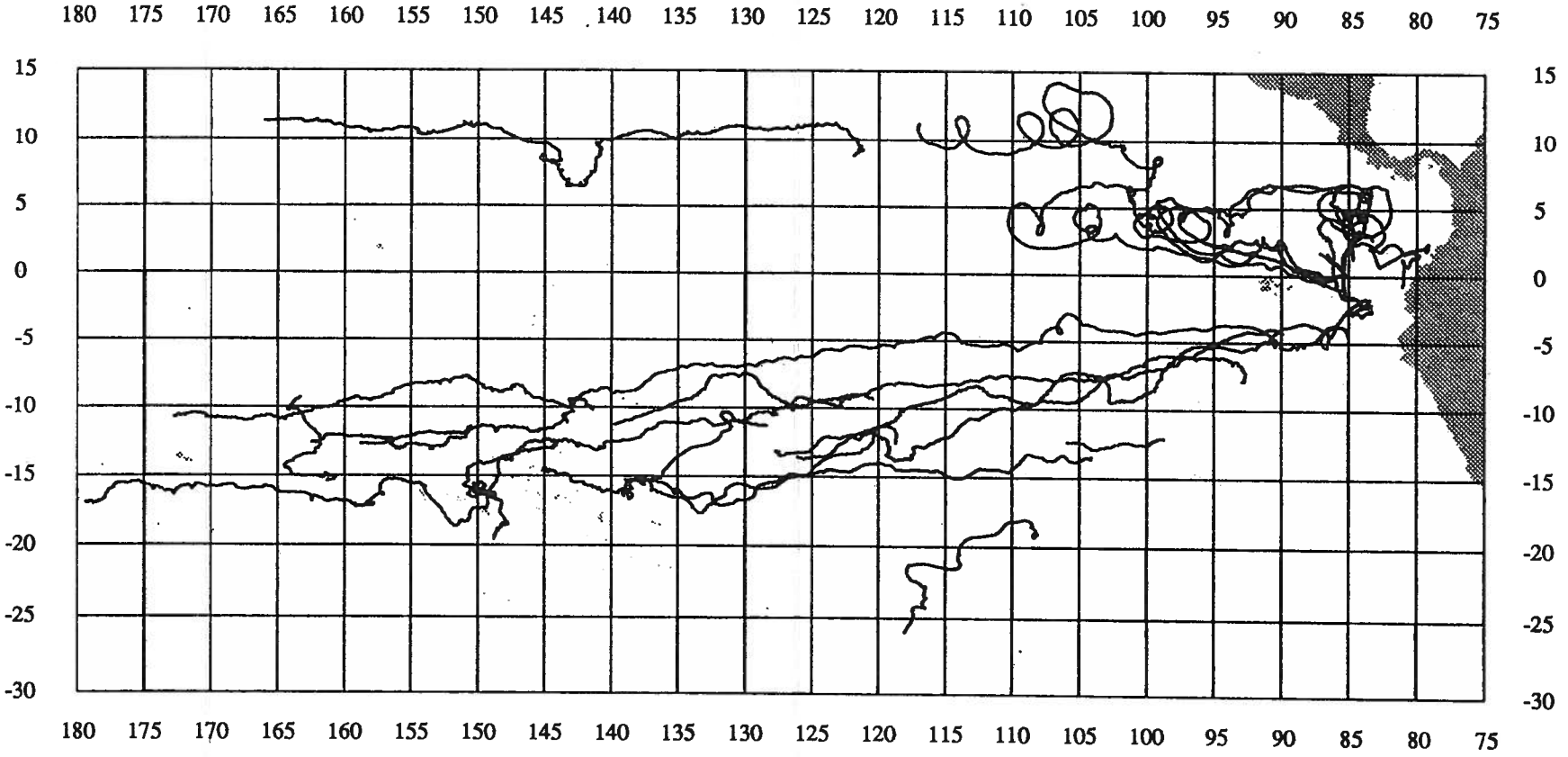
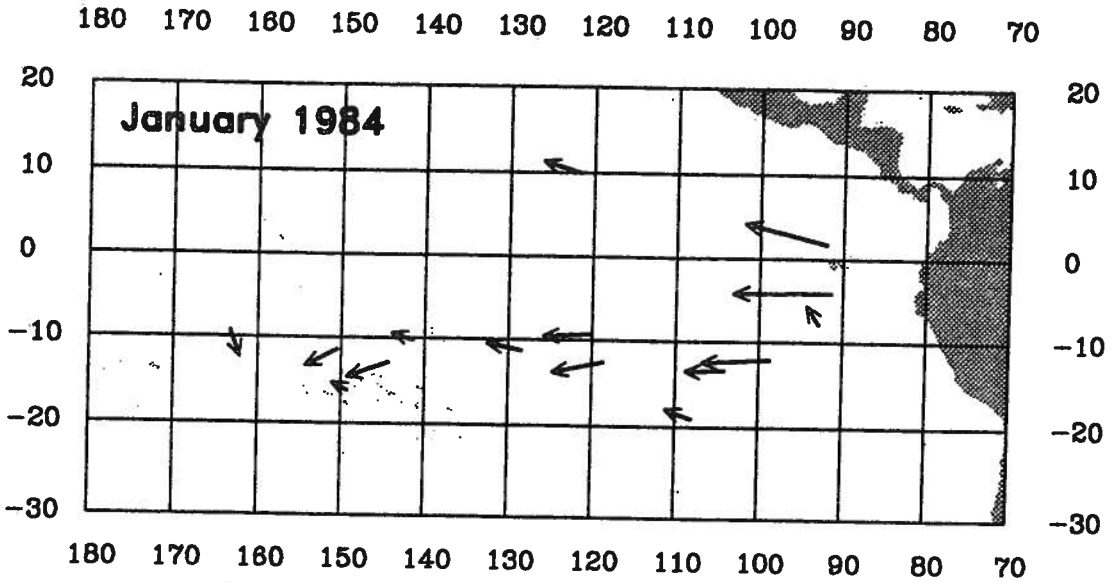
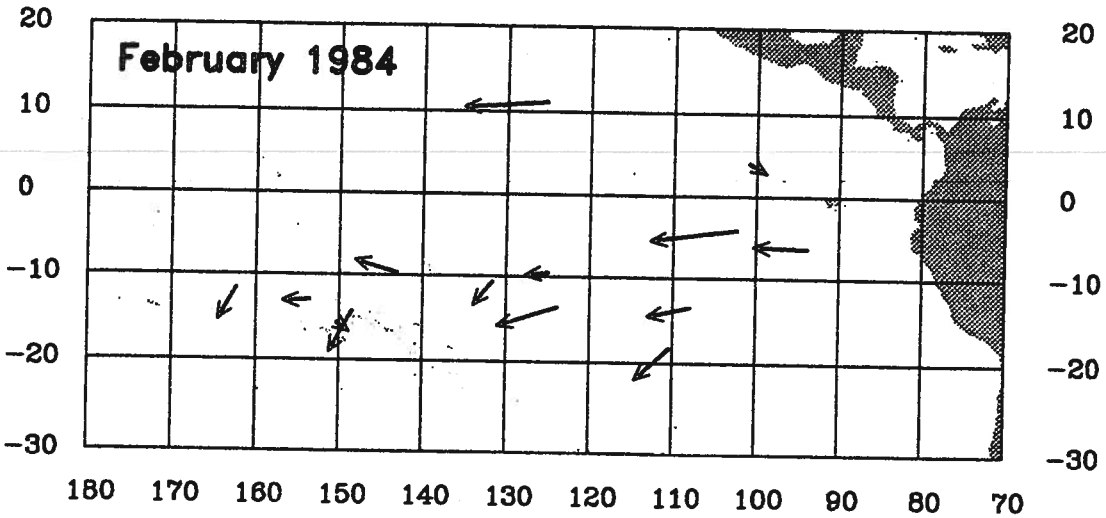


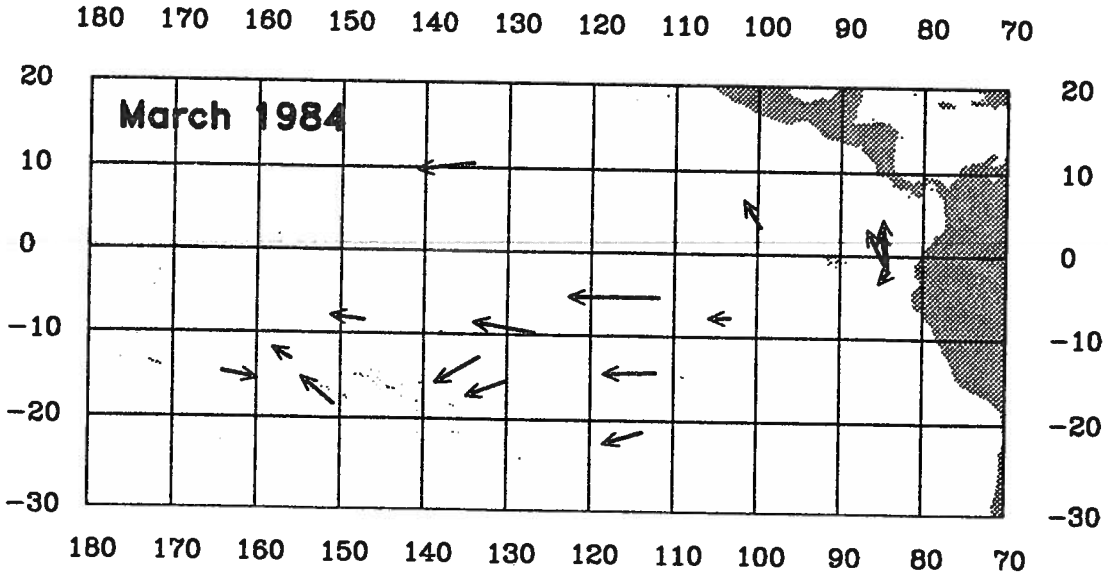
Figure 4. Buoy without drogue

Composite plot of all trajectories from January 1,1984 thru May 31,1985

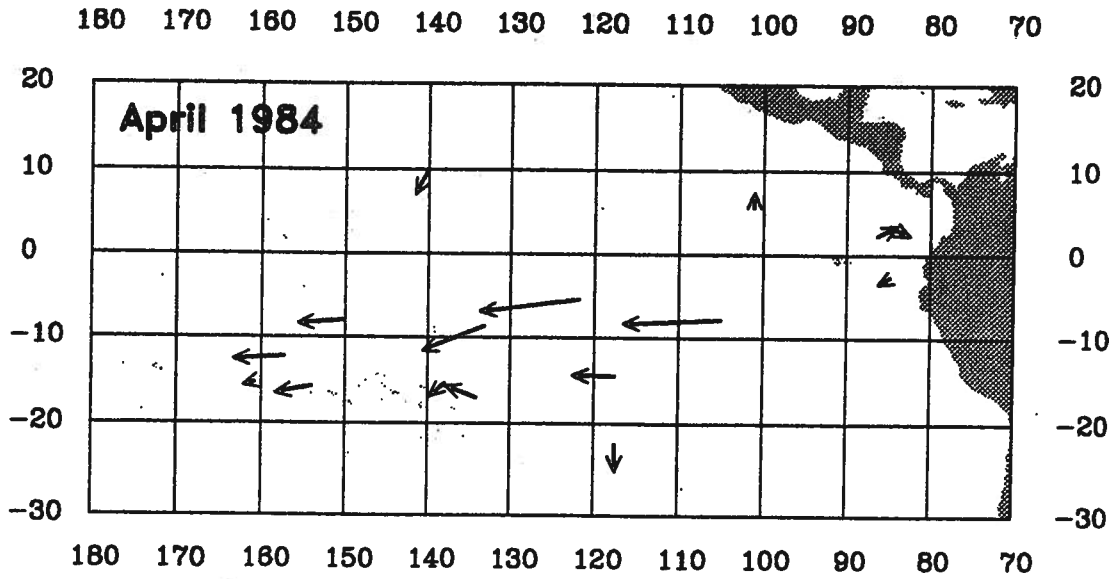


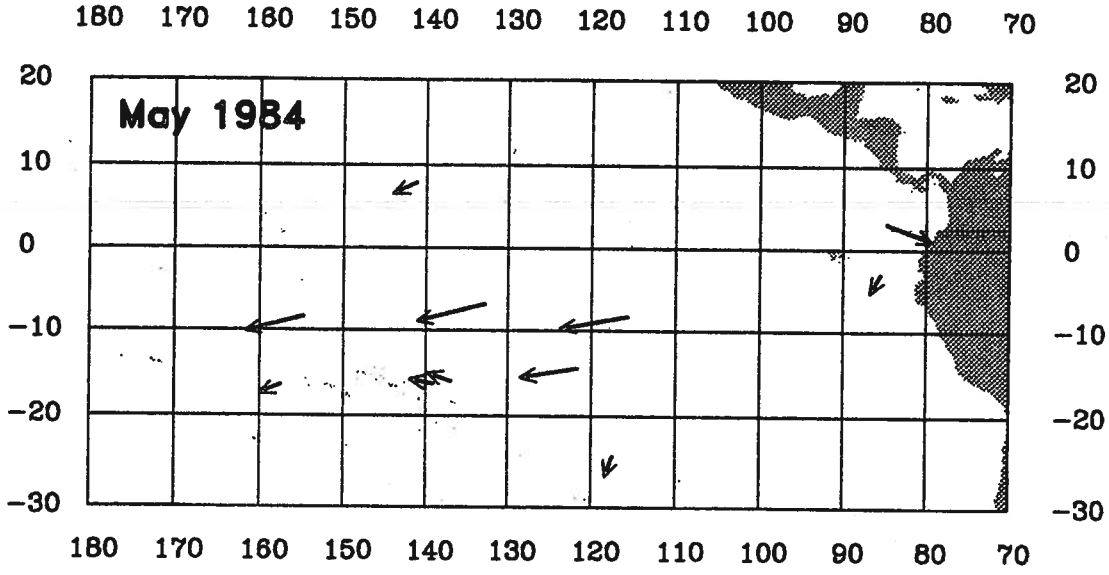


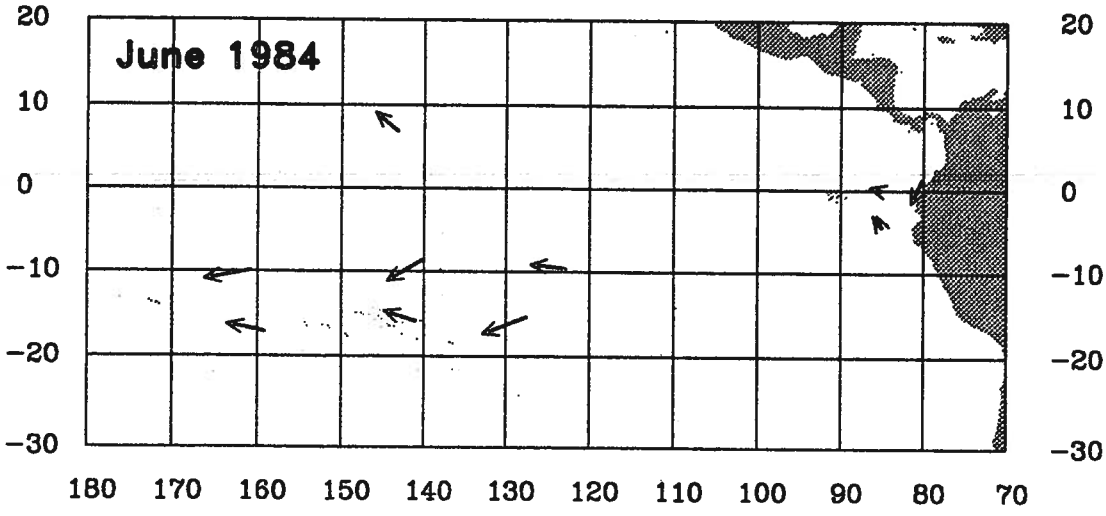




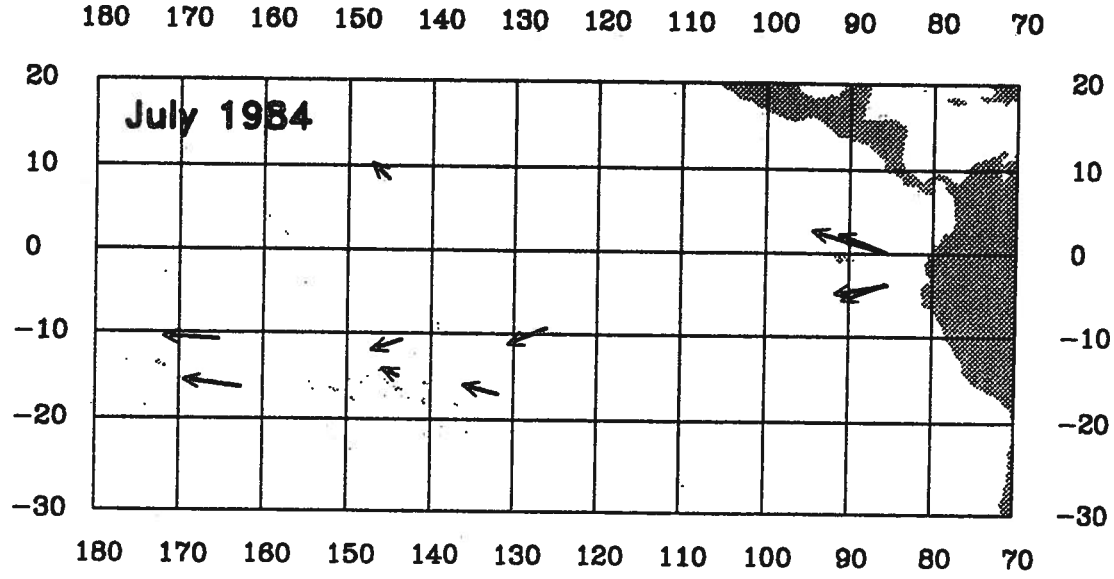
MONTHLY DISPLACEMENT OF BUOYS

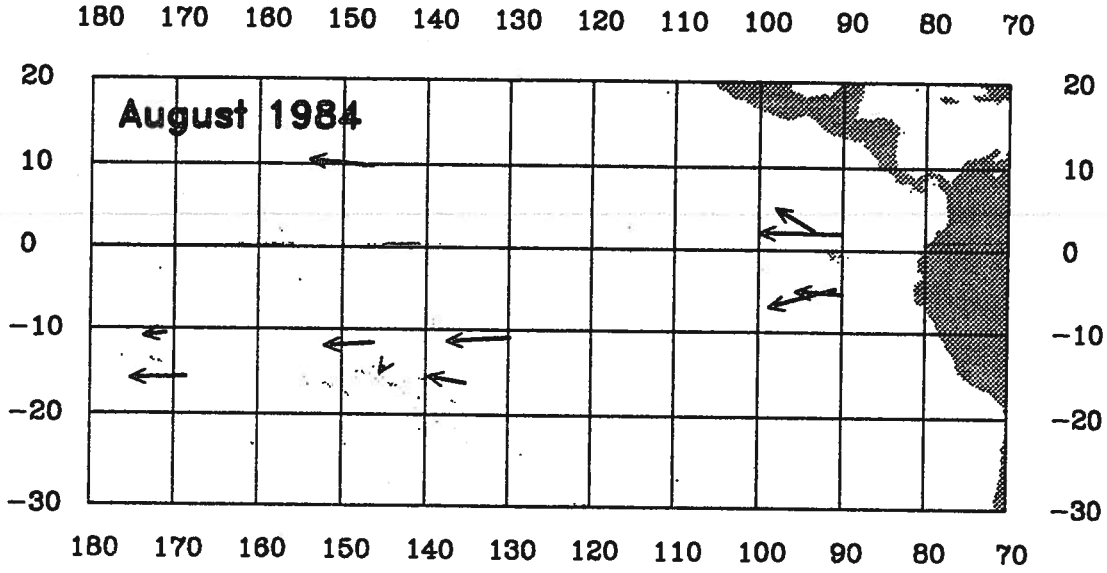


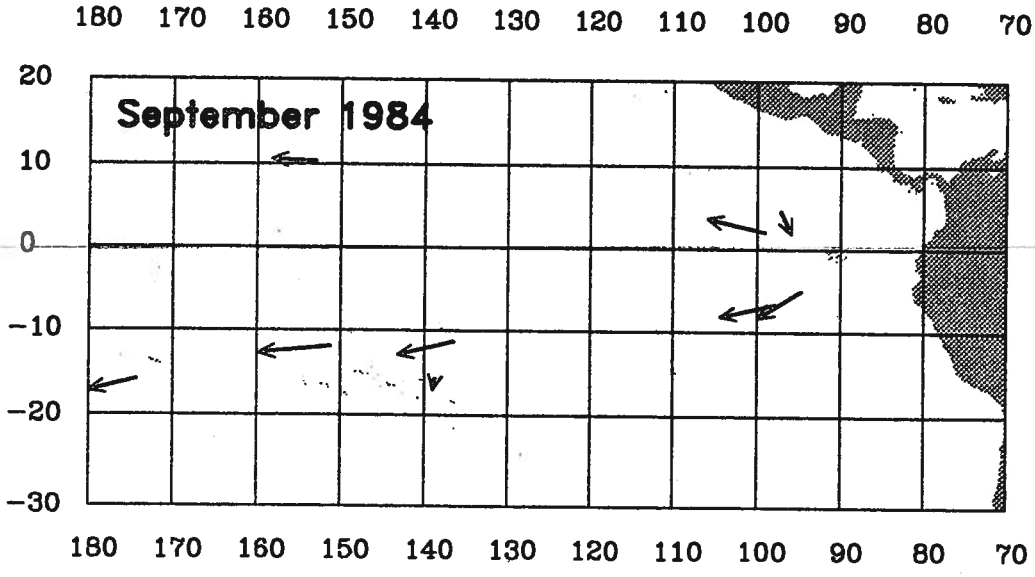




MONTHLY DISPLACEMENT OF BUOYS







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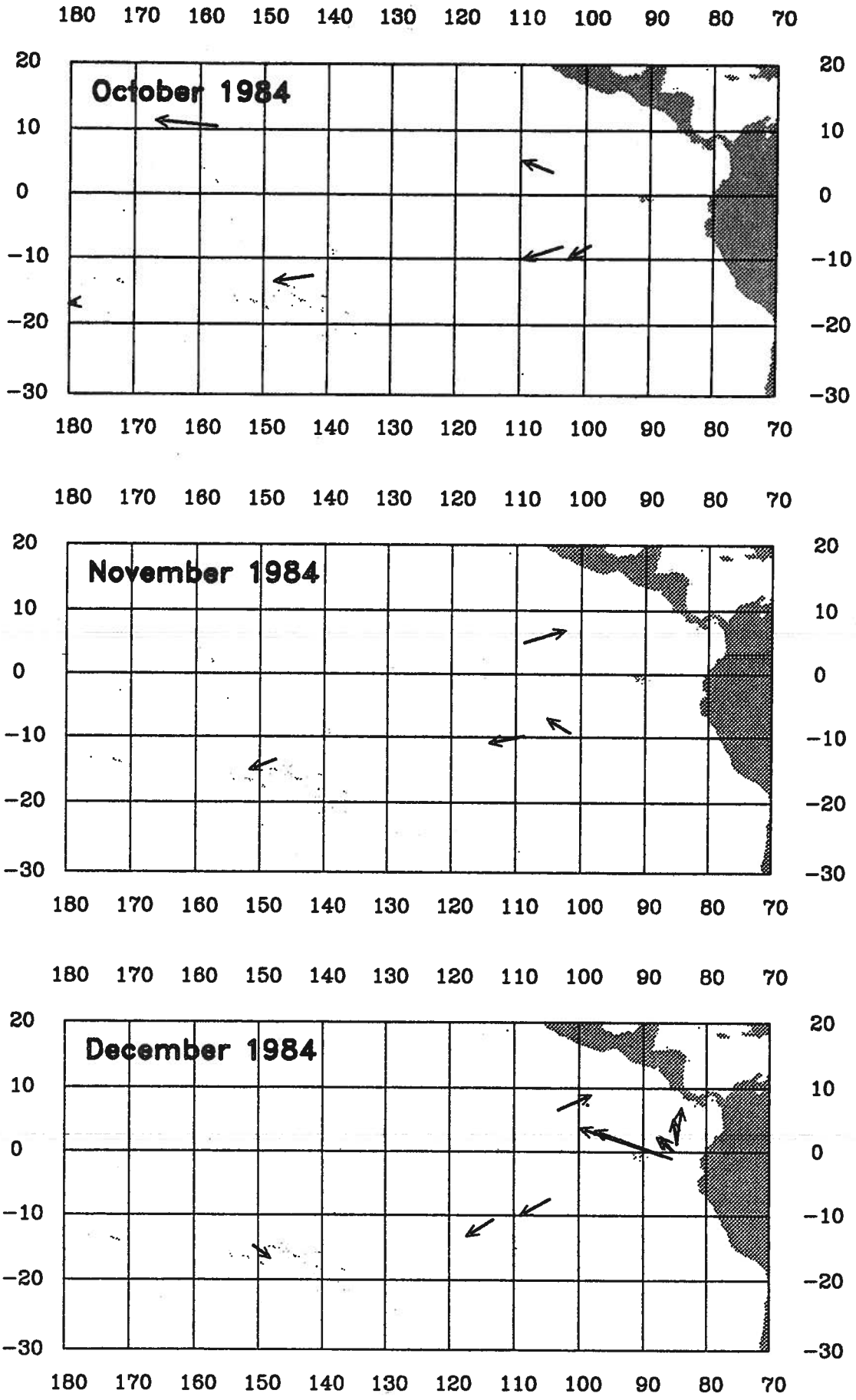

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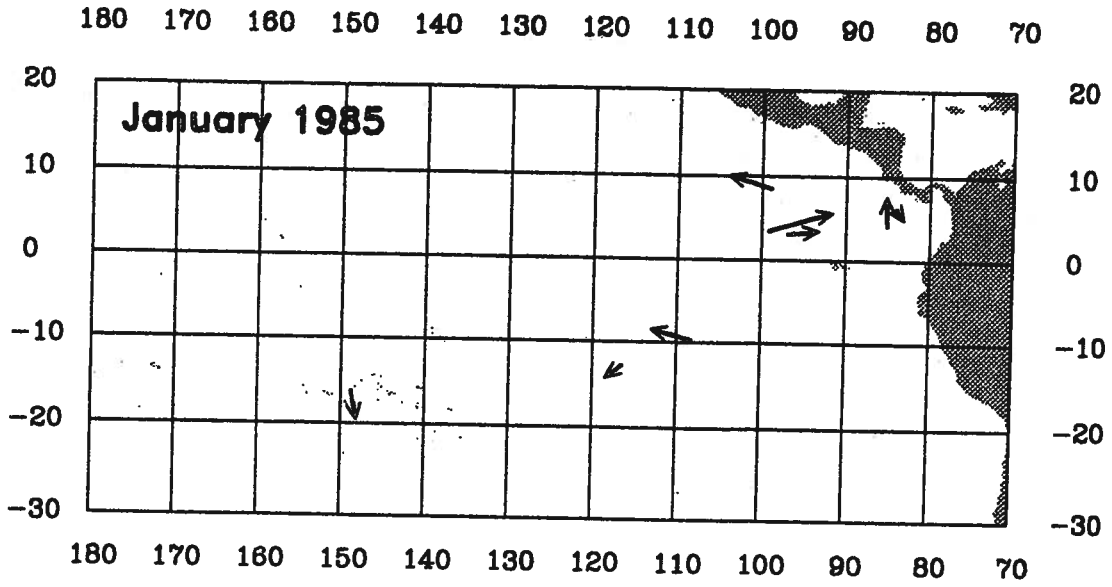

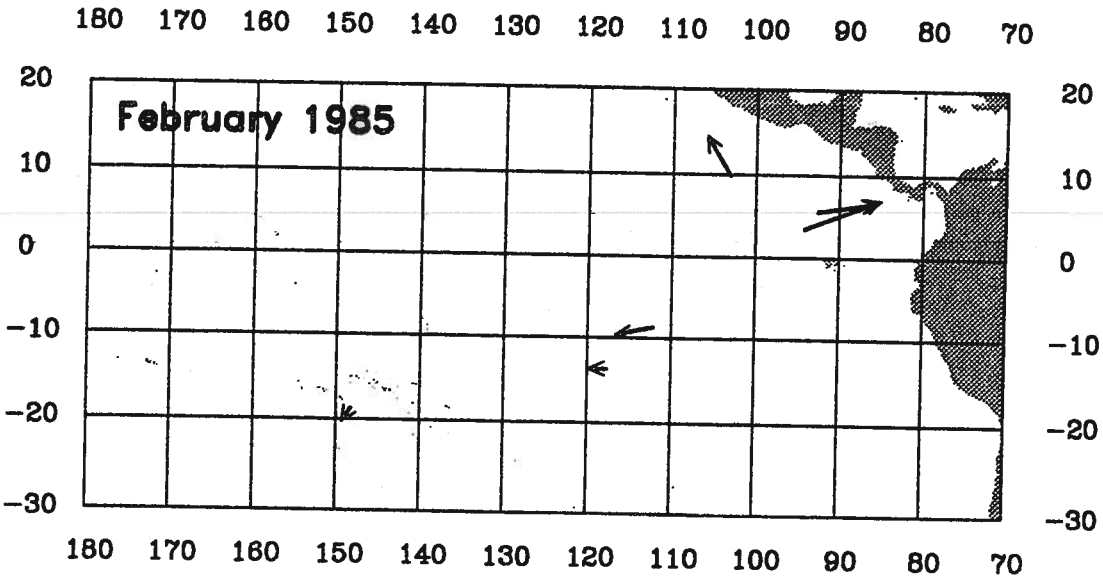

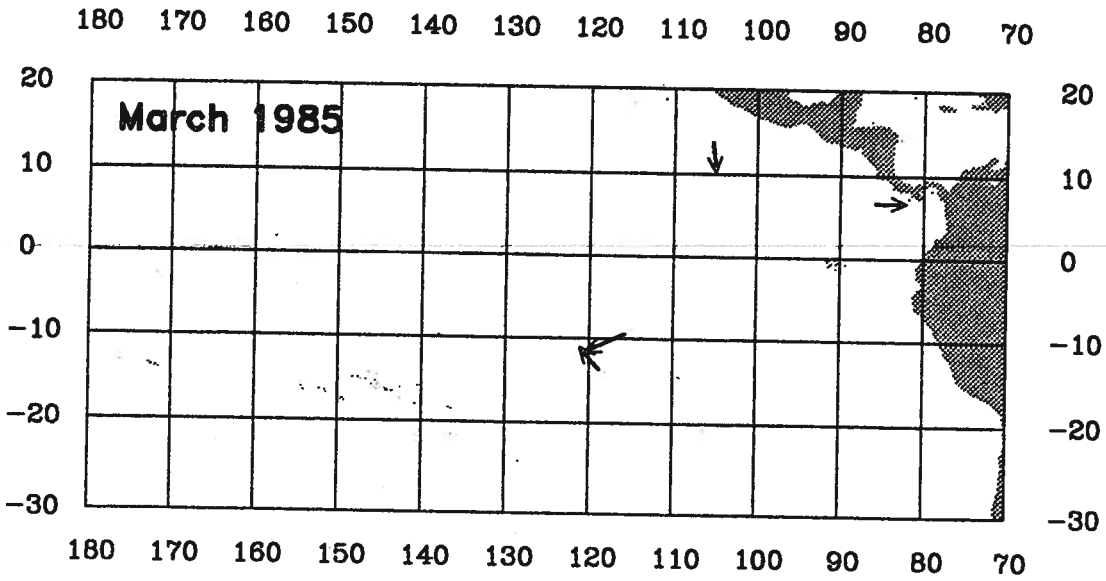

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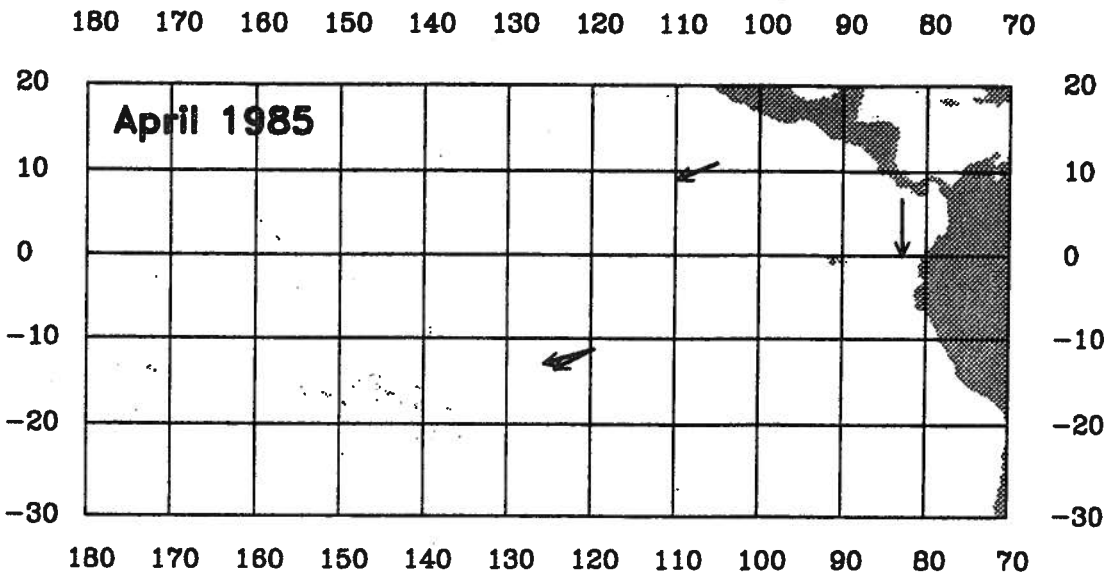

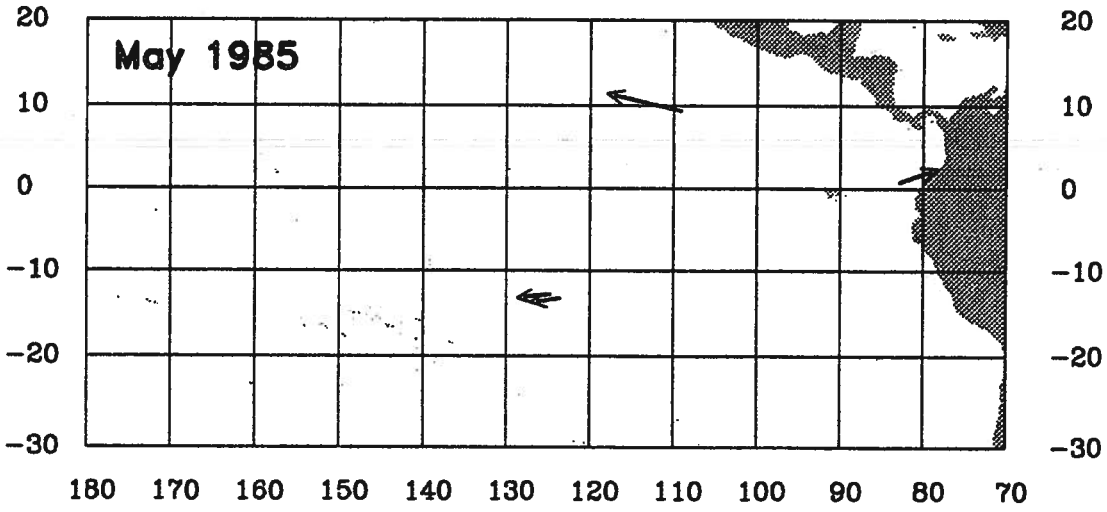

MONTHLY DISPLACEMENT OF BUOYS

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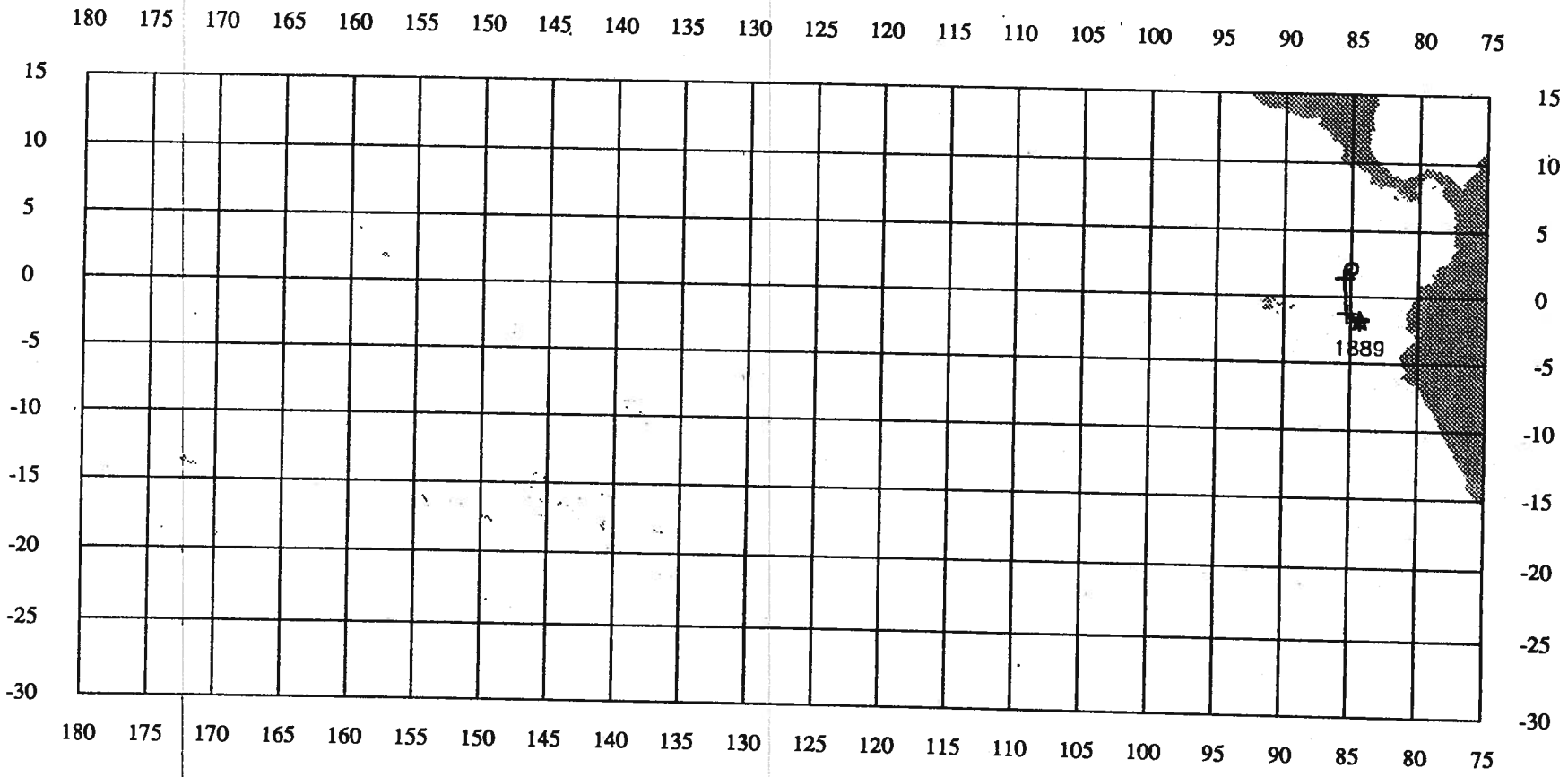
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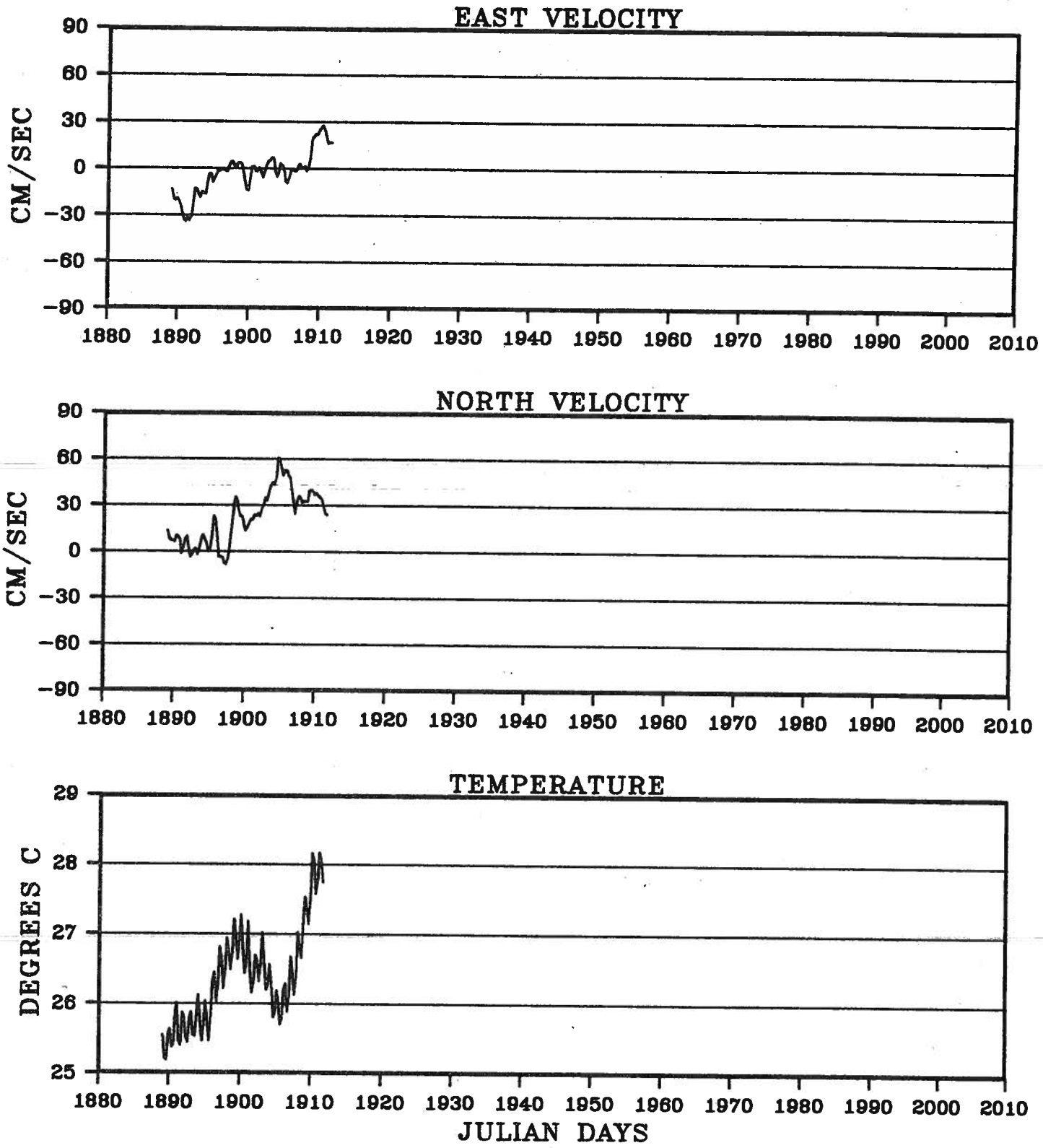
BUOY 2080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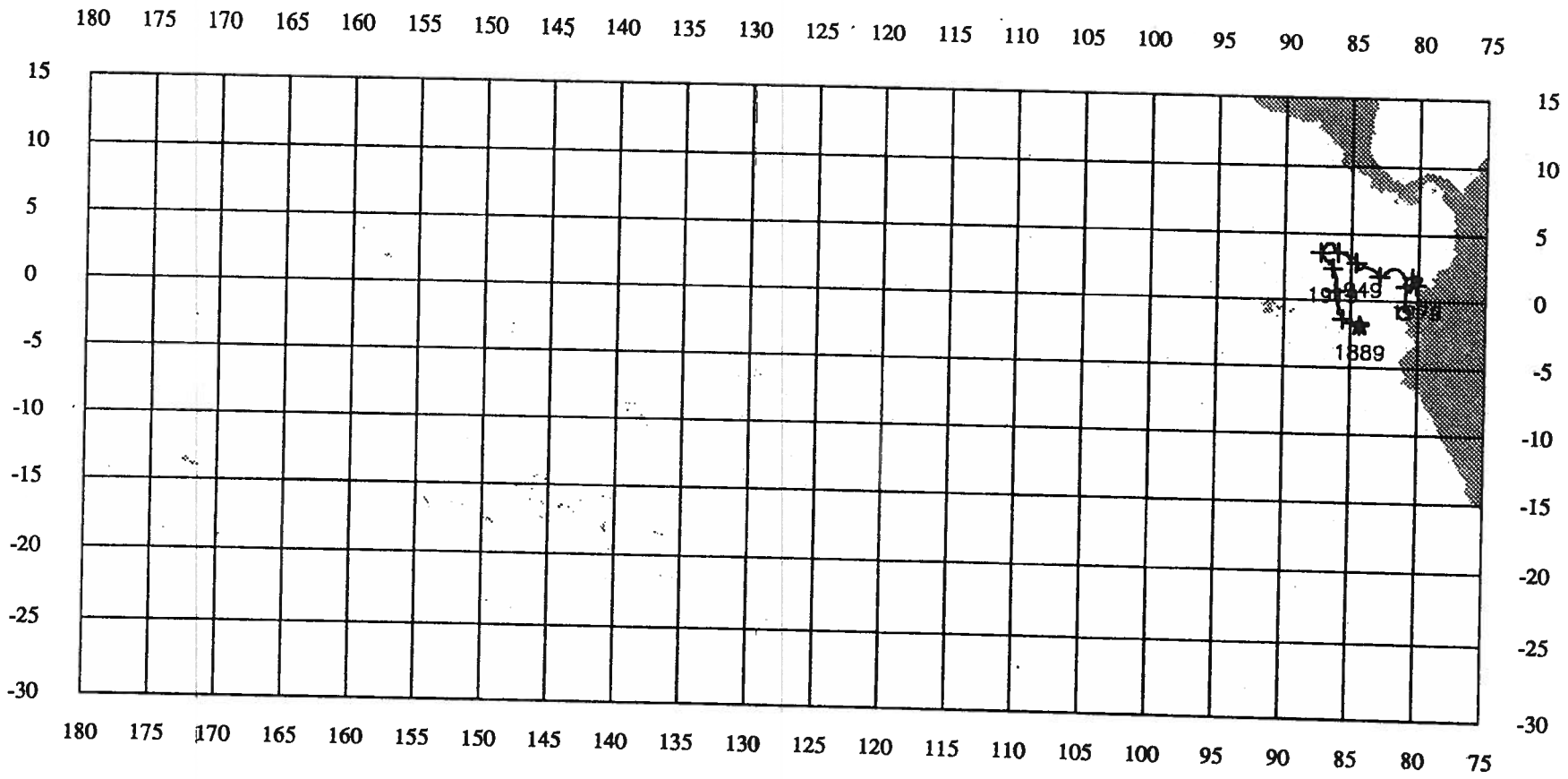
JULIAN DAYS

BUOY 2081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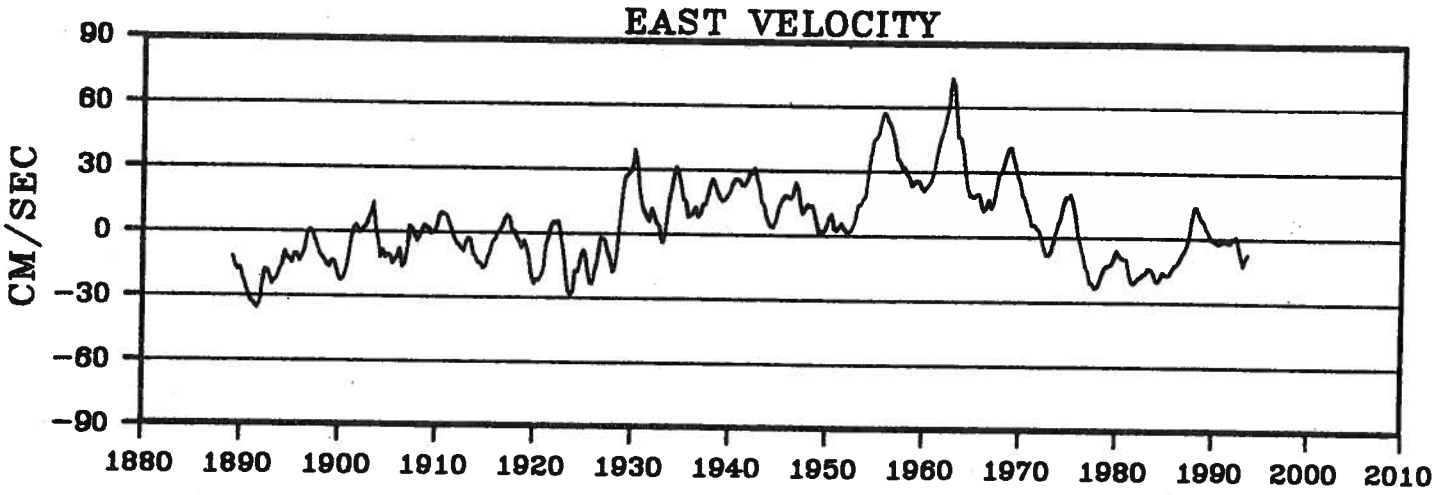
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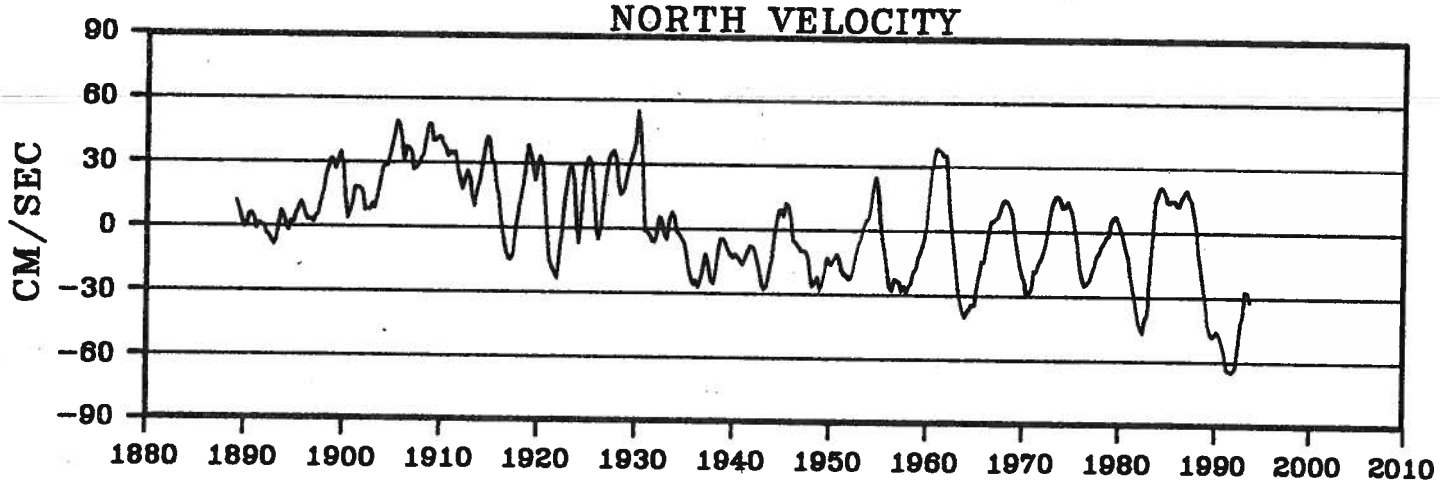
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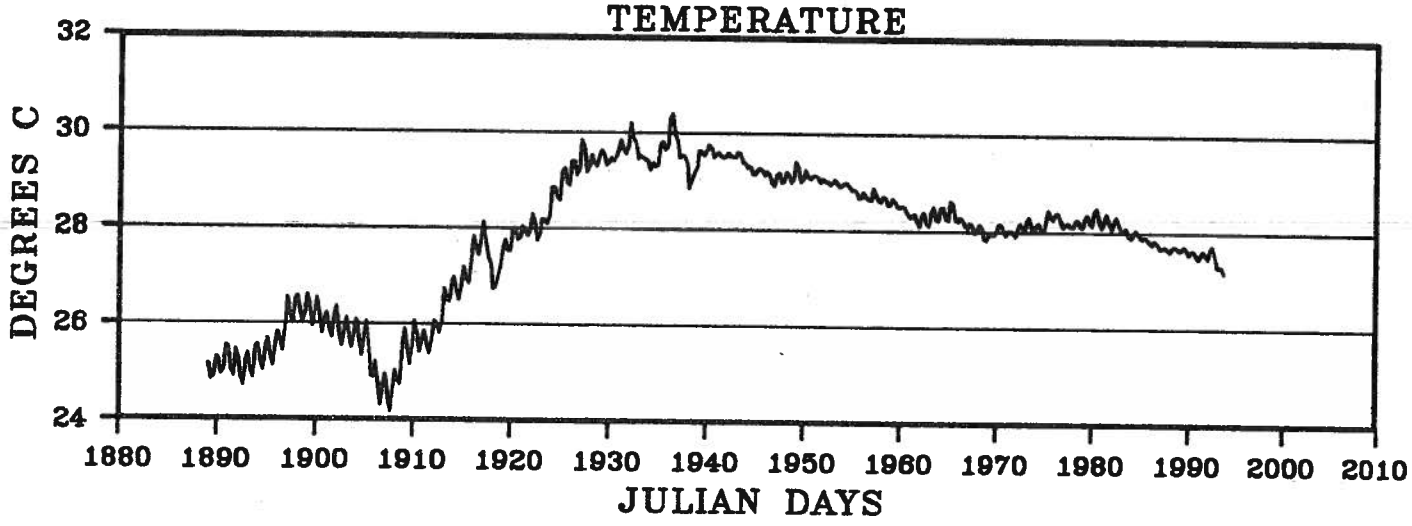
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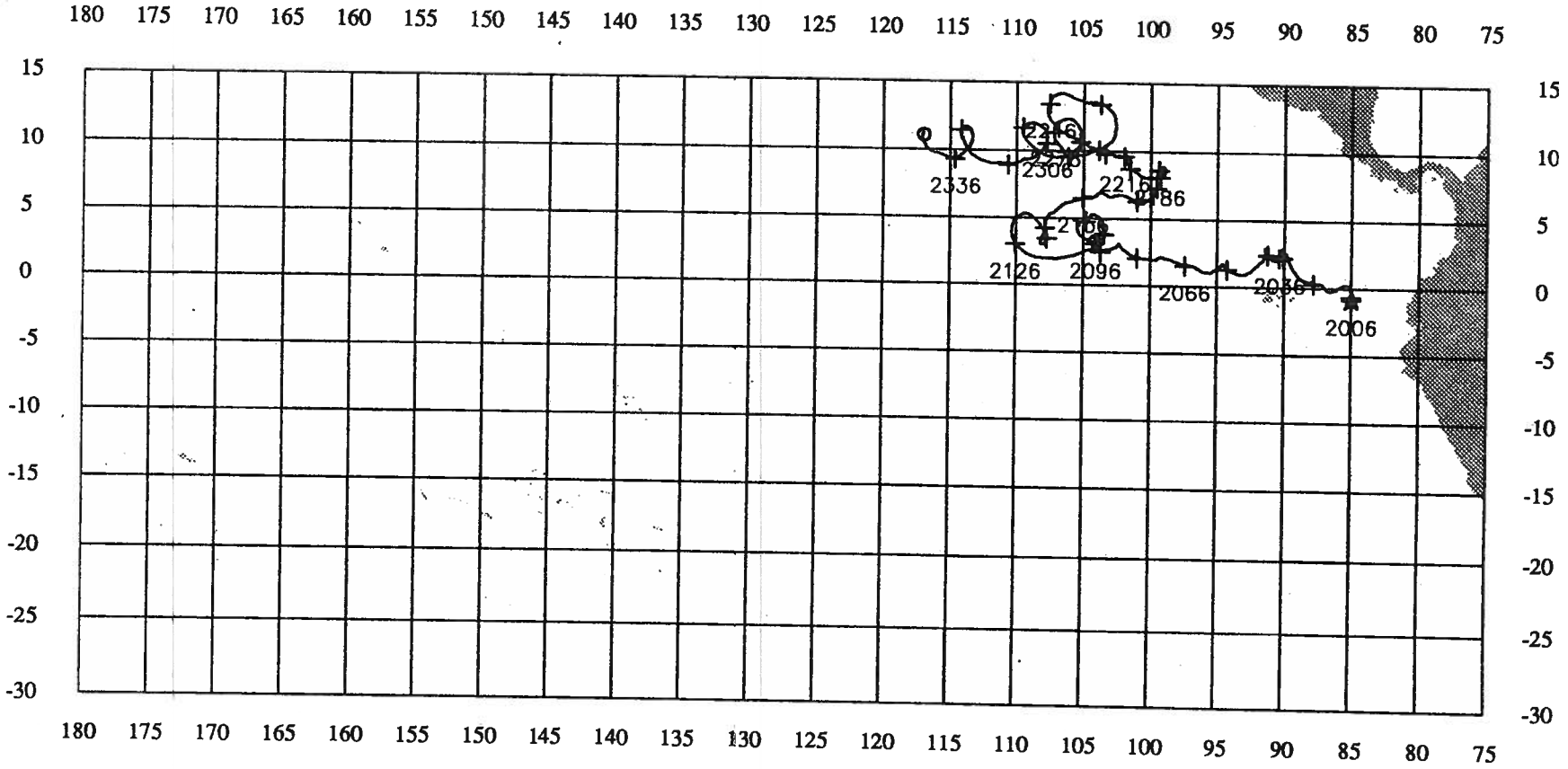
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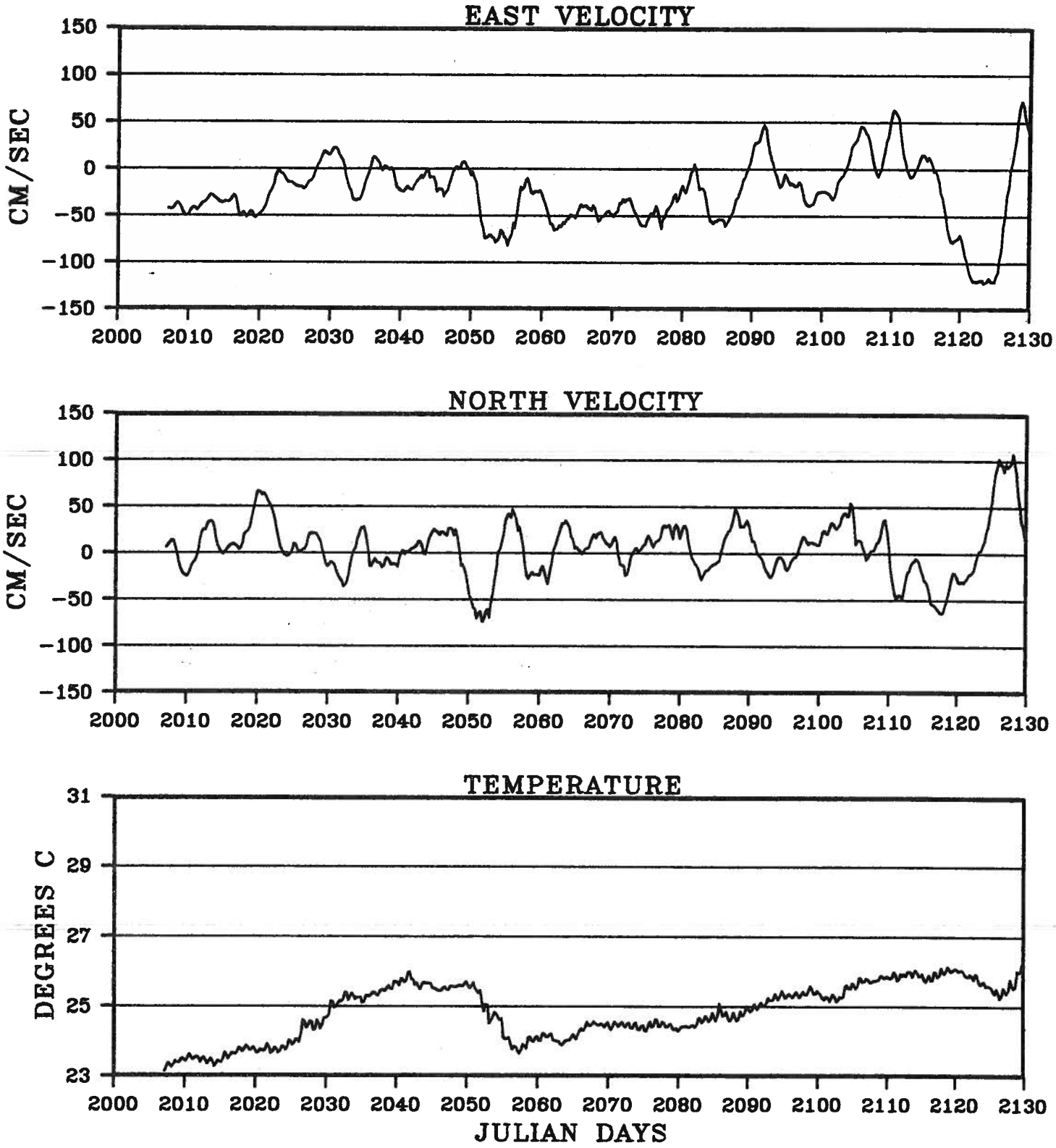
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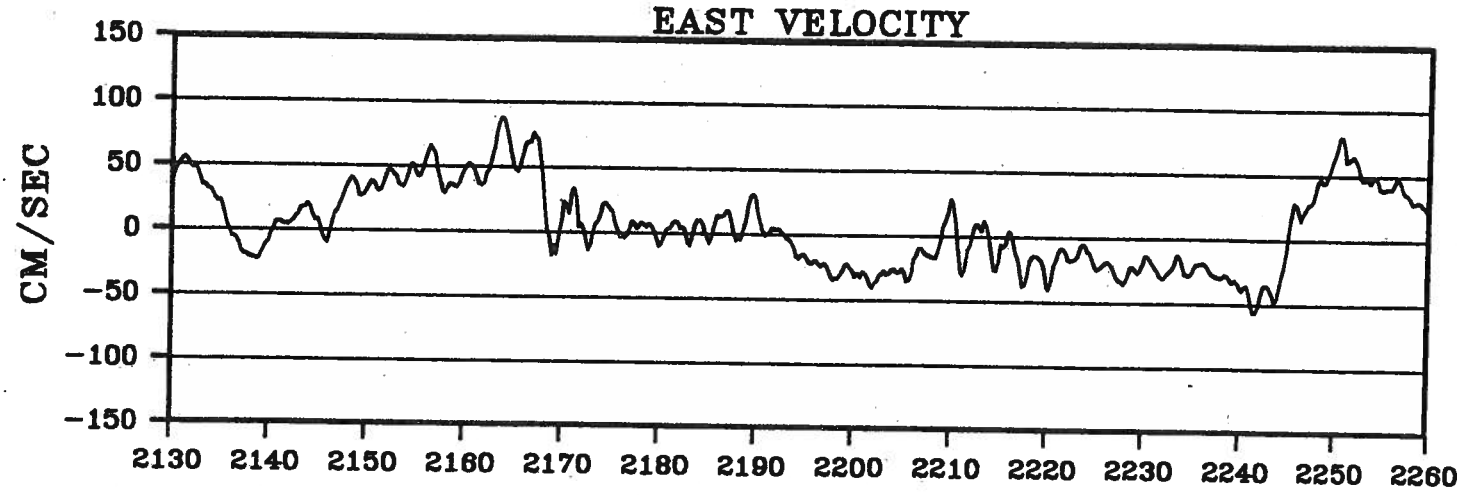
JULIAN DAYS

BUOY 2084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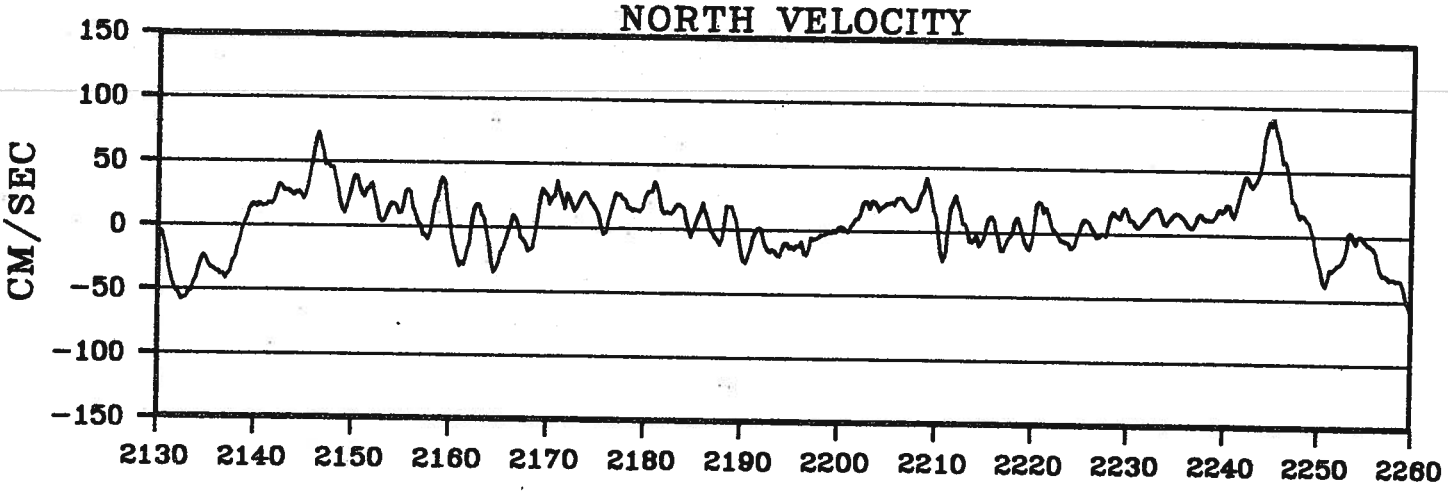
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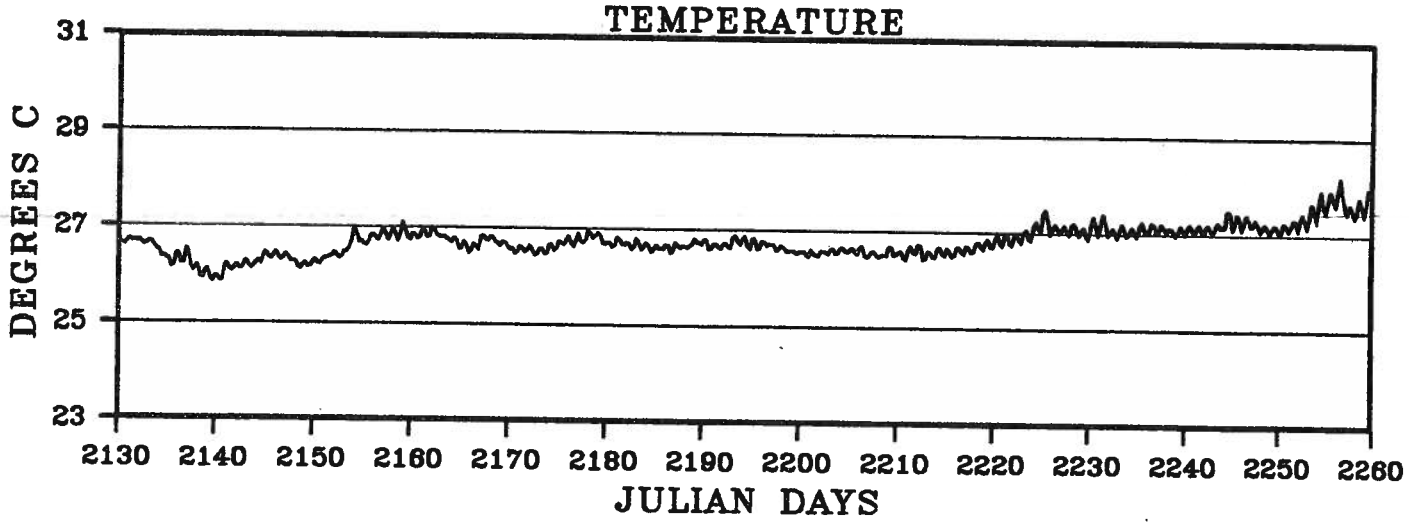
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JULIAN DAYS

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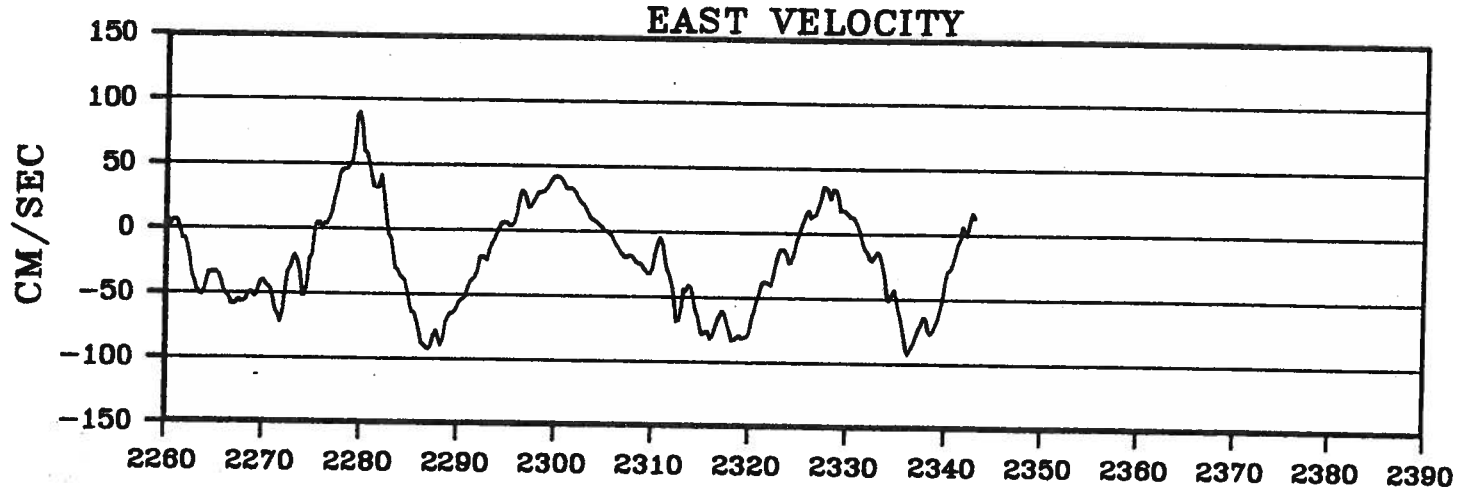
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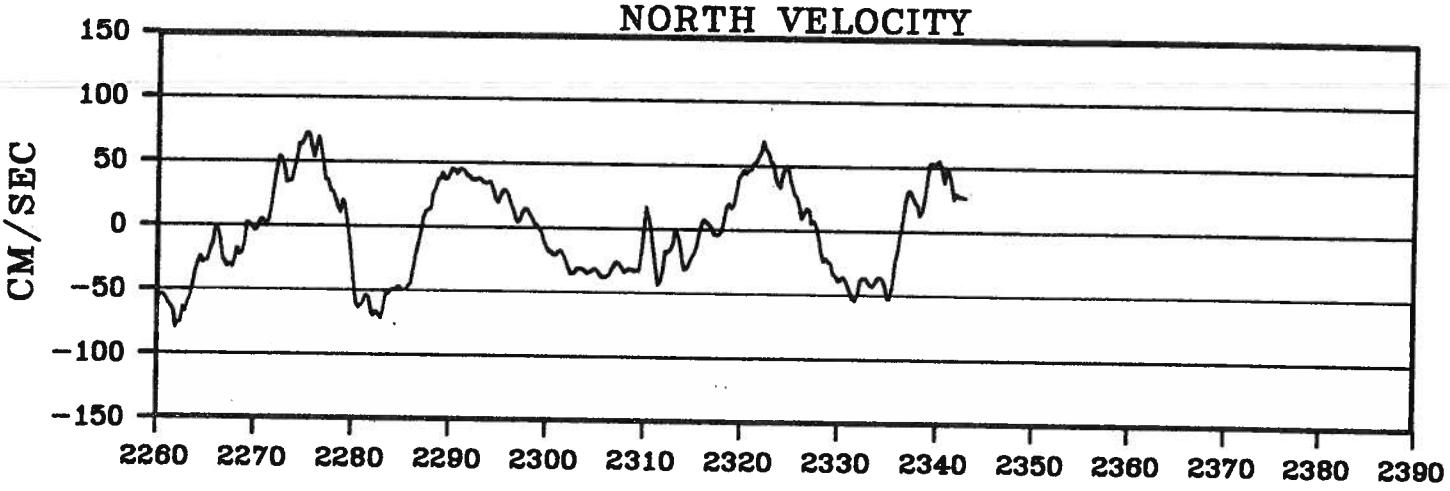
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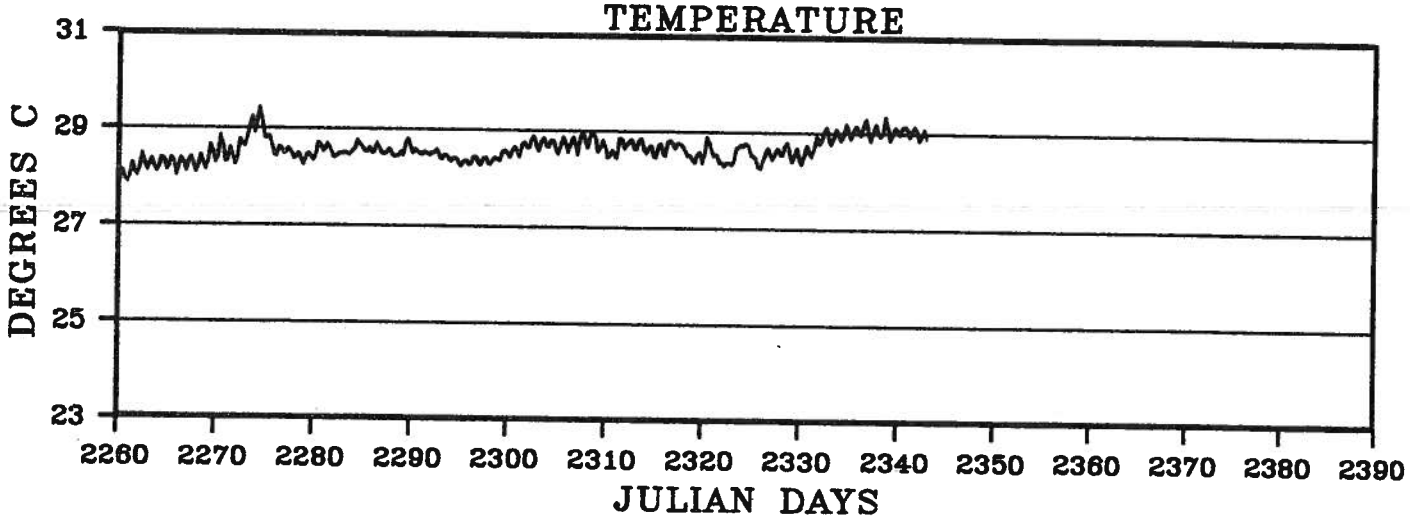
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JULIAN DAYS

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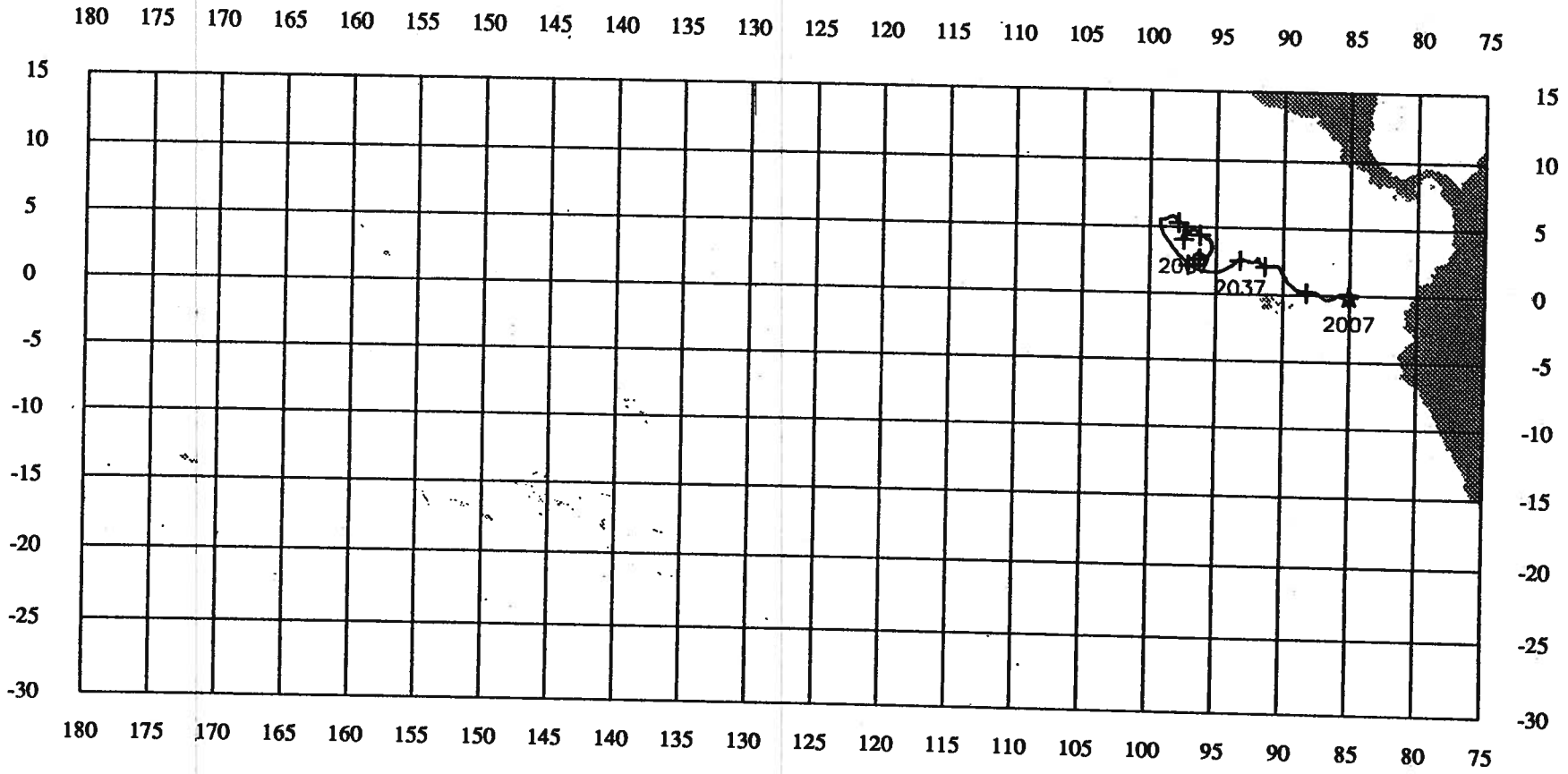
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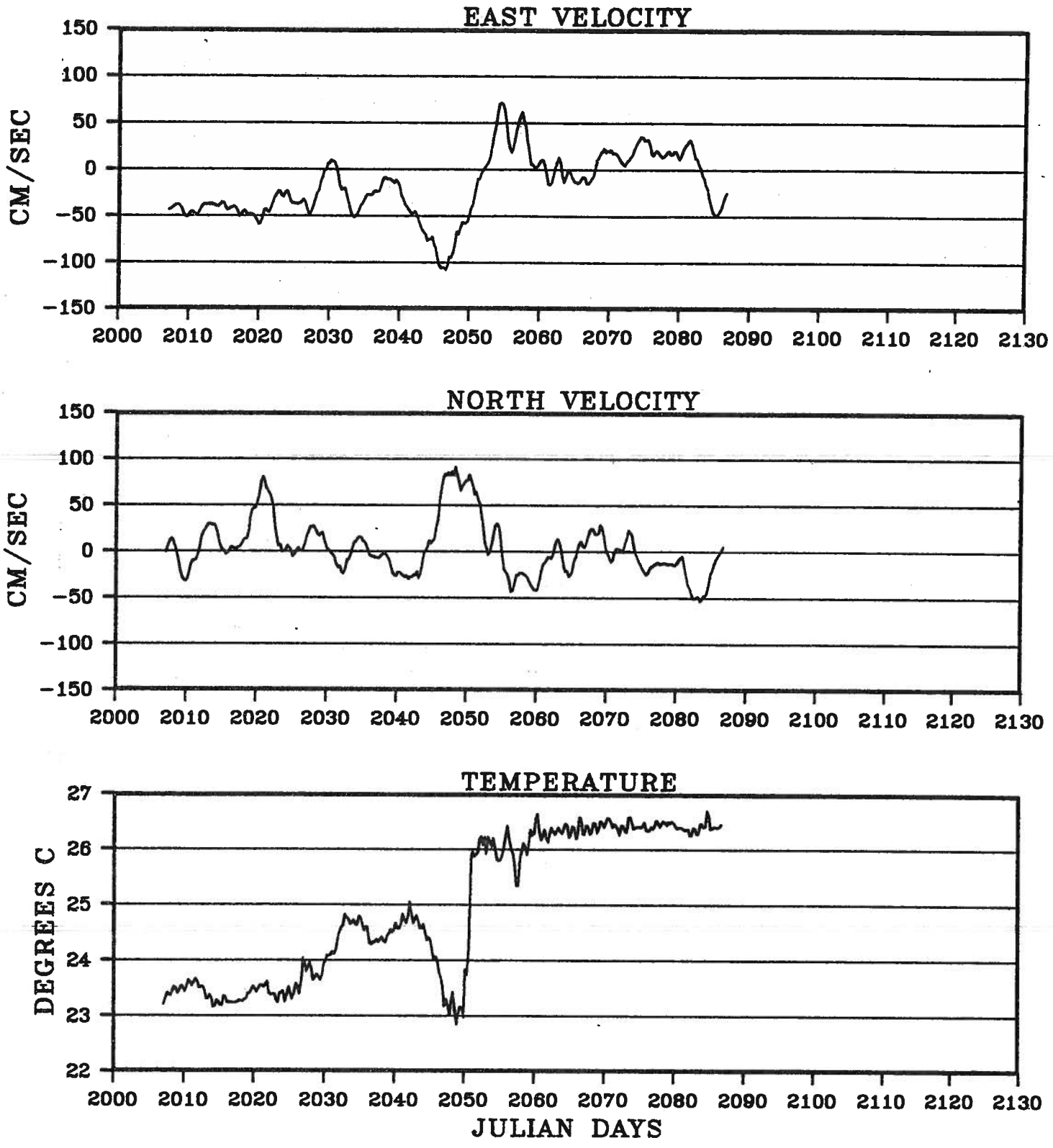
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TEMPERATURE
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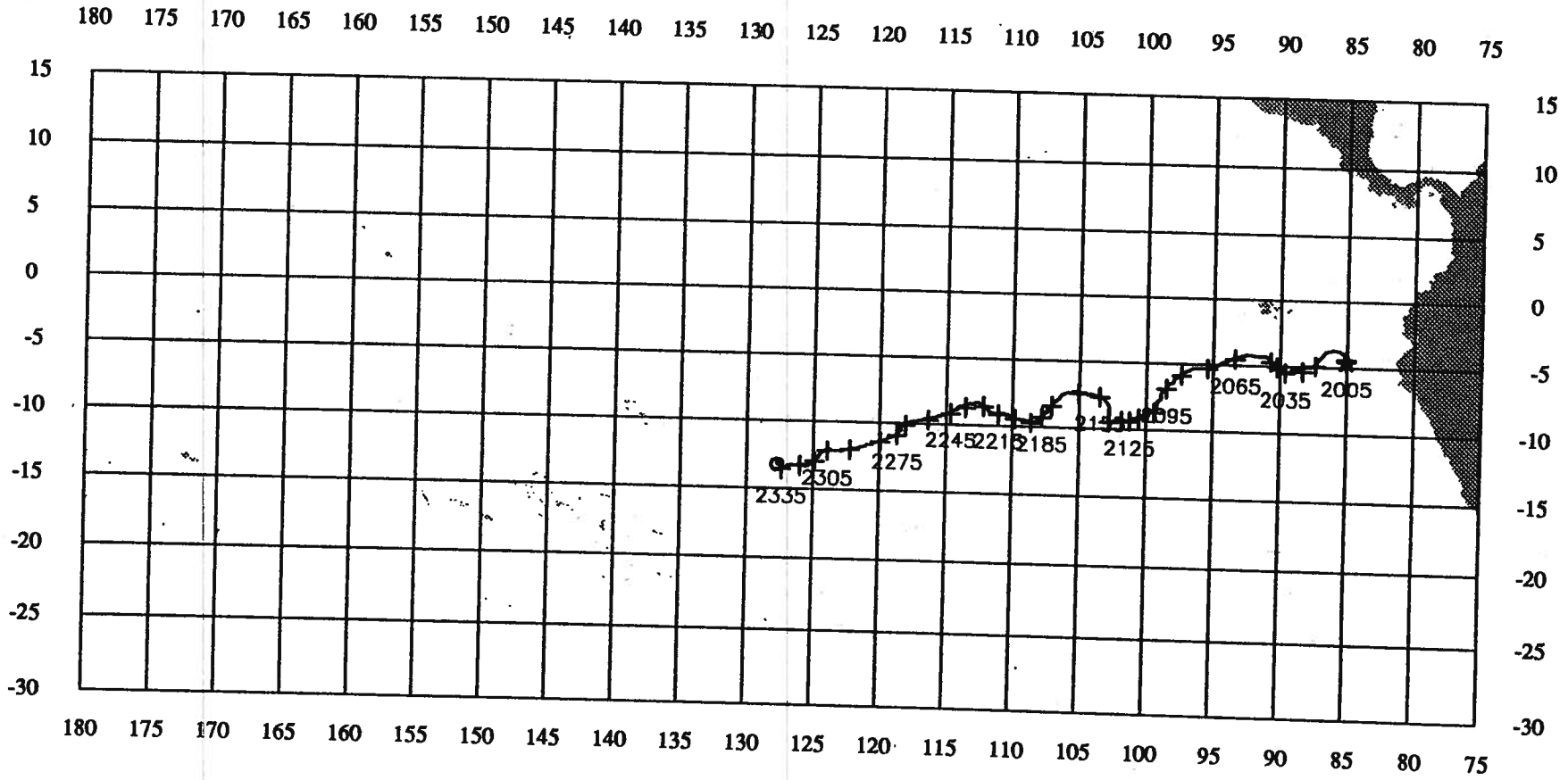
JULIAN DAYS

BUOY 2086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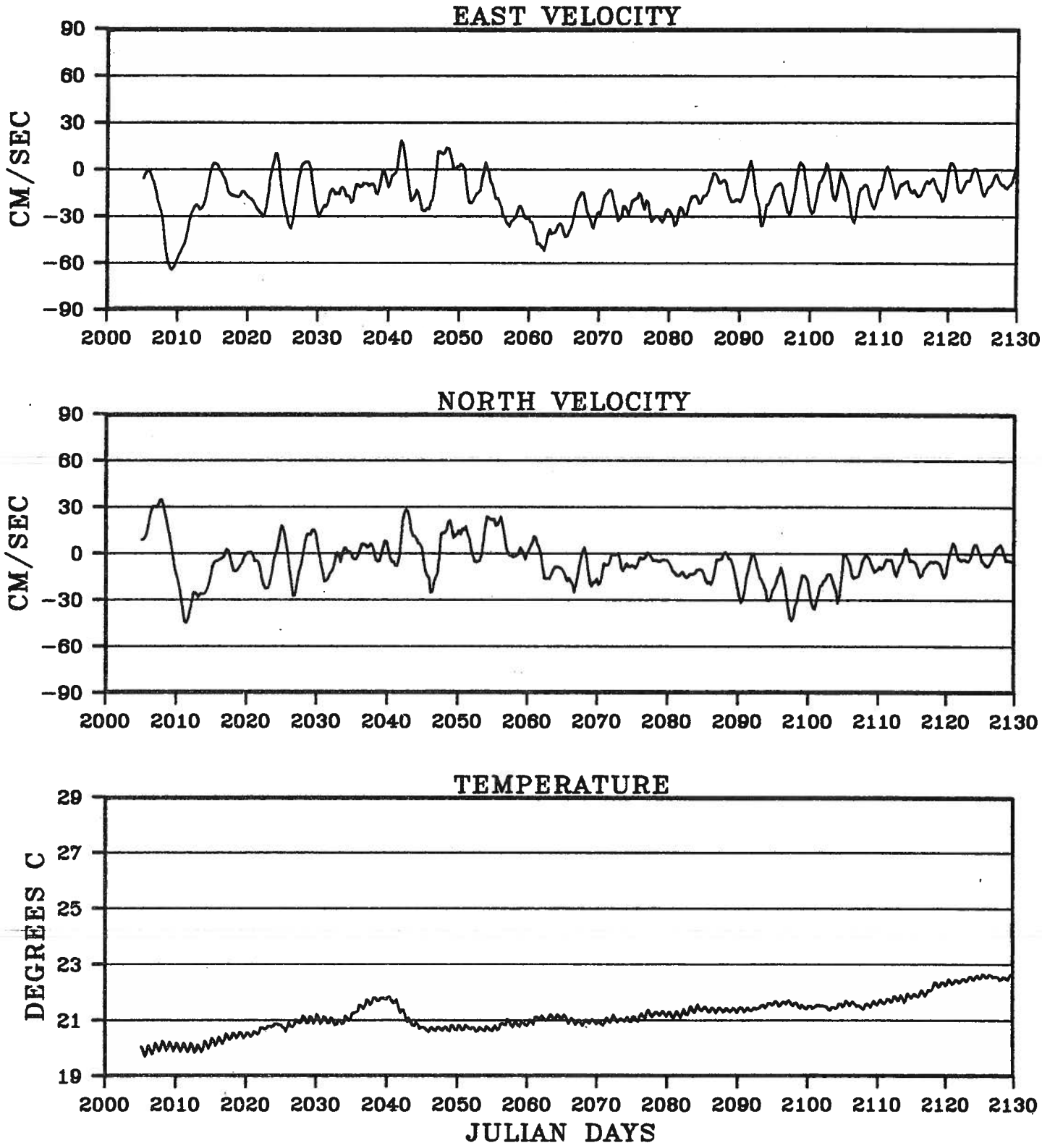
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TEMPERATURE
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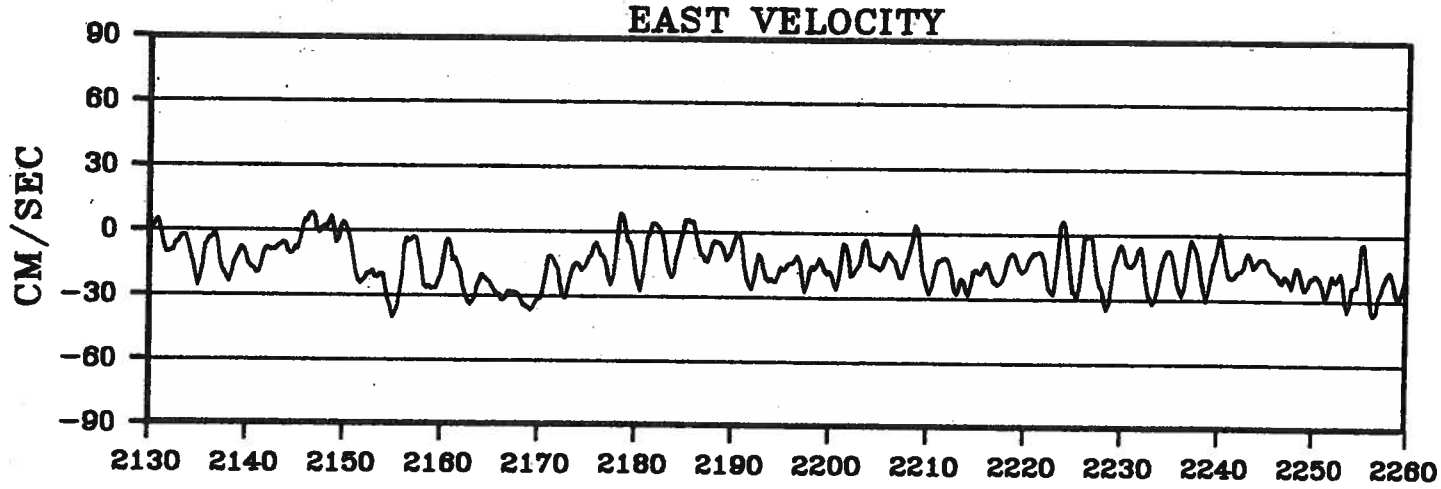
JULIAN DAYS

BUOY 2086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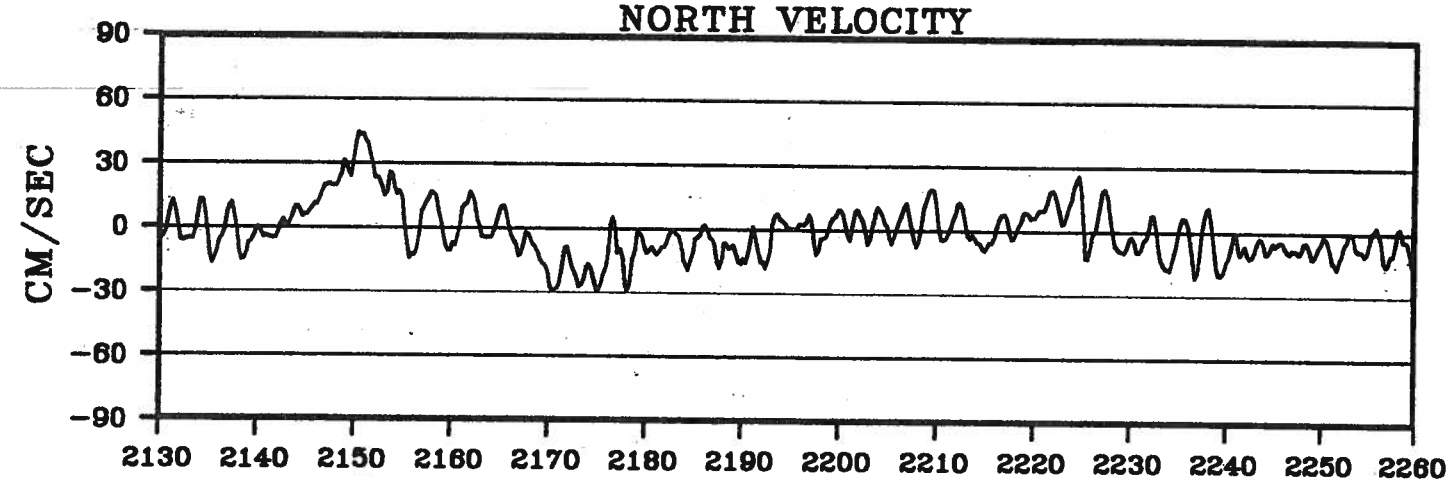
NORTH VELOCITY
CM/SEC
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-90
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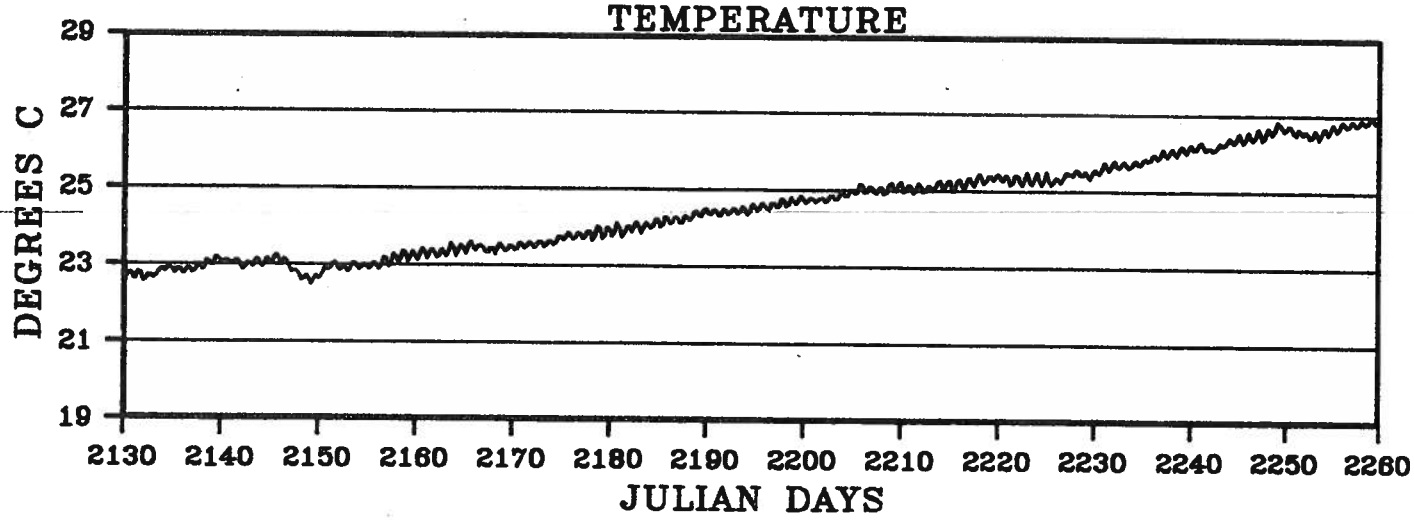
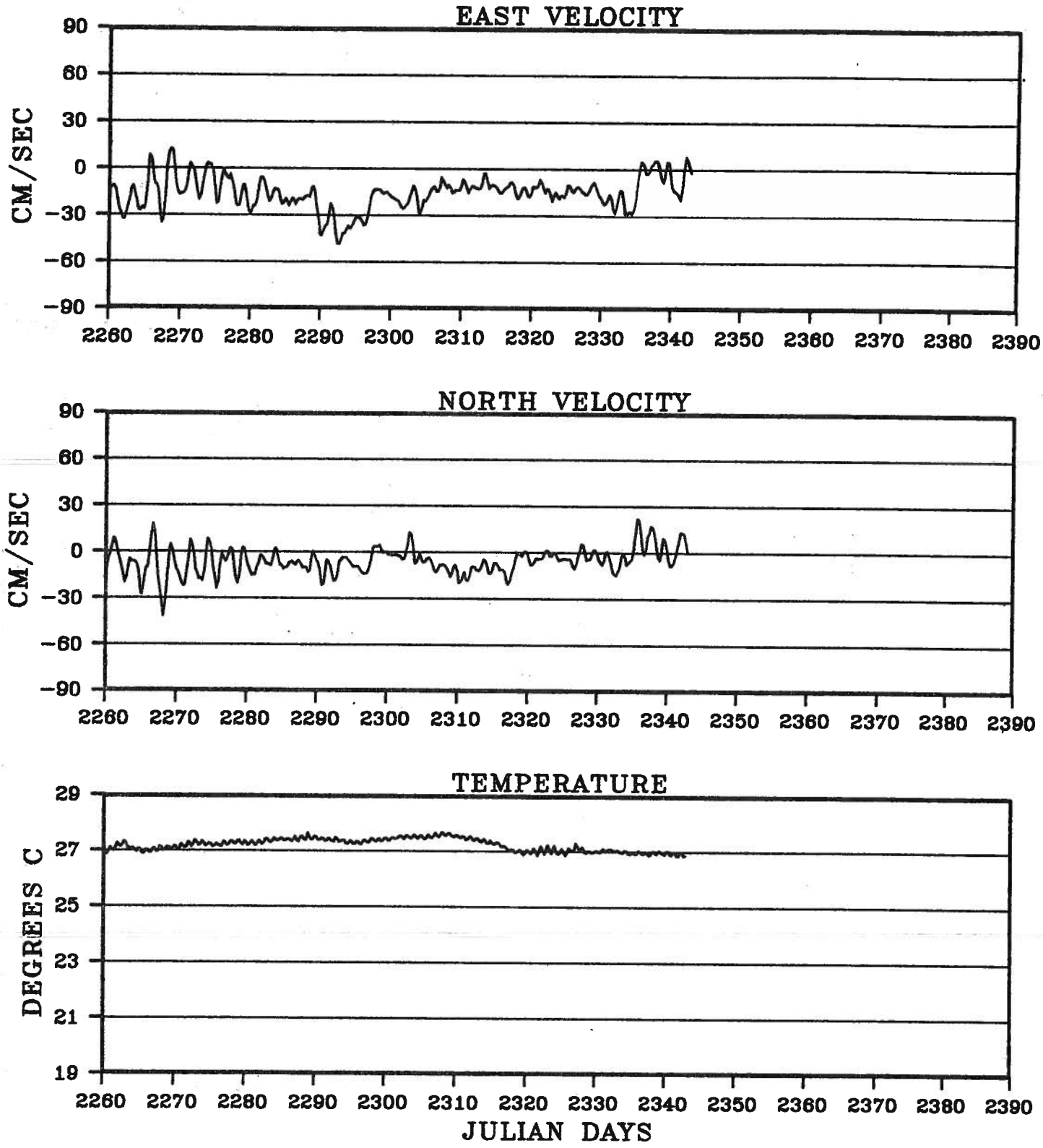

TEMPERATURE
DEGREES C
29
27
25
23
21
19
2130 2140 2150 2160 2170 2180 2190 2200 2210 2220 2230 2240 2250 2260
JULIAN DAYS

BUOY 2086


EAST VELOCITY
CM/SEC
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-30
-60
-90
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
NORTH VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
TEMPERATURE
DEGREES C
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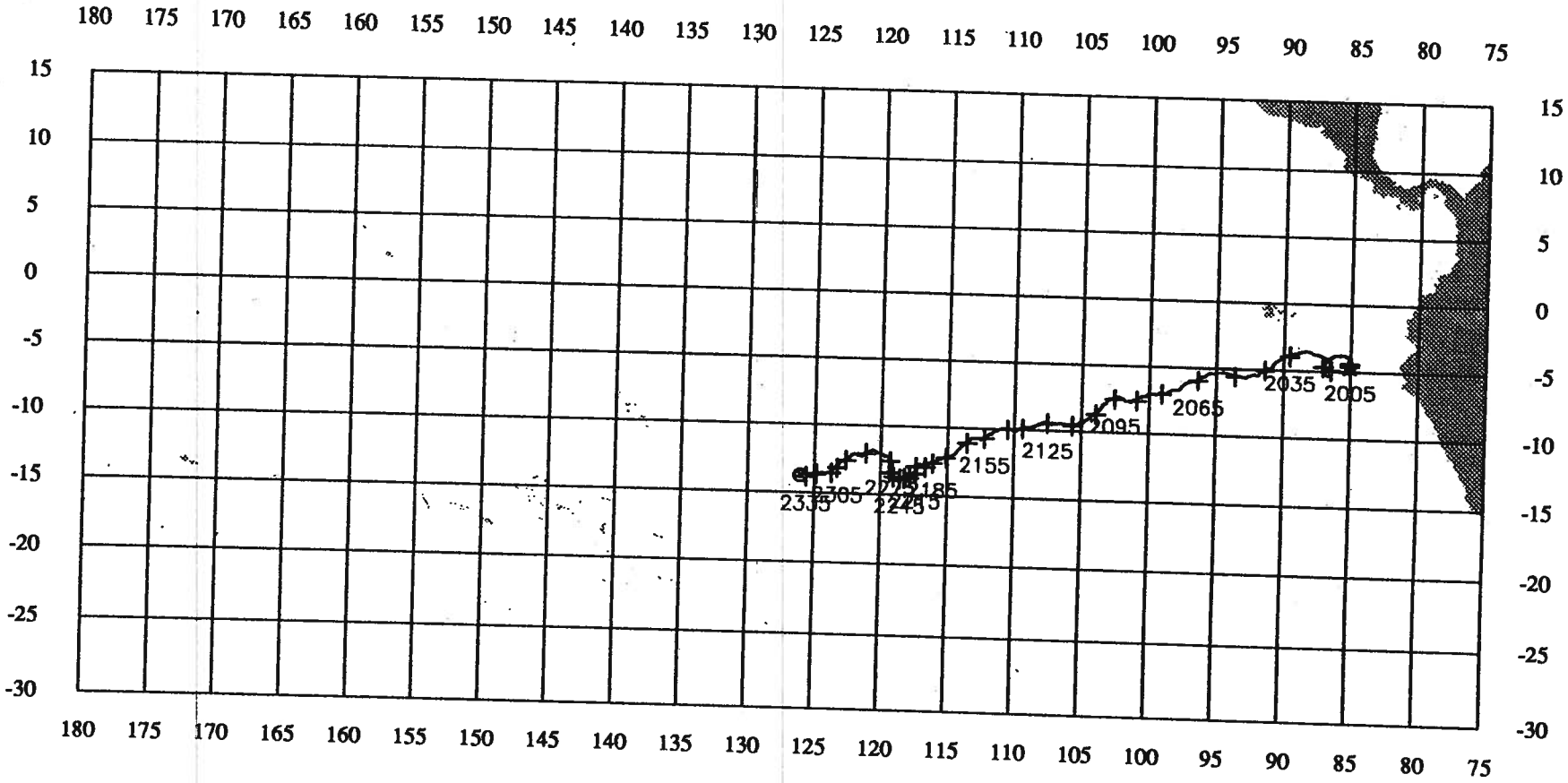
25
23
21
19
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
JULIAN DAYS

BUOY 2087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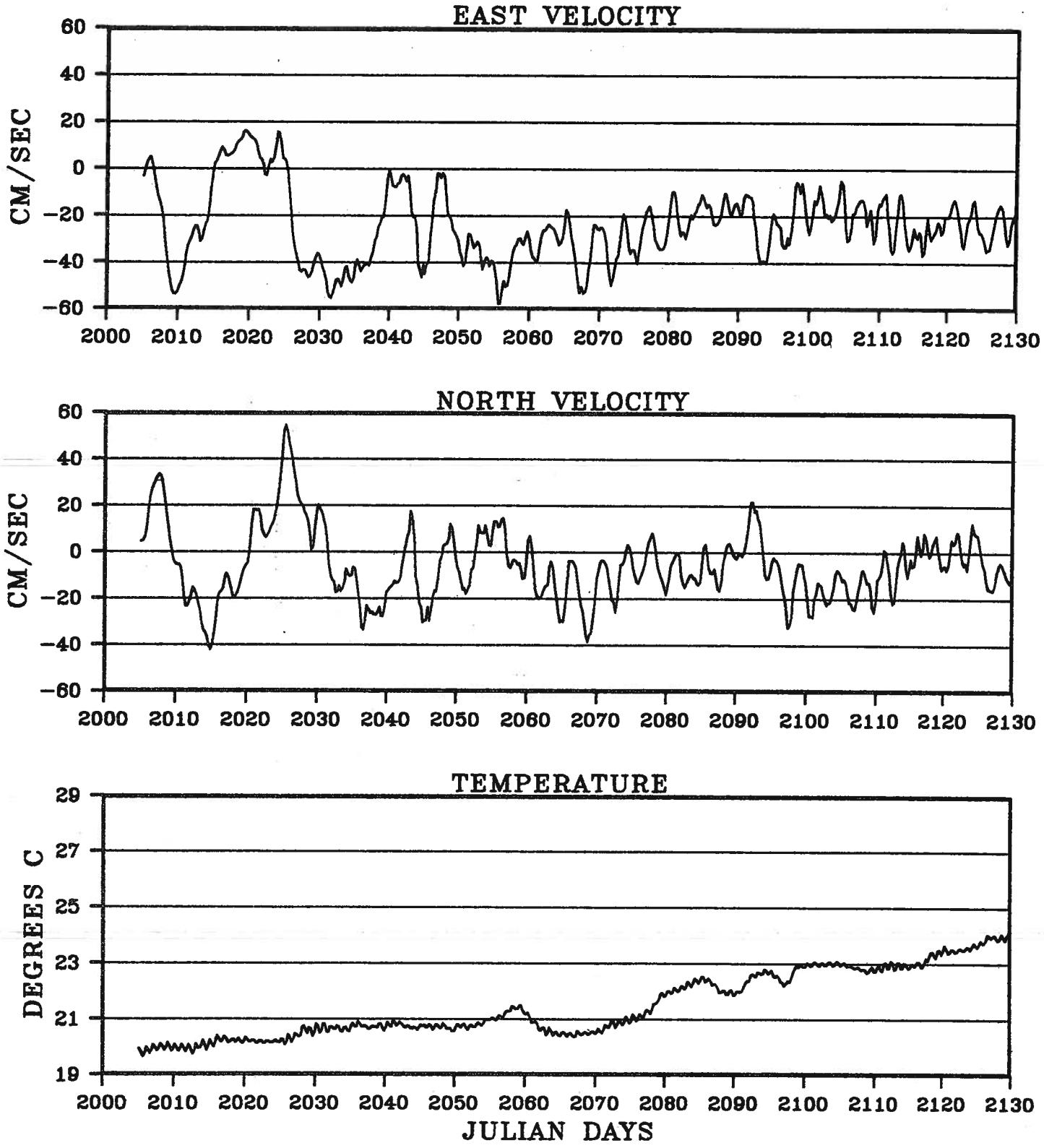
BUOY 2087


EAST VELOCITY
CM/SEC
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-20
-40
-60
2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130
TEMPERATURE
DEGREES C
29
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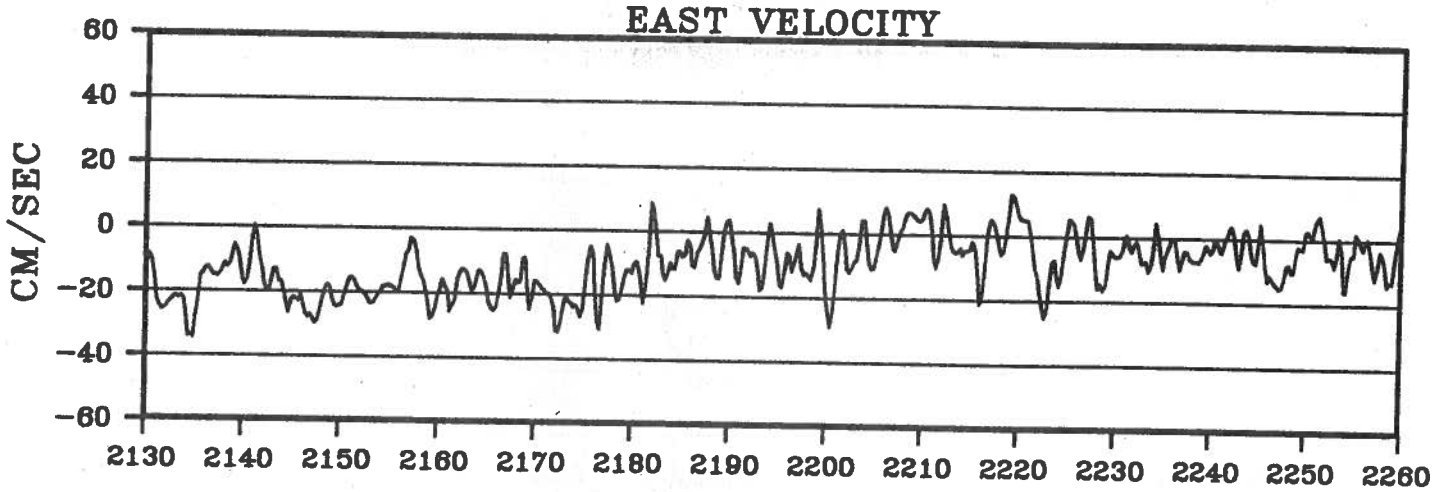
2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130
JULIAN DAYS

BUOY 2087


EAST VELOCITY
CM/SEC
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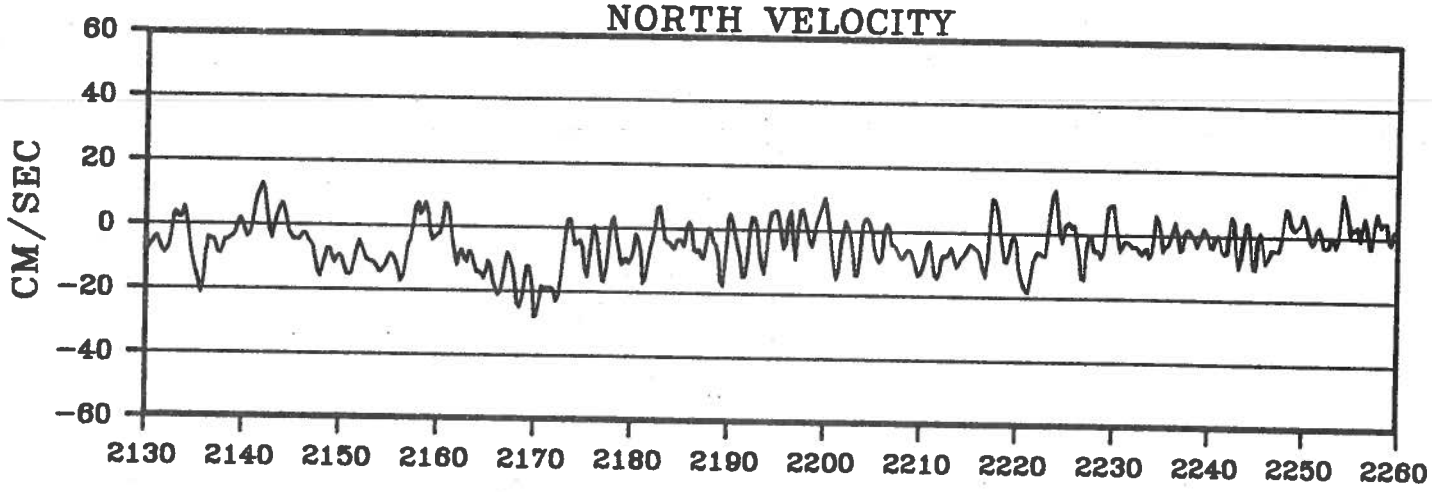
2130 2140 2150 2160 2170 2180 2190 2200 2210 2220 2230 2240 2250 2260


NORTH VELOCITY
CM/SEC
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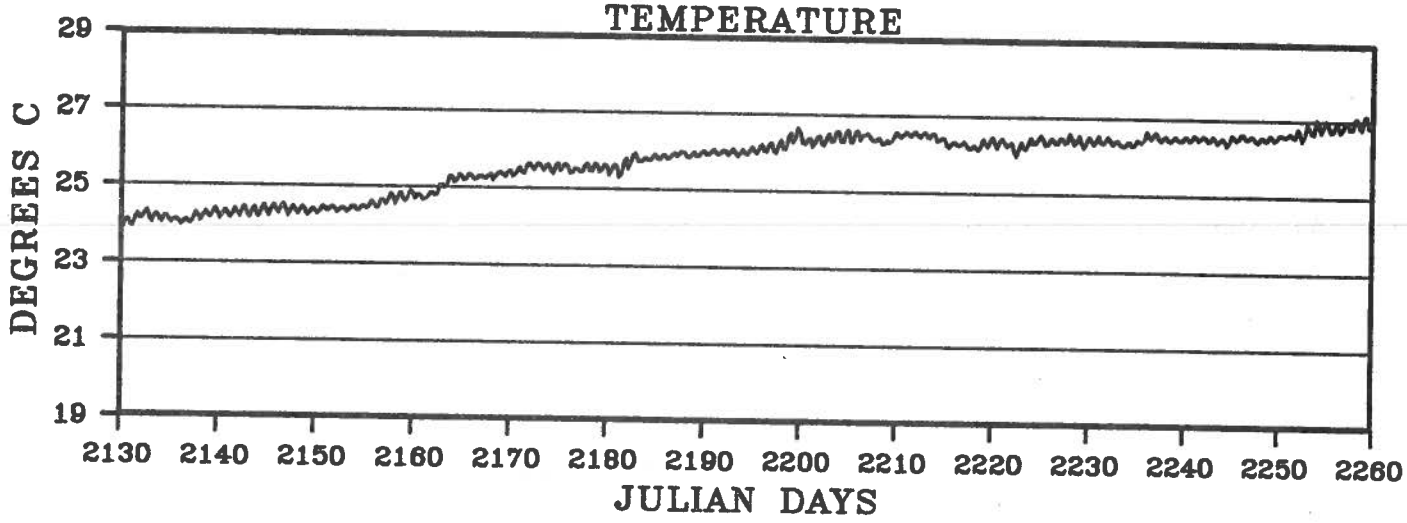
TEMPERATURE
DEGREES C
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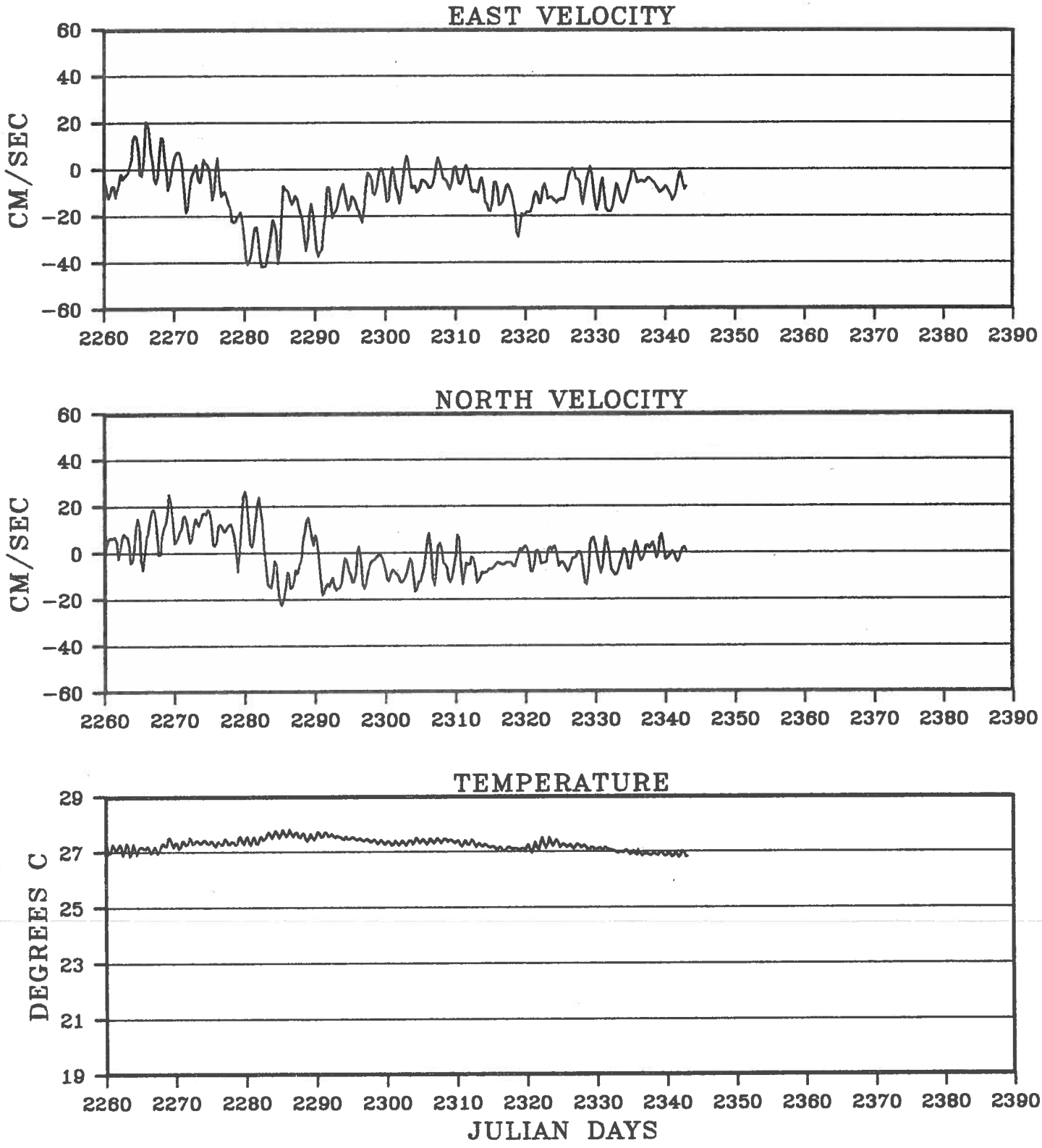
JULIAN DAYS

BUOY 2087


EAST VELOCITY
CM/SEC
60
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20
0
-20
-40
-60
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
TEMPERATURE
DEGREES C
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27
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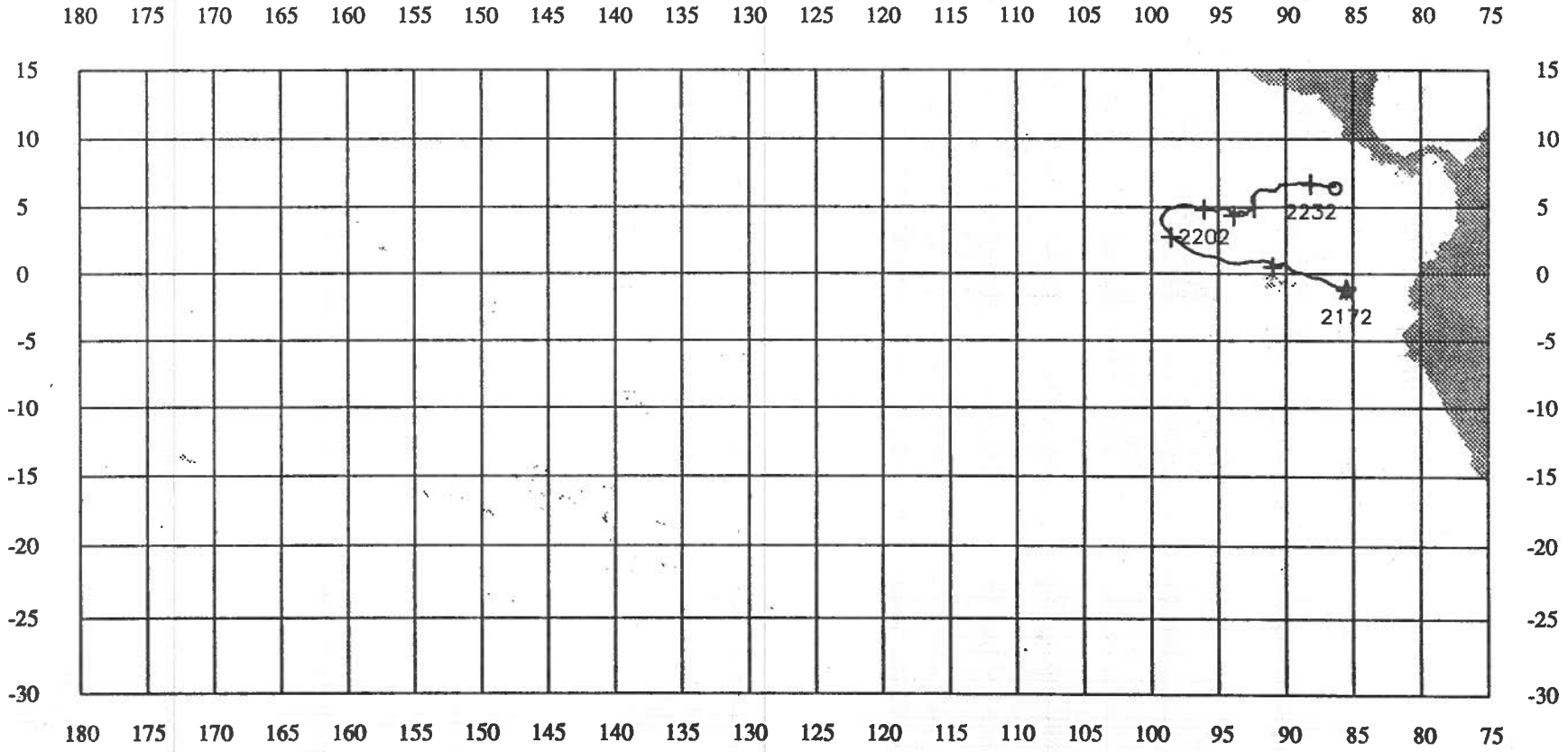
23
21
19
2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390
JULIAN DAYS

BUOY 2088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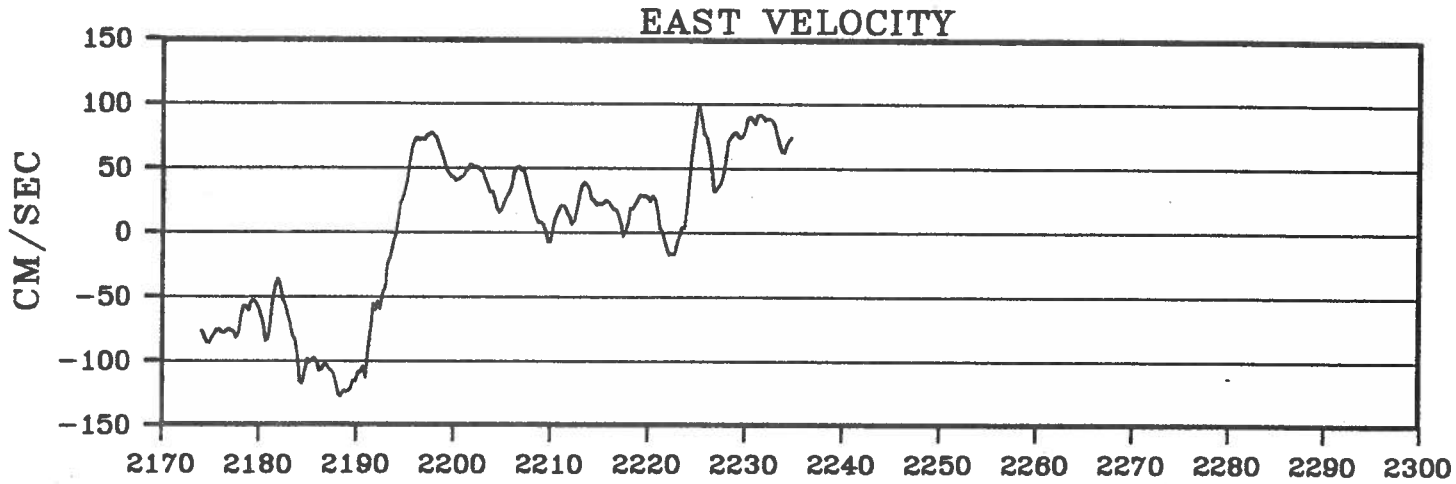
2232
2172

BUOY 2088


EAST VELOCITY
CM/SEC
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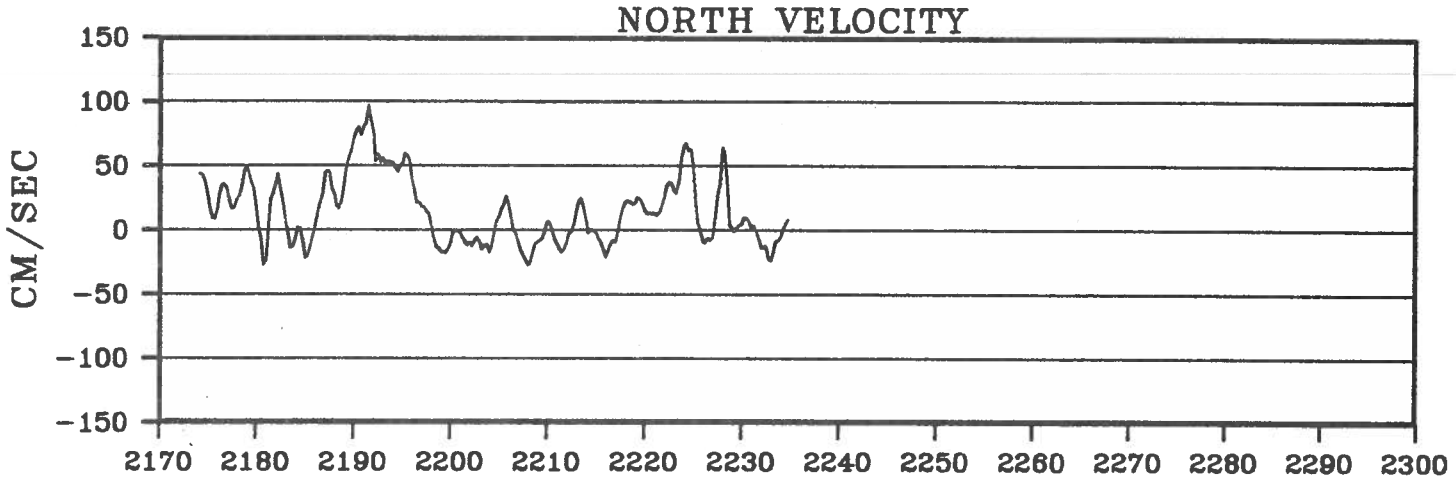
50
0
-50
-100
-150
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300


NORTH VELOCITY
CM/SEC
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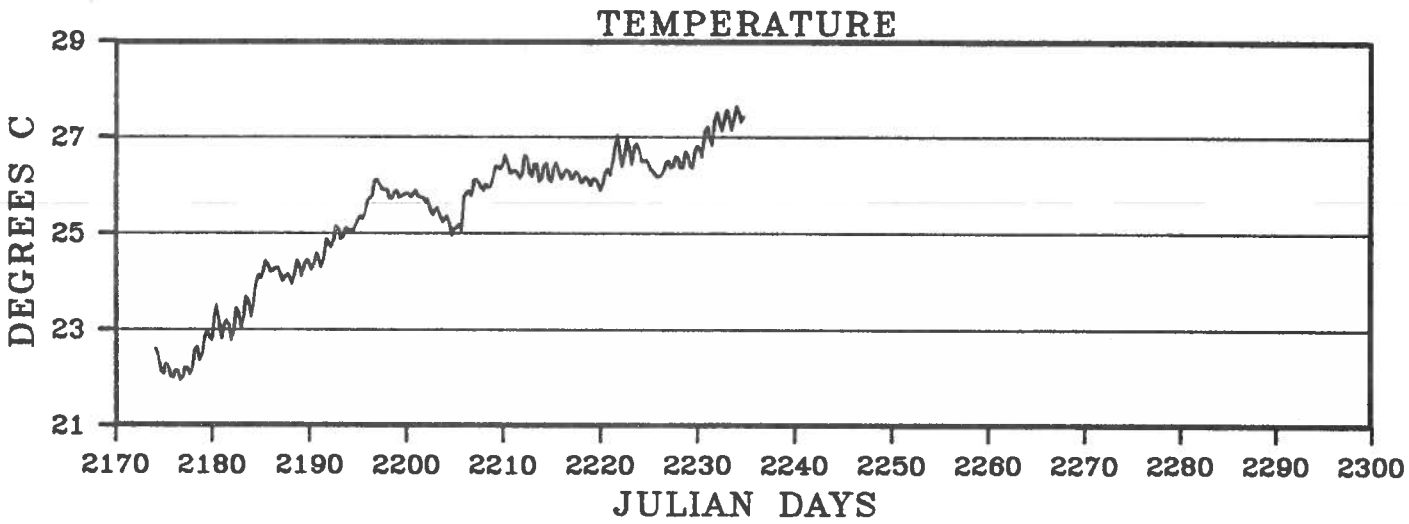
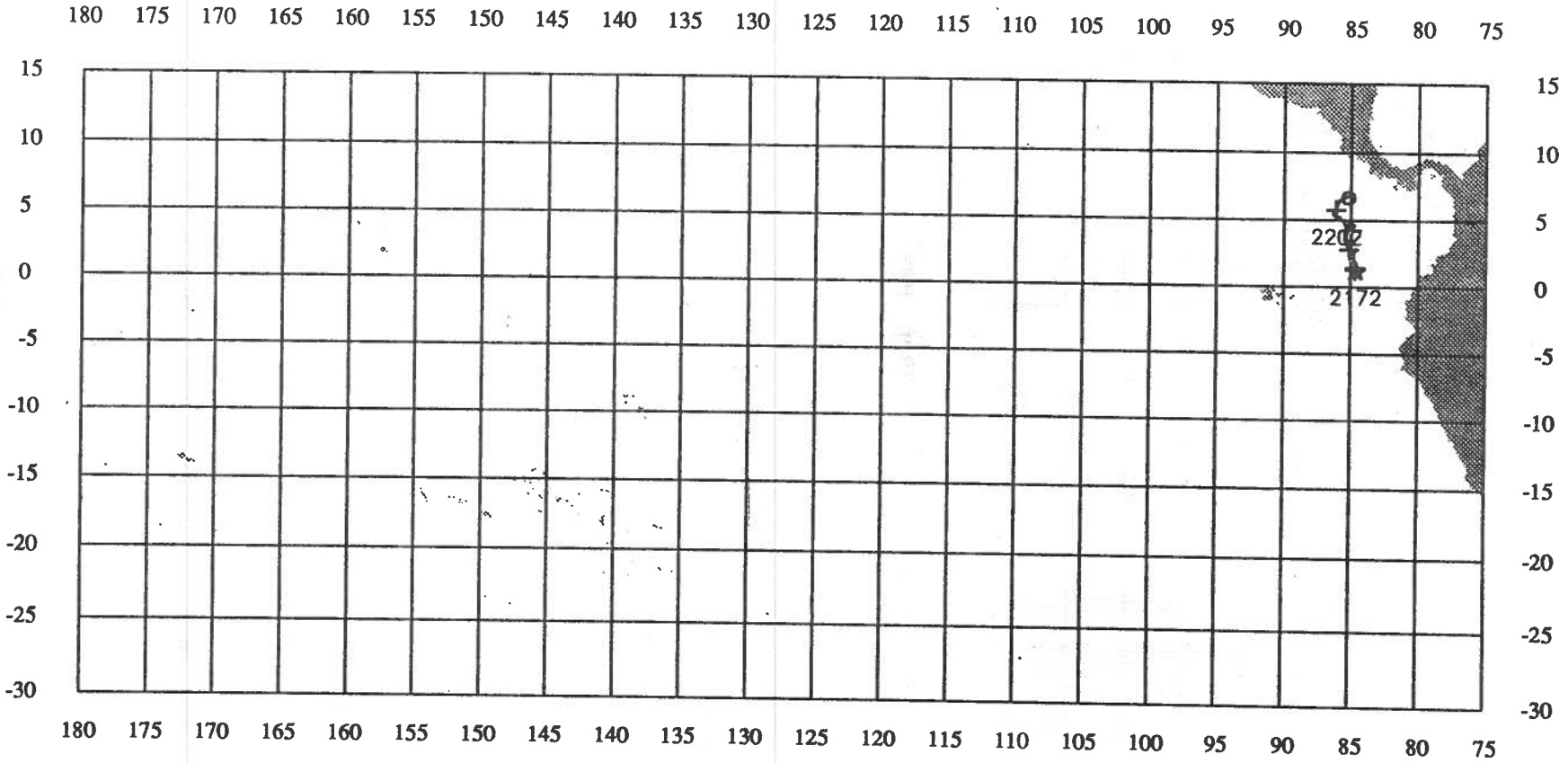
100
50
0
-50
-100
-150
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300


TEMPERATURE
DEGREES C
29
27
25
23
21
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
JULIAN DAYS

BUOY 2089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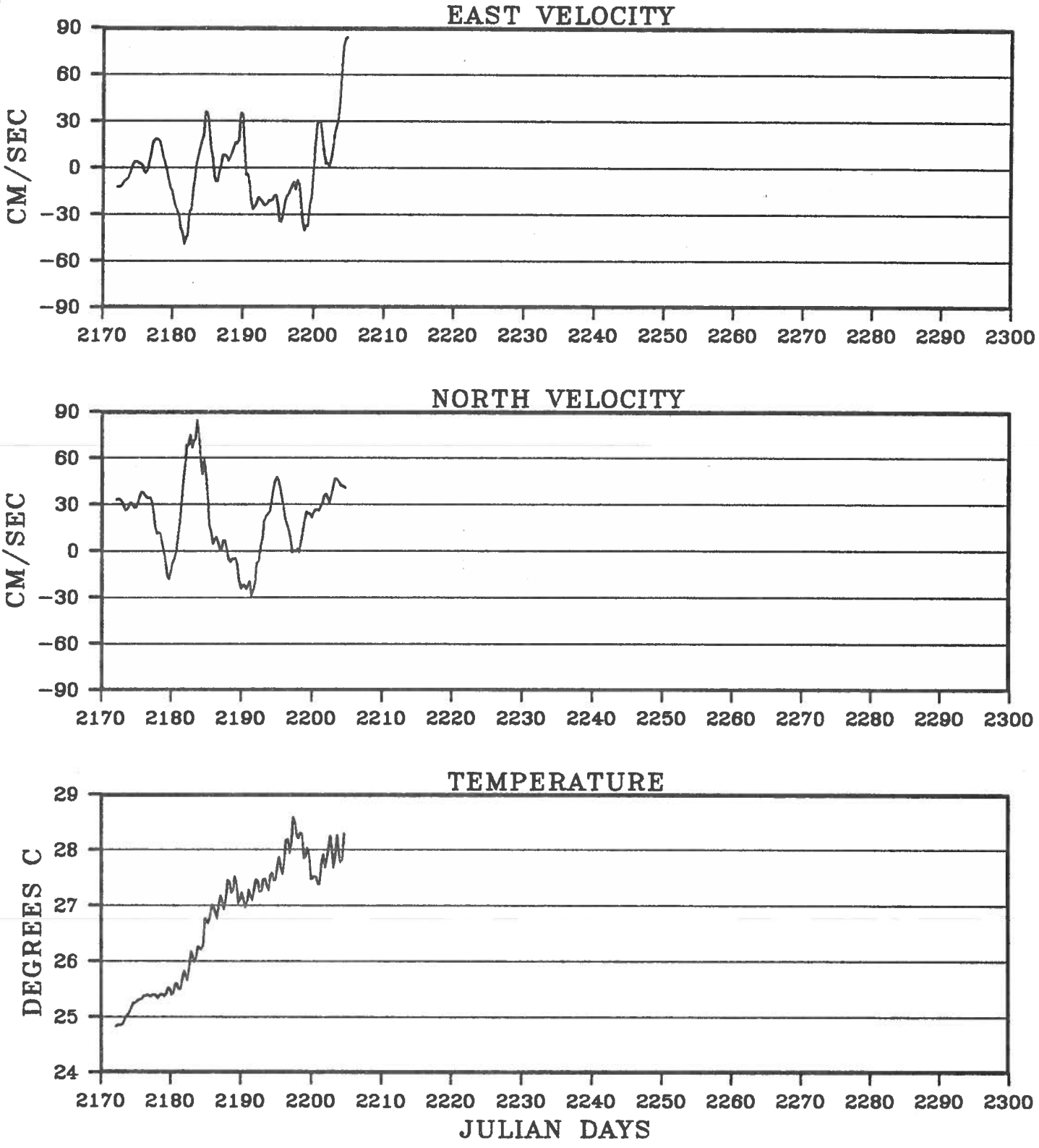
15 10 5 0 -5 -10 -15 -20 -25 -30
2202
2172

BUOY 2089


EAST VELOCITY
CM/SEC
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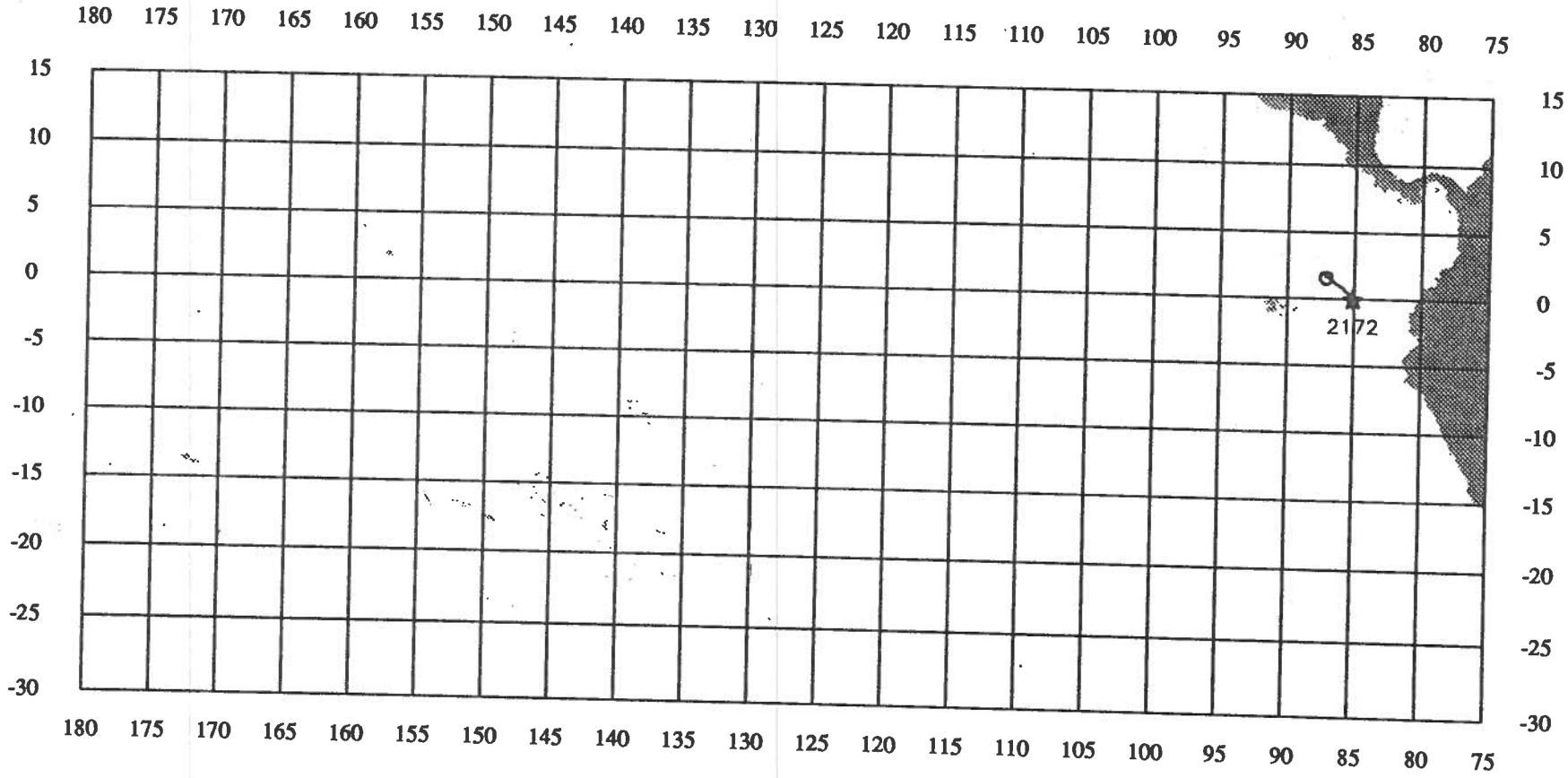
60
30
0
-30
-60
-90
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
NORTH VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
TEMPERATURE
DEGREES C
29
28
27
26
25
24
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
JULIAN DAYS

BUOY 2090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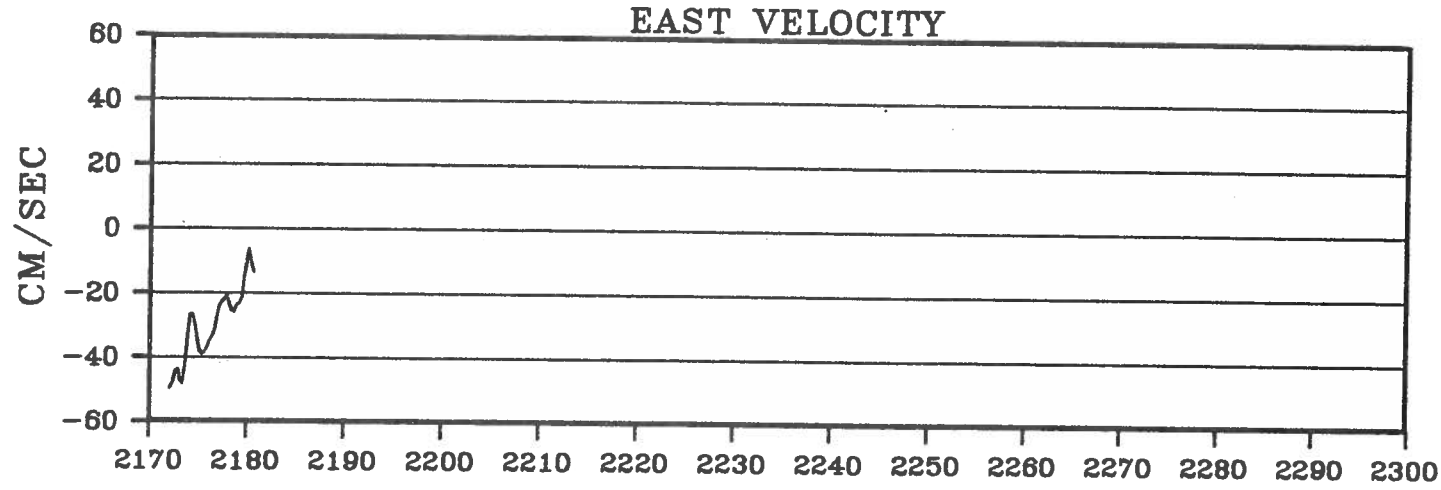
BUOY 2090


EAST VELOCITY
CM/SEC
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20
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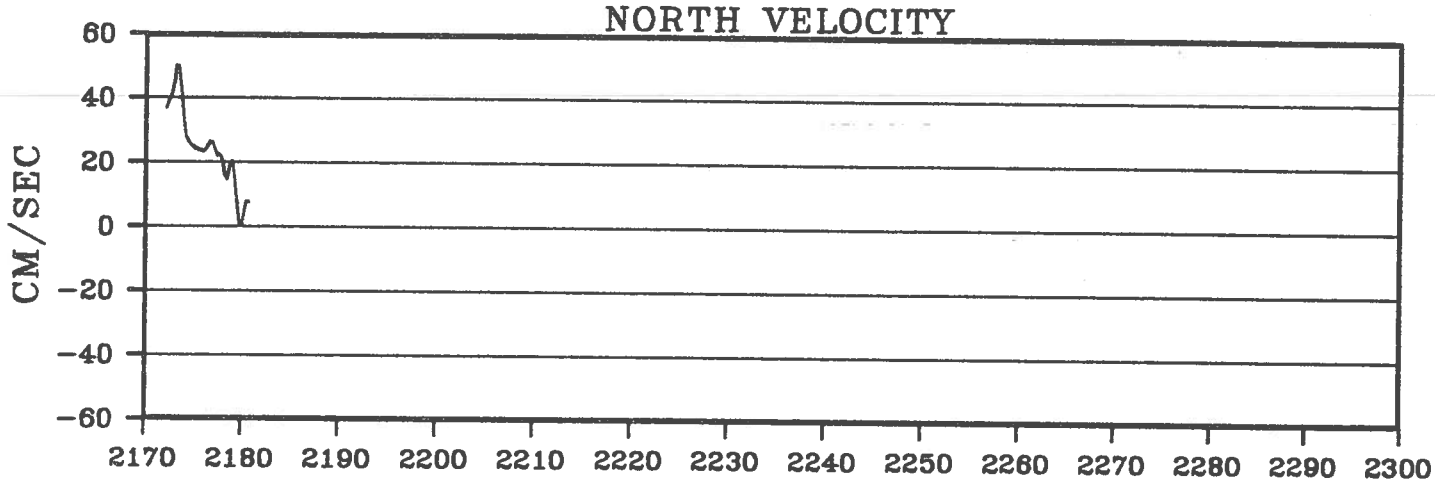
-20
-40
-60
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300


NORTH VELOCITY
CM/SEC
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40
20
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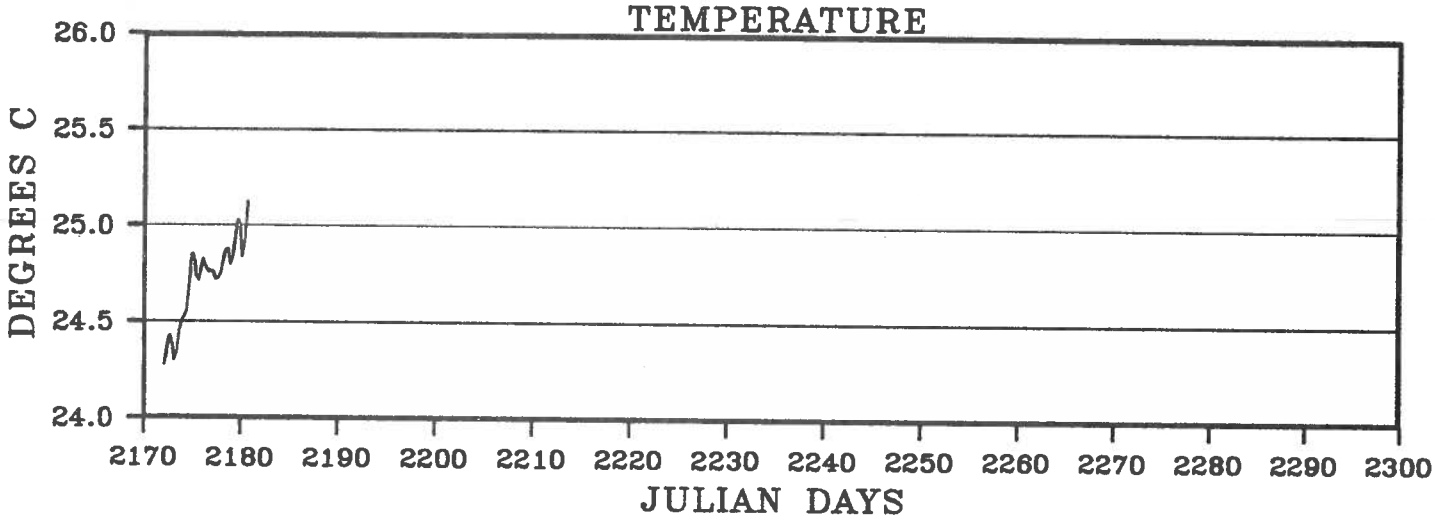
-20
-40
-60
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300


TEMPERATURE
DEGREES C
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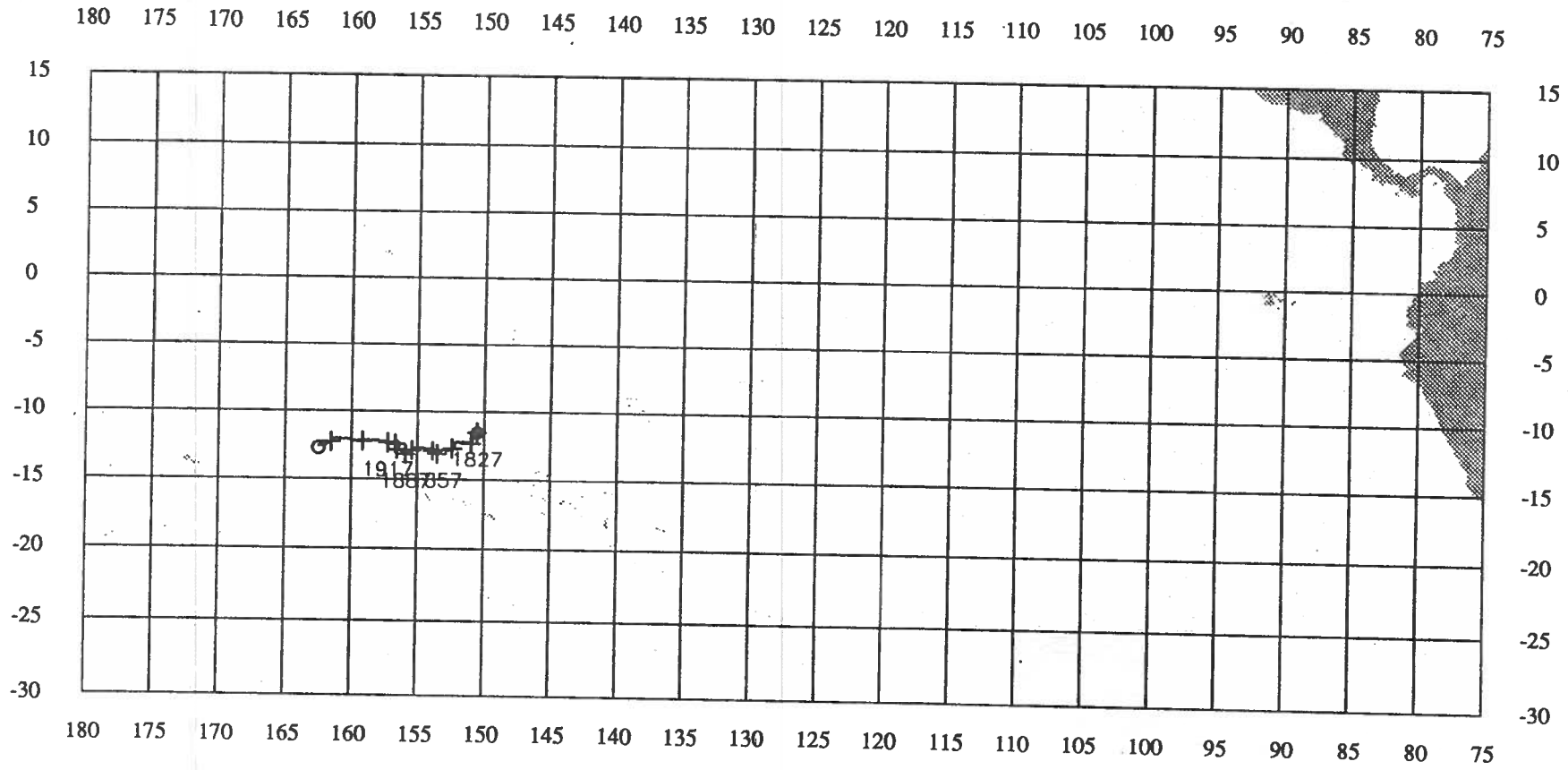
25.0
24.5
24.0
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
JULIAN DAYS

BUOY 2177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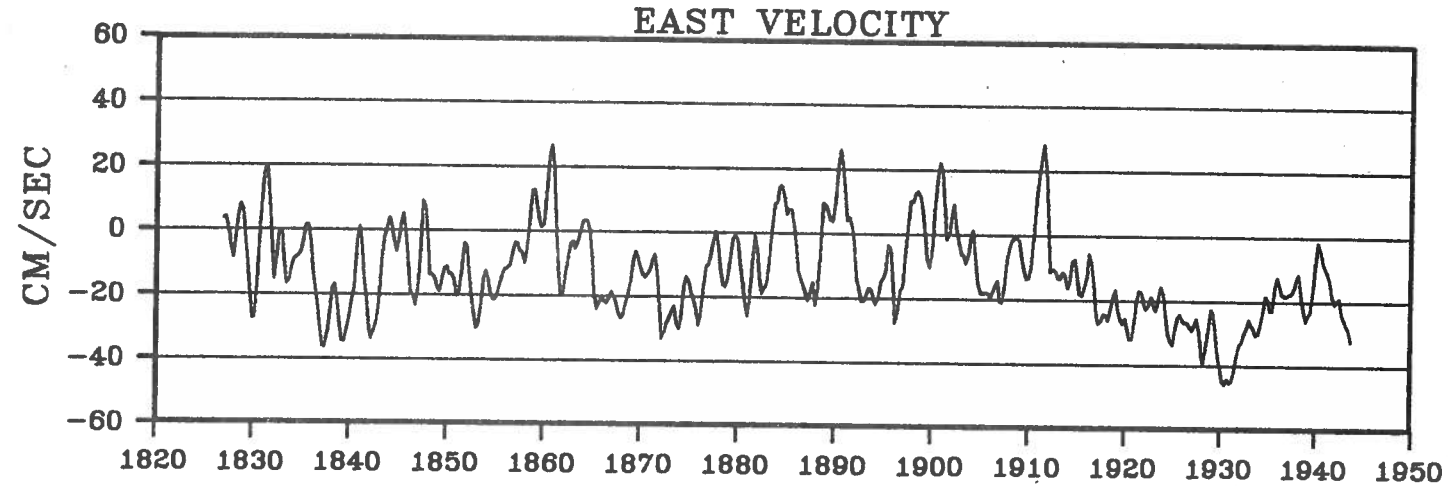
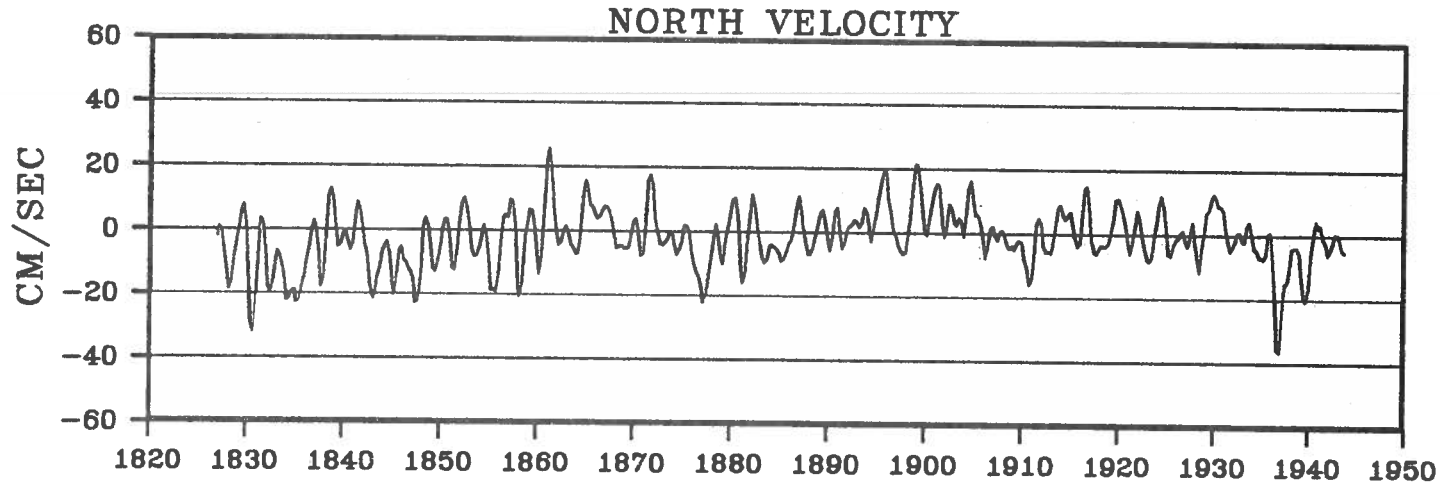
1827

BUOY 2177


EAST VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950


NORTH VELOCITY
CM/SEC
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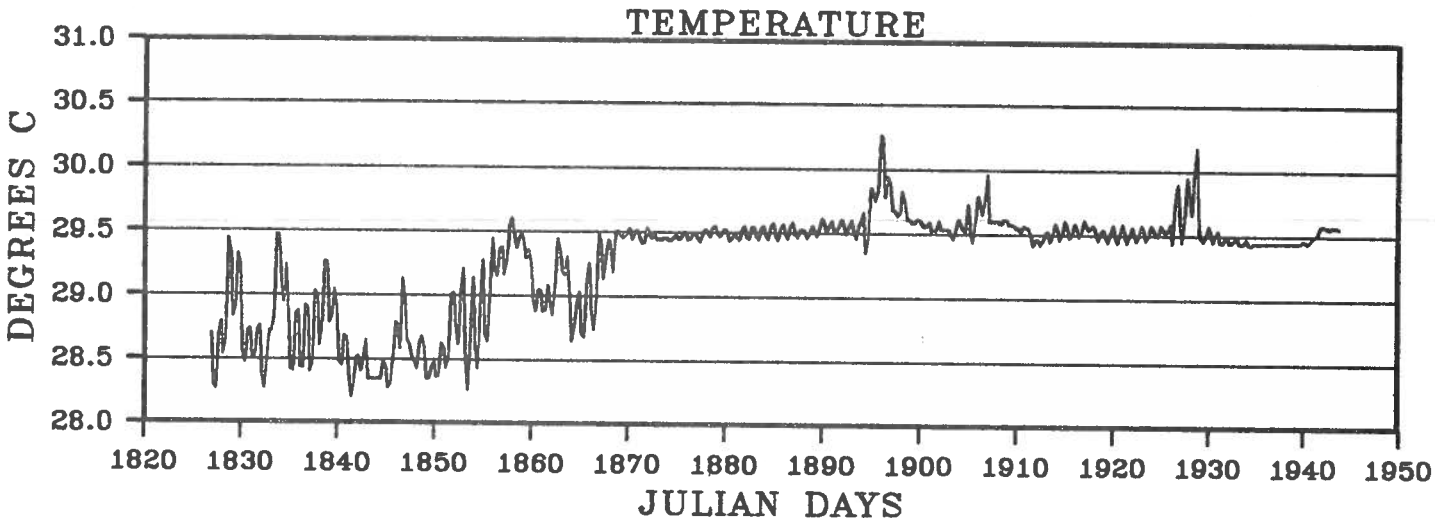
1890
1900
1910
1920
1930
1940
1950


TEMPERATURE
DEGREES C
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30.0
29.5
29.0
28.5
28.0
1820
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1860
1870
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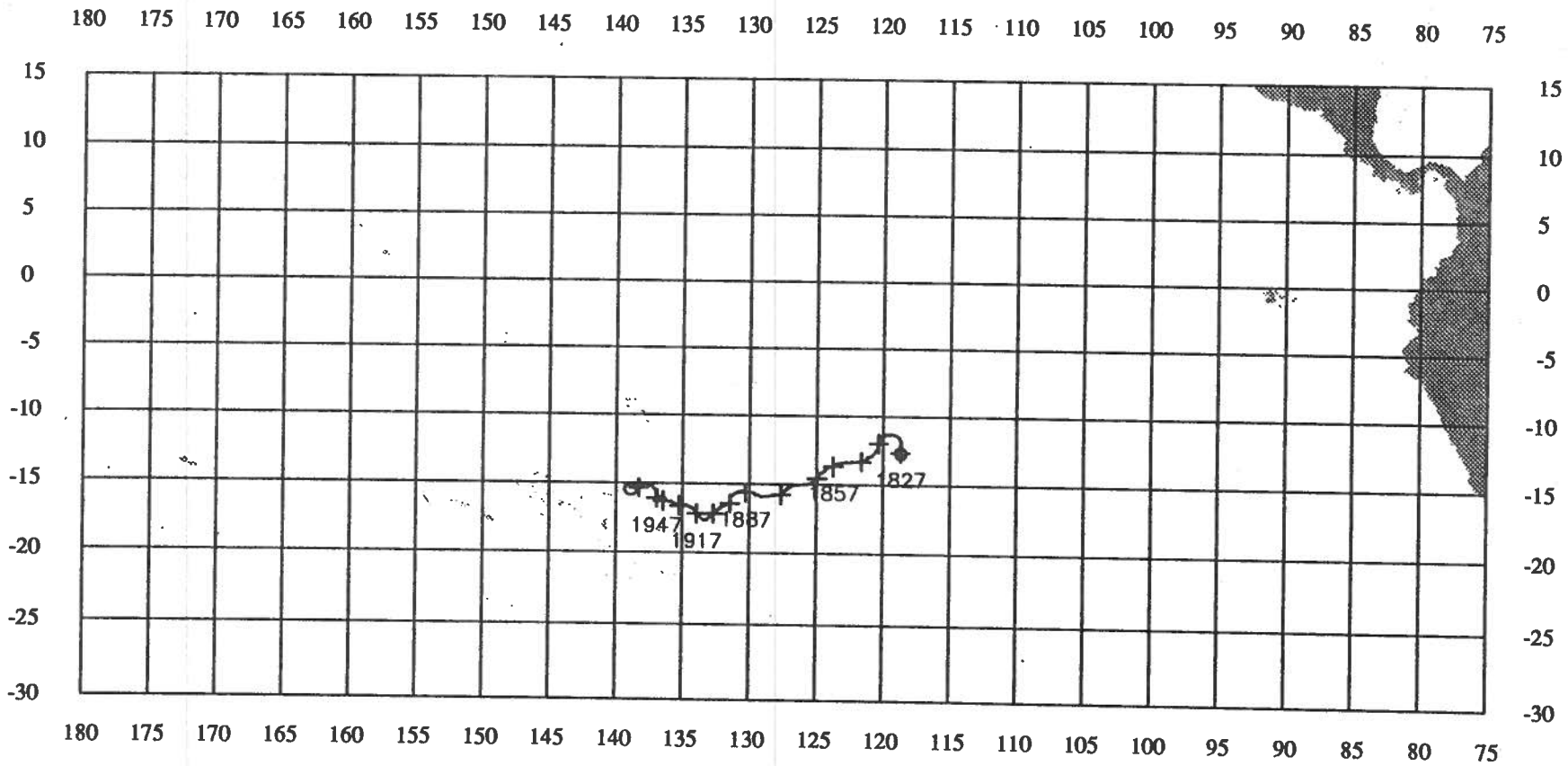
1890
1900
1910
1920
1930
1940
1950
JULIAN DAYS

BUOY 2180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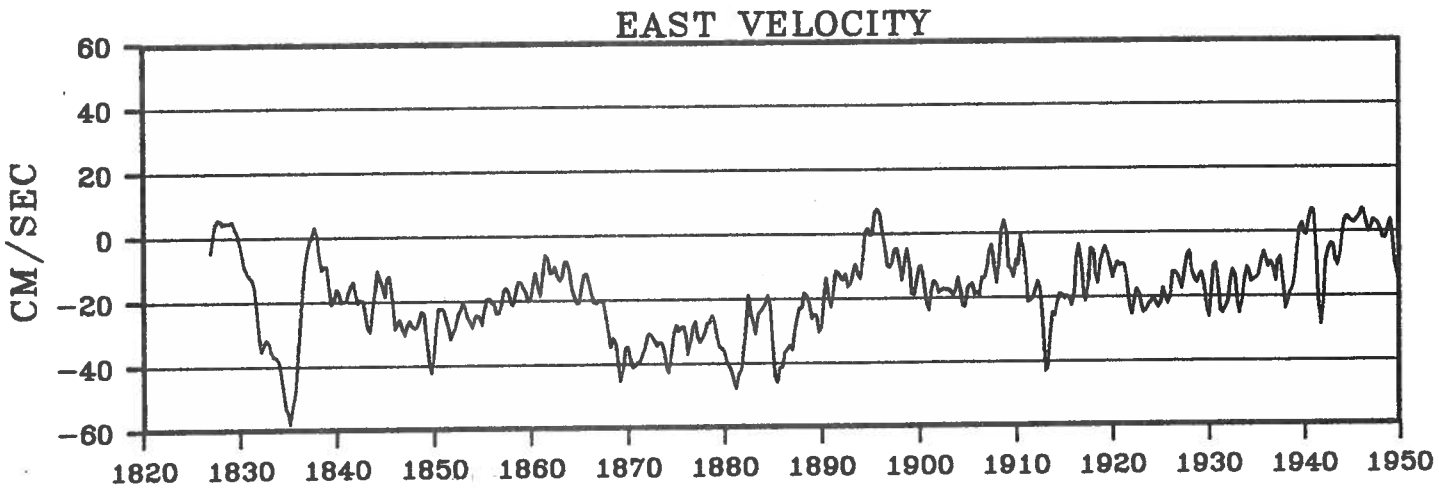
1947
1917
1887
1857
1827

BUOY 2180


EAST VELOCITY
CM/SEC
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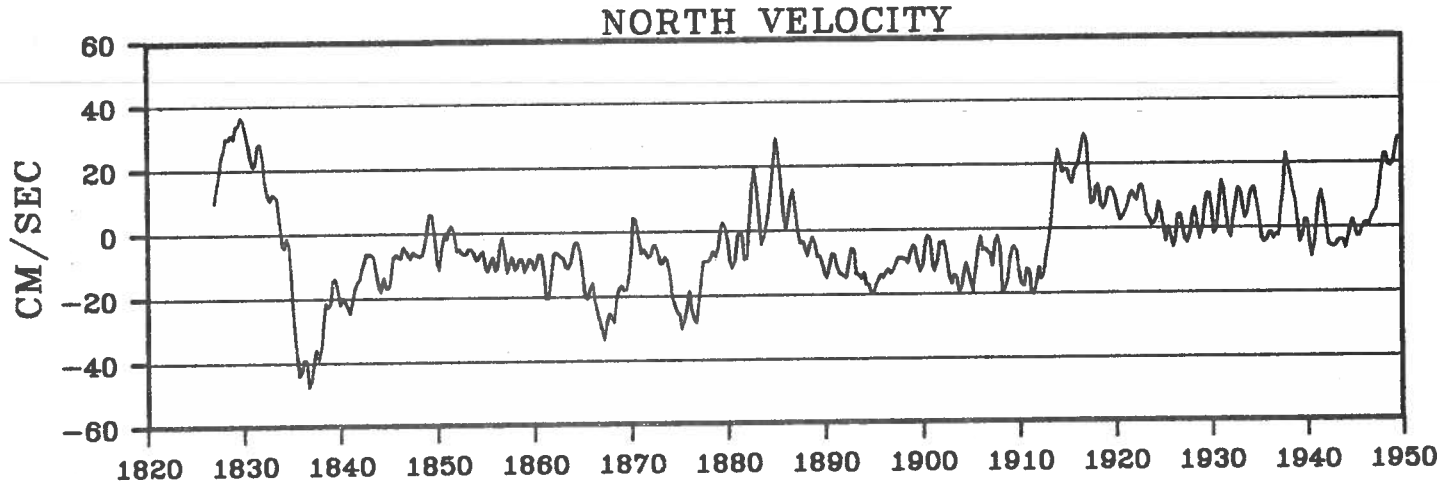
40
20
0
-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


NORTH VELOCITY
CM/SEC
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-40
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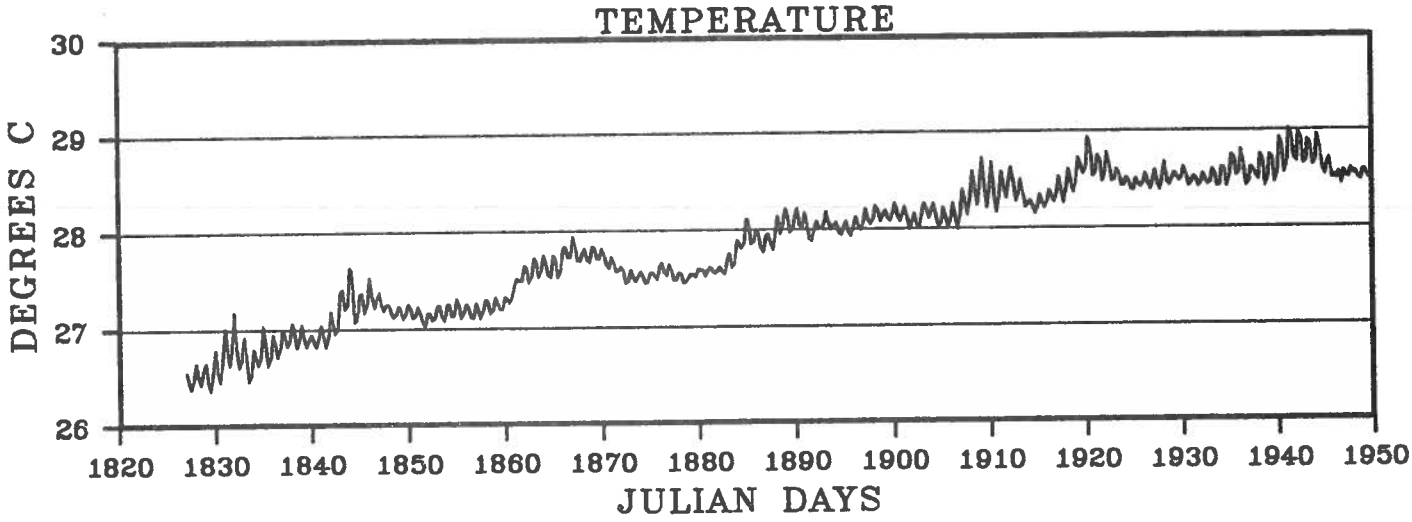
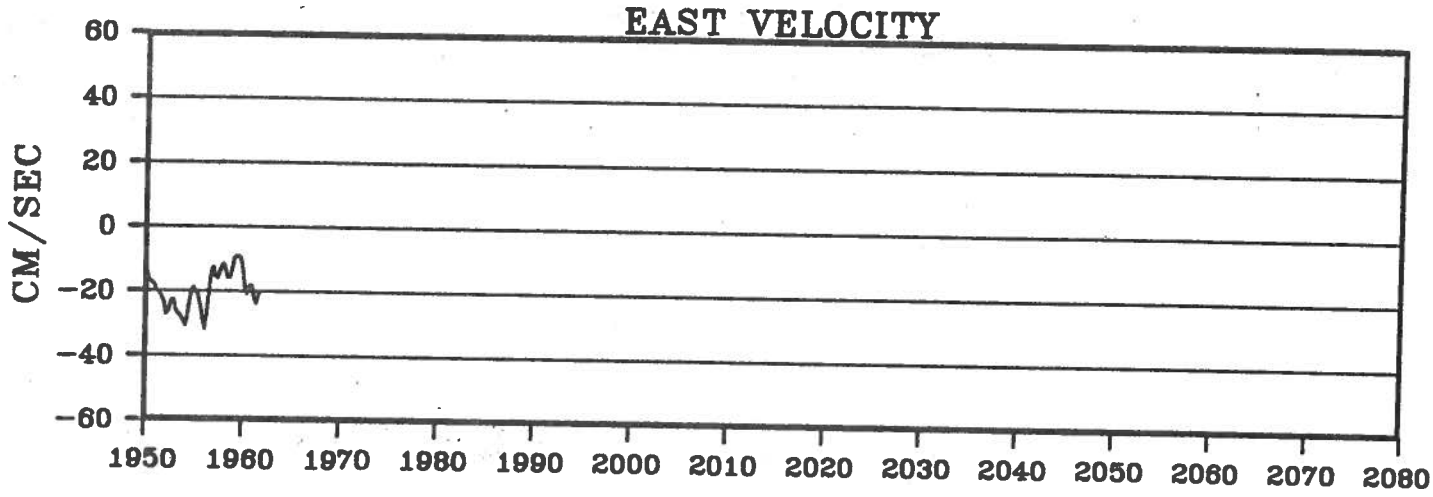
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


TEMPERATURE
DEGREES C
30
29
28
27
26
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 2180


EAST VELOCITY
CM/SEC
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20
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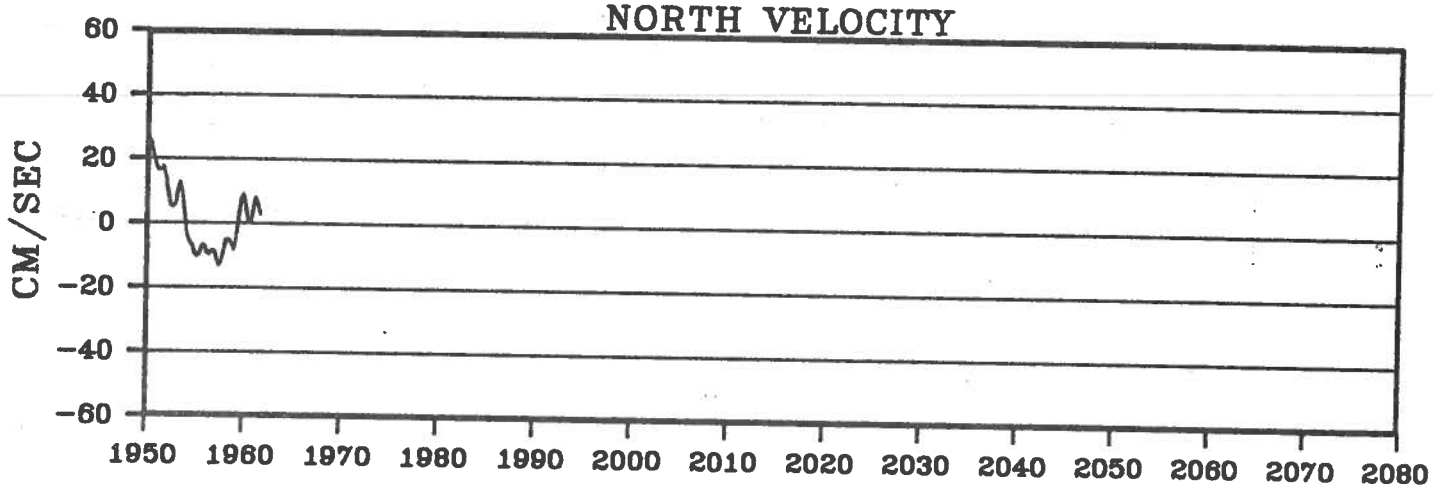
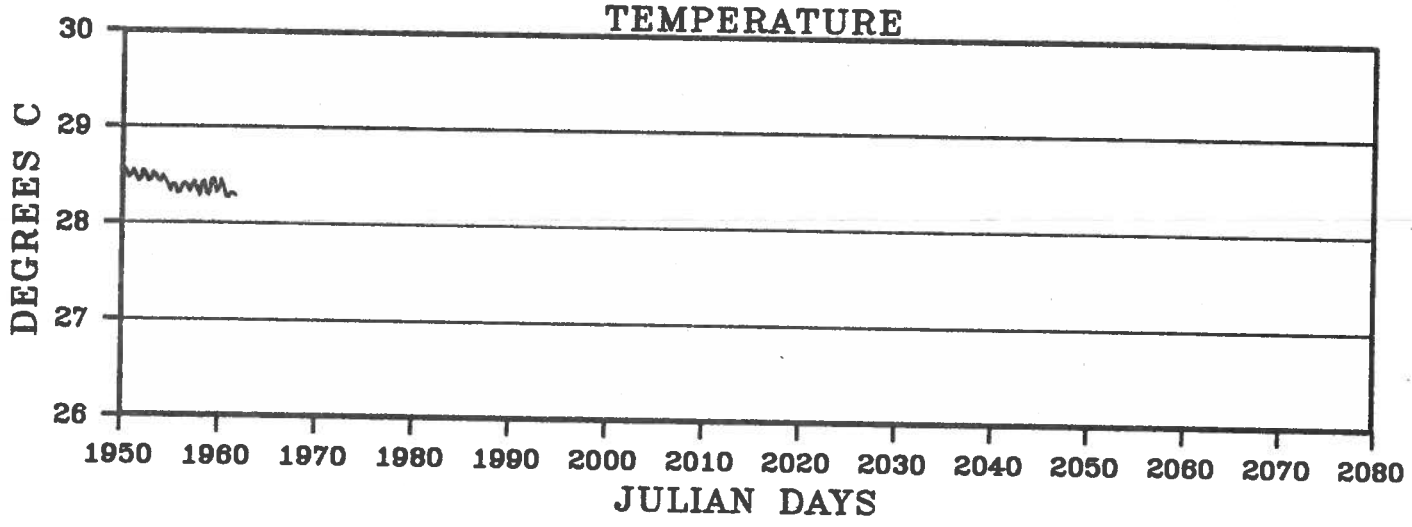
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


TEMPERATURE
DEGREES C
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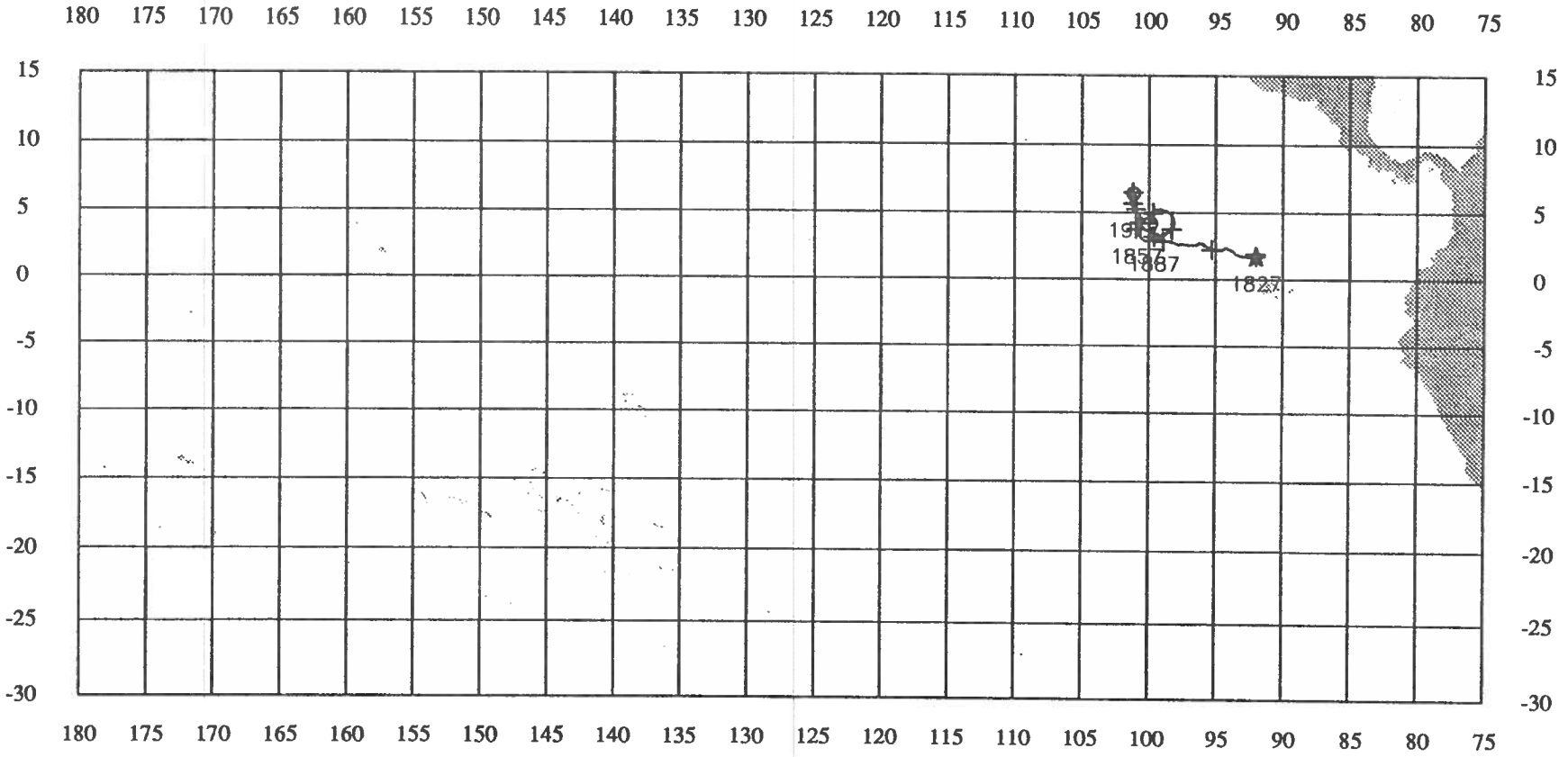
29
28
27
26
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 2184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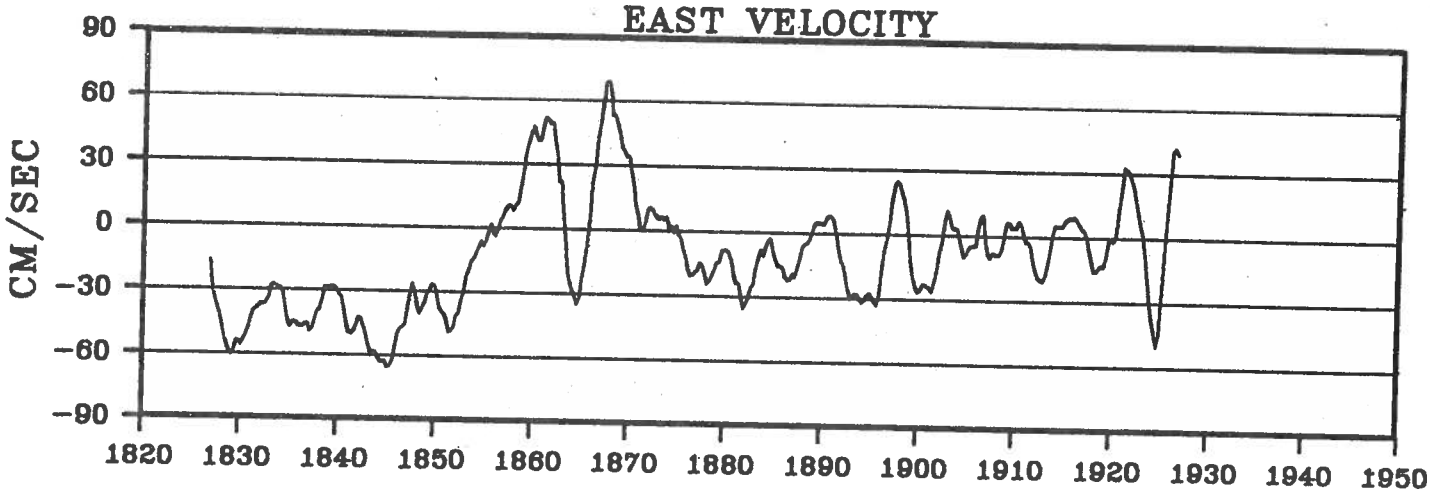
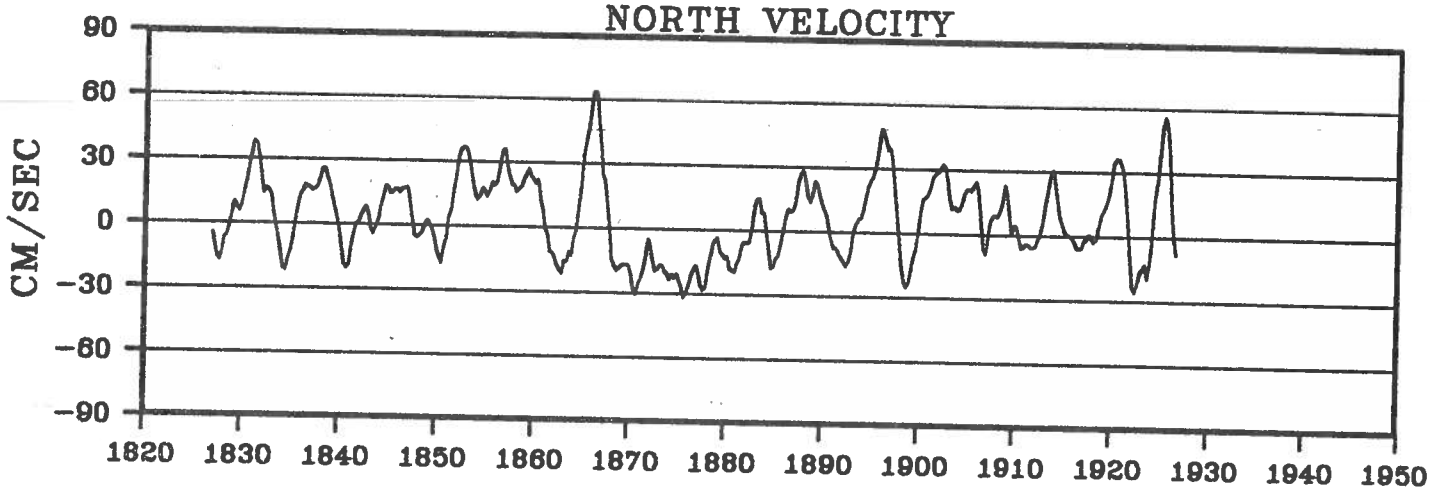
15 10 5 0 -5 -10 -15 -20 -25 -30
1857
1827

BUOY 2184


EAST VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950


NORTH VELOCITY
CM/SEC
90
60
30
0
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-60
-90
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1830
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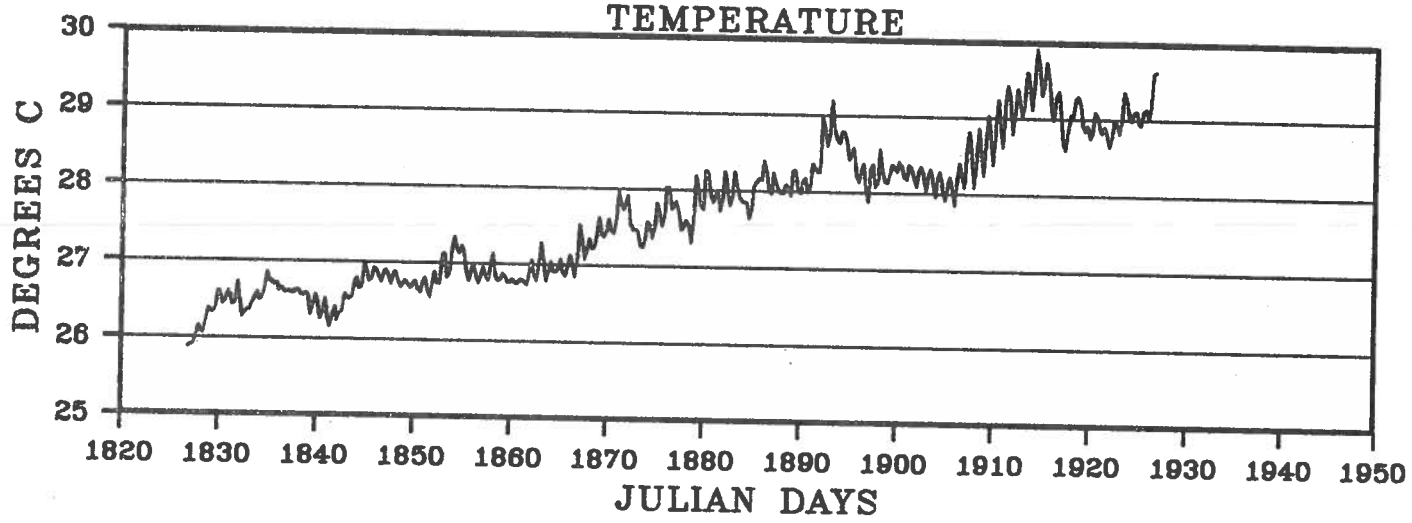
1870
1880
1890
1900
1910
1920
1930
1940
1950


TEMPERATURE
DEGREES C
30
29
28
27
26
25
1820
1830
1840
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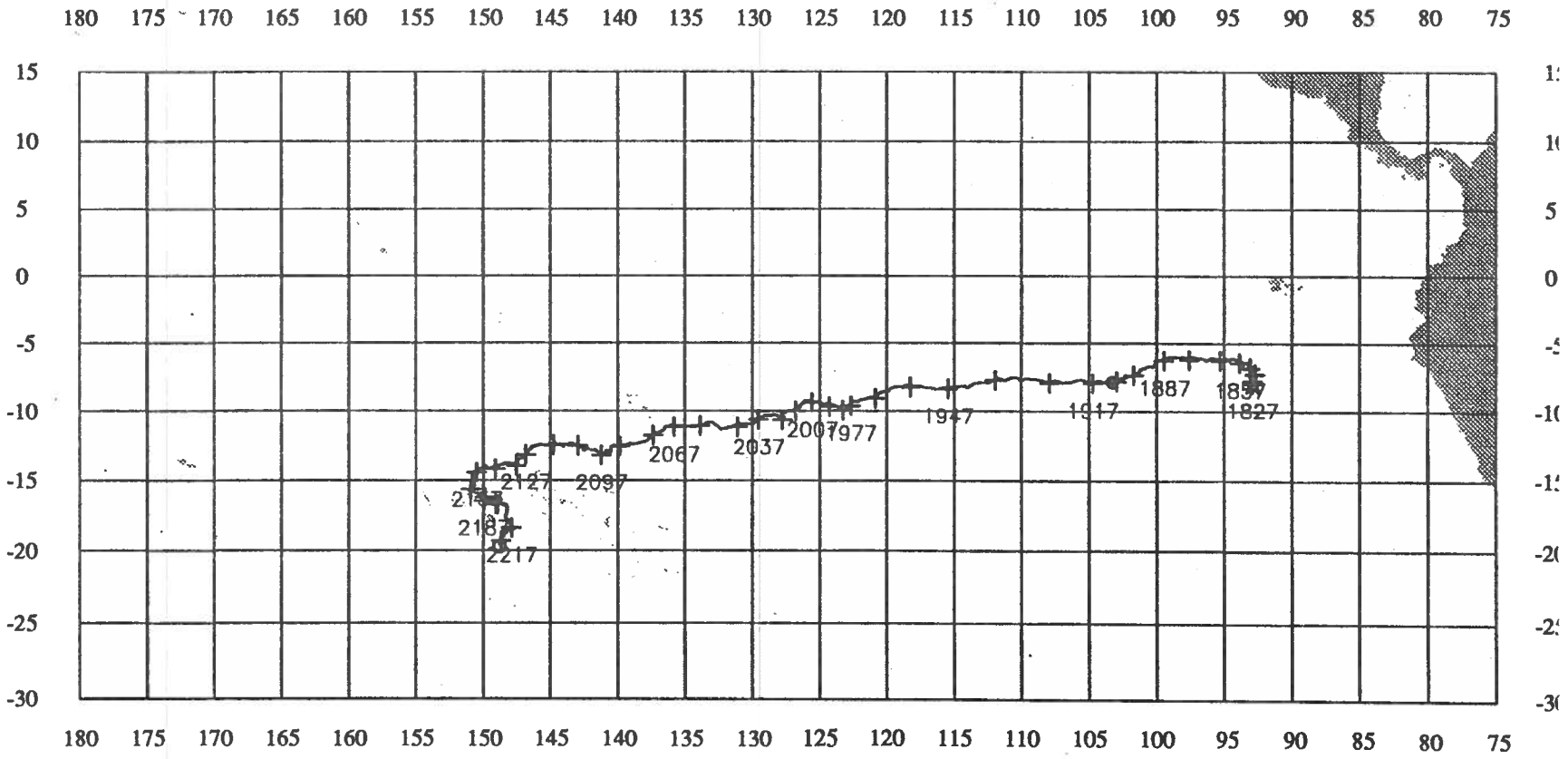
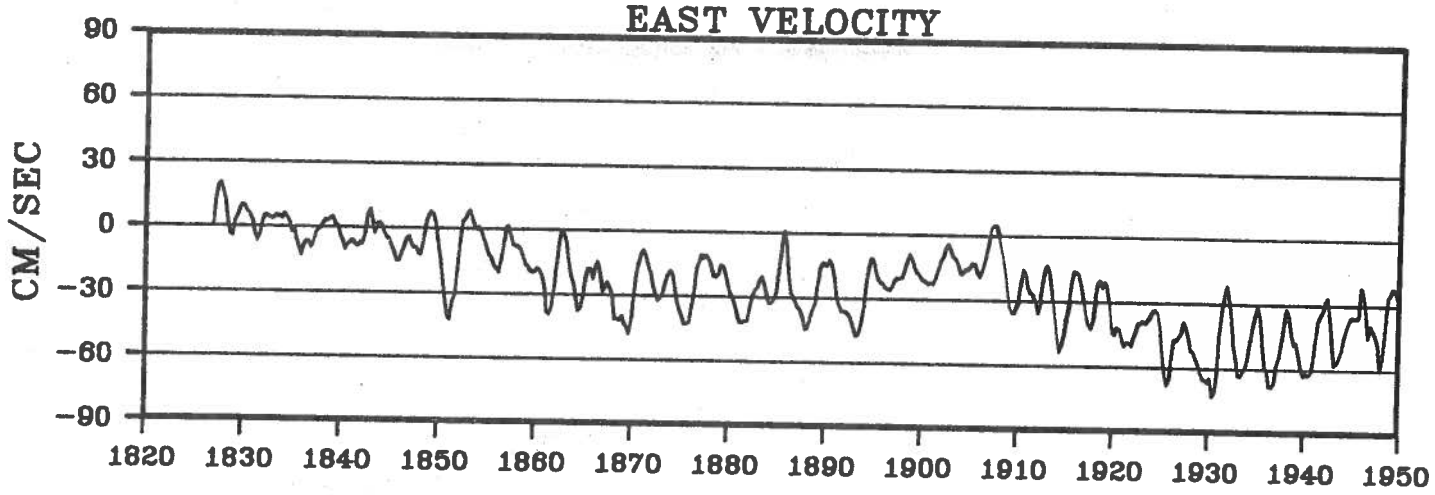
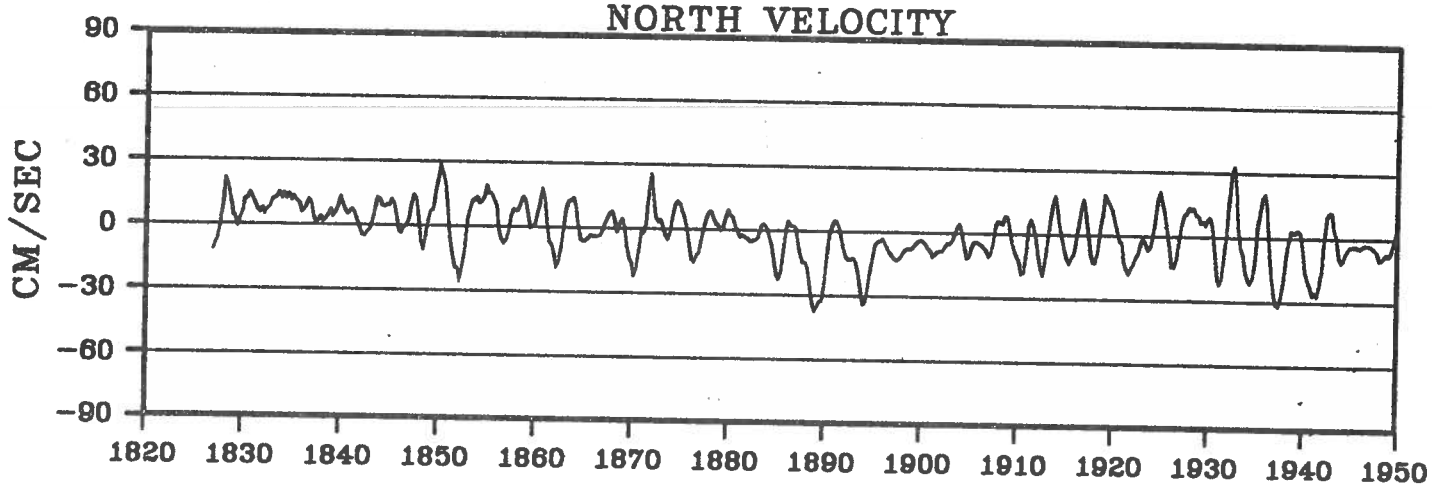
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
JULIAN DAYS

BUOY 2185


180 175 170 165 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75
15 10 5 0 -5 -10 -15 -20 -25 -30
2127
2097
2187
2217
2067
2037
2007
1977
1947
1917
1887
1857
1827

BUOY 2185


EAST VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950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CM/SEC
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-60
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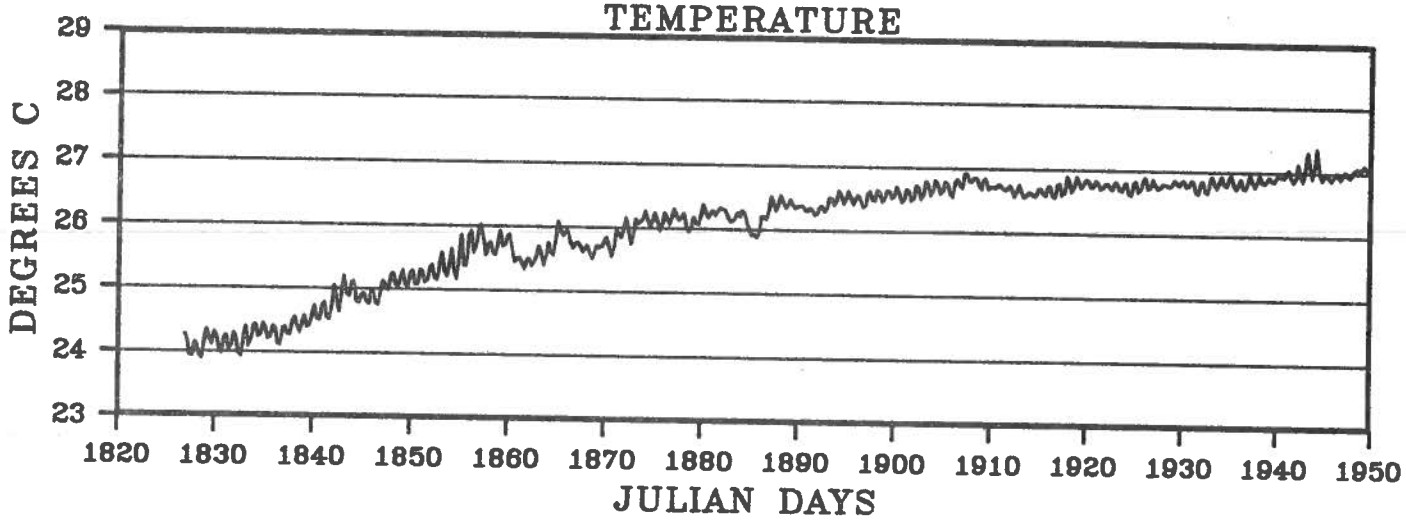
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


TEMPERATURE
DEGREES C
29
28
27
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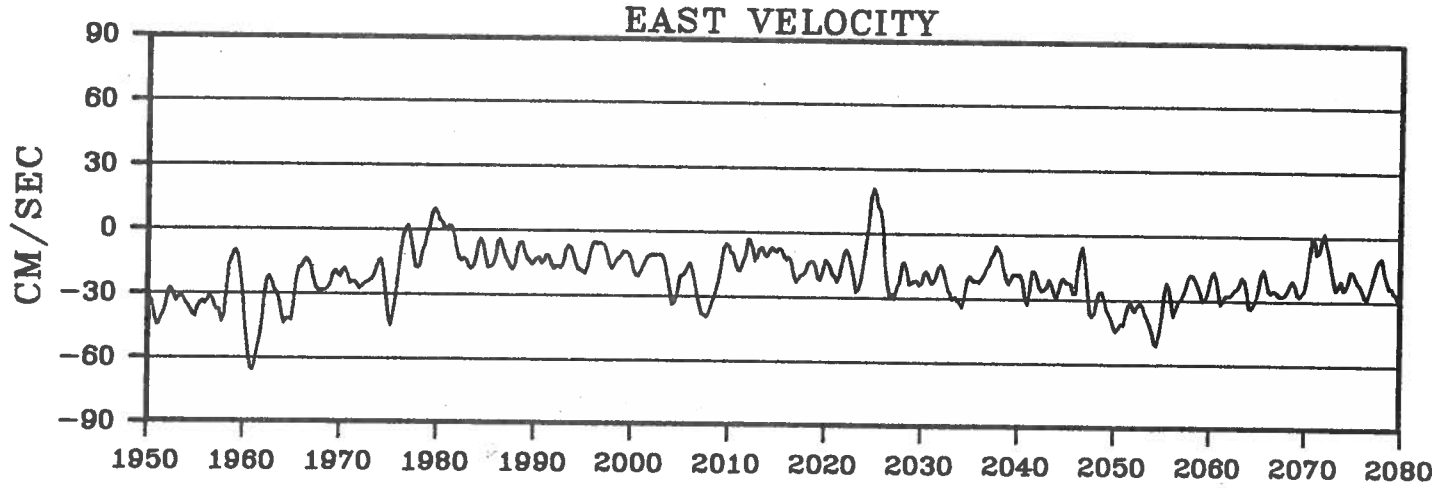
23
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 2185


EAST VELOCITY
CM/SEC
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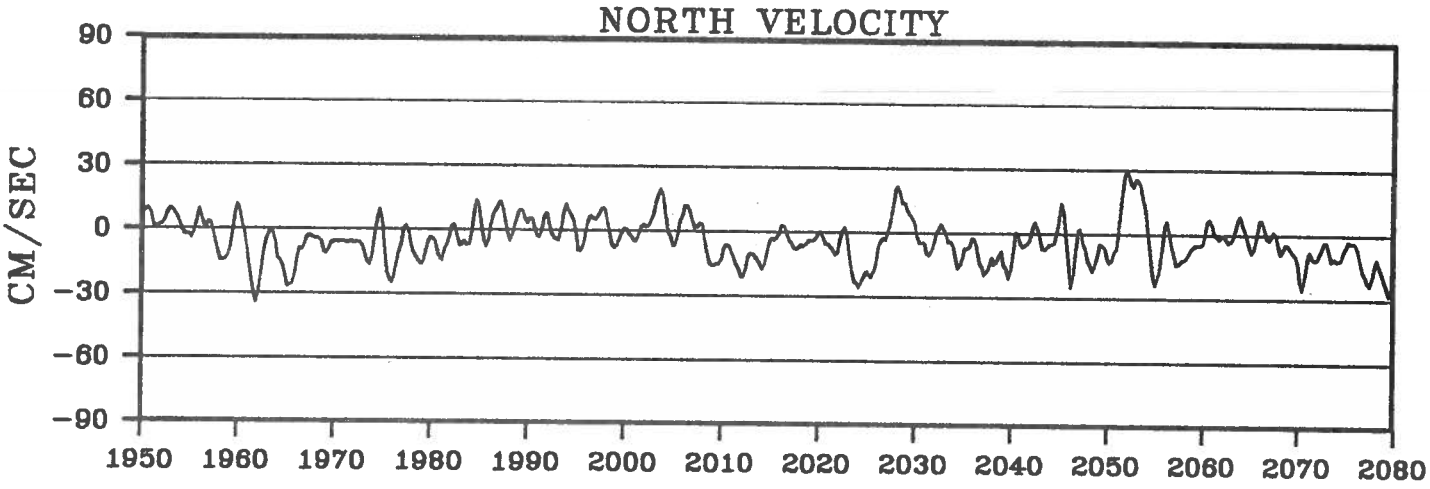
-30
-60
-90
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080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CM/SEC
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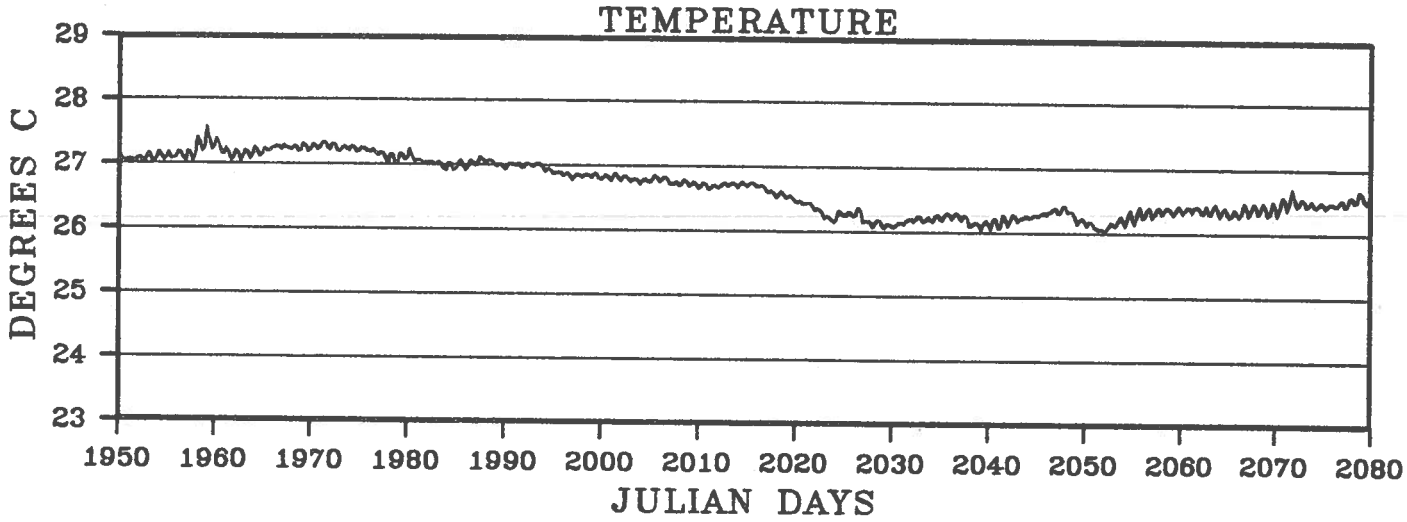
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


TEMPERATURE
DEGREES C
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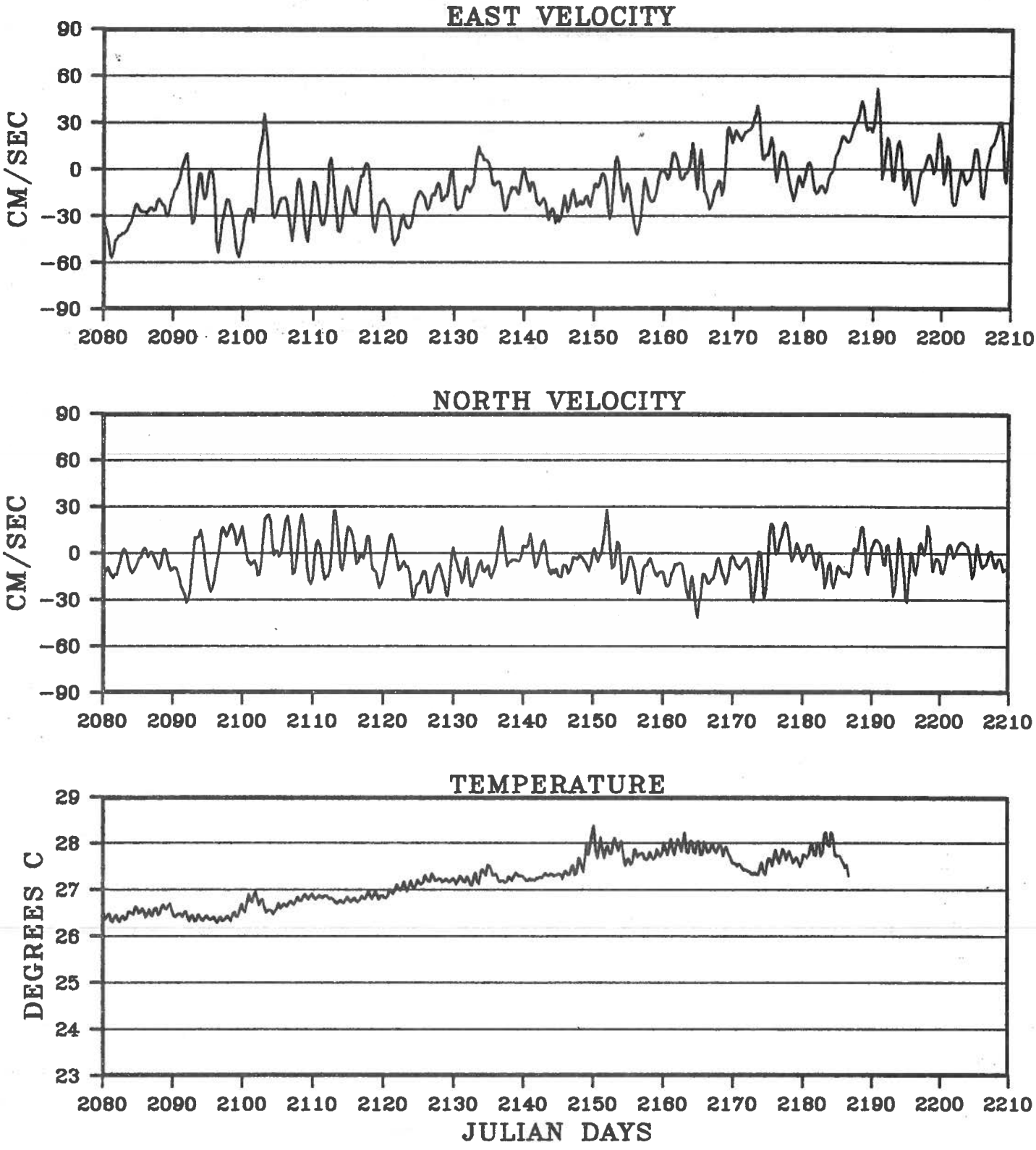
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 2185


EAST VELOCITY
CM/SEC
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-30
-60
-90
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
NORTH VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
TEMPERATURE
DEGREES C
29
28
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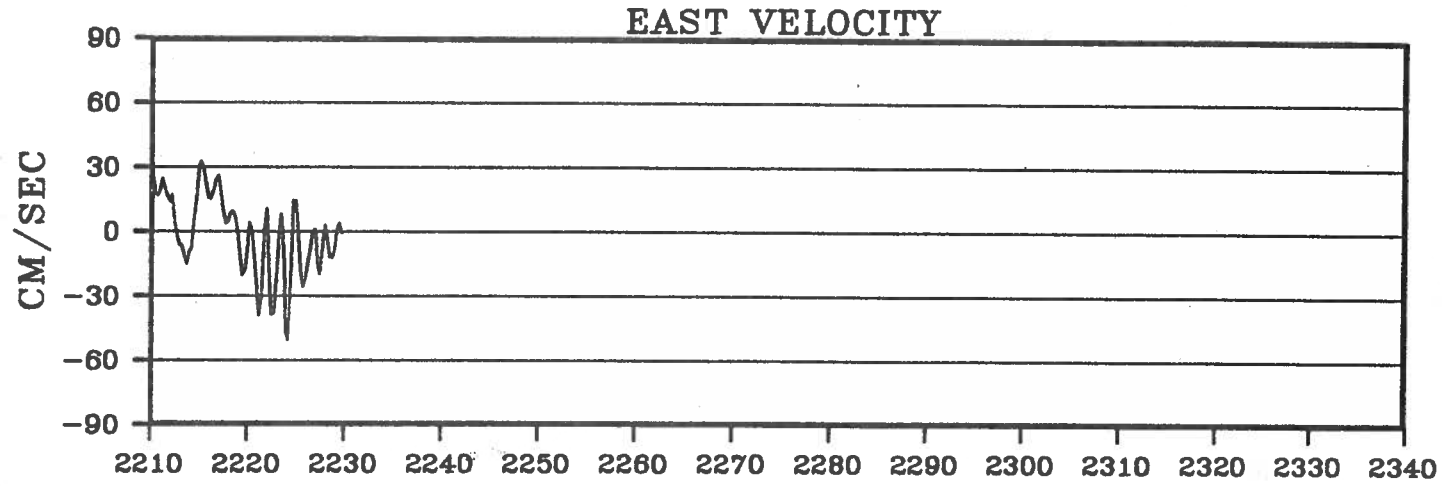
23
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
JULIAN DAYS

BUOY 2185


EAST VELOCITY
CM/SEC
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60
30
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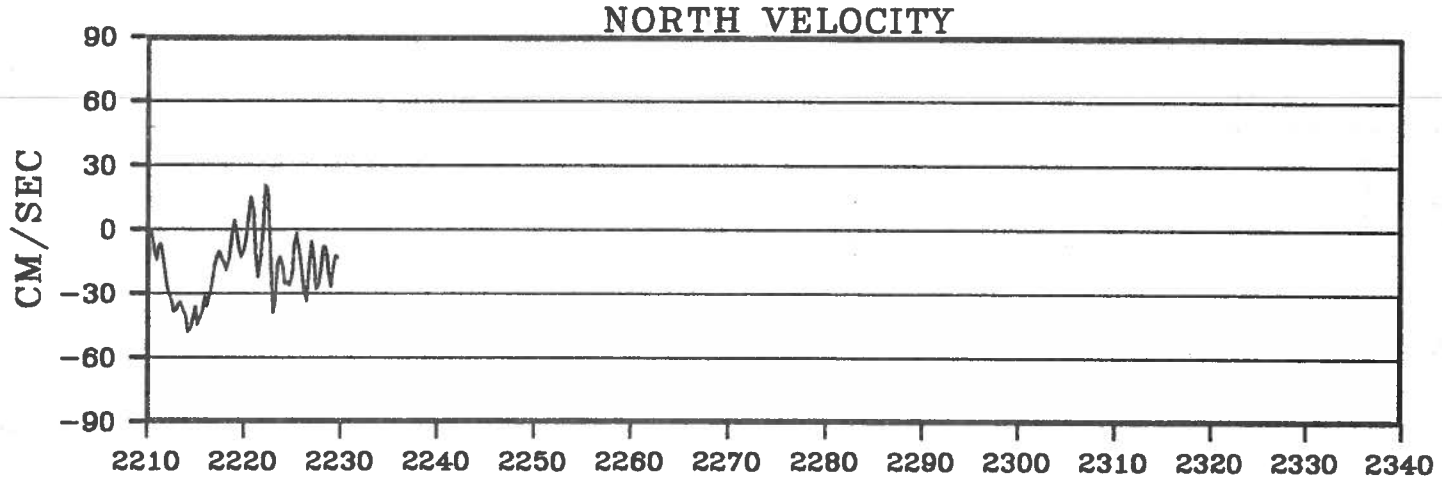
-30
-60
-90
2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340


NORTH VELOCITY
CM/SEC
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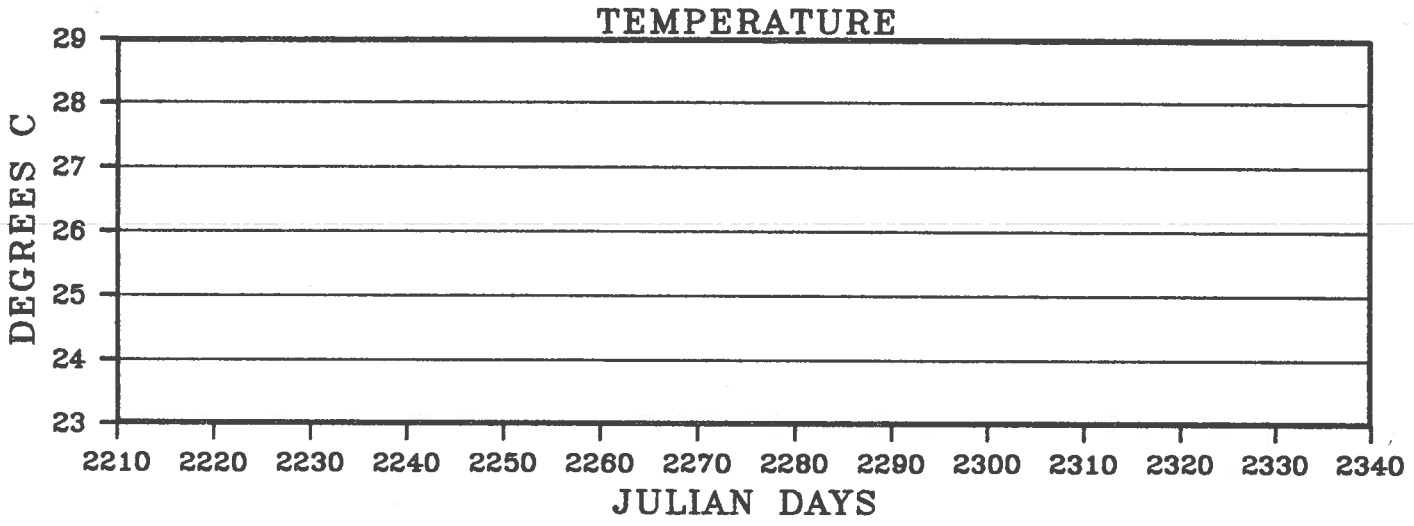
2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340


TEMPERATURE
DEGREES C
29
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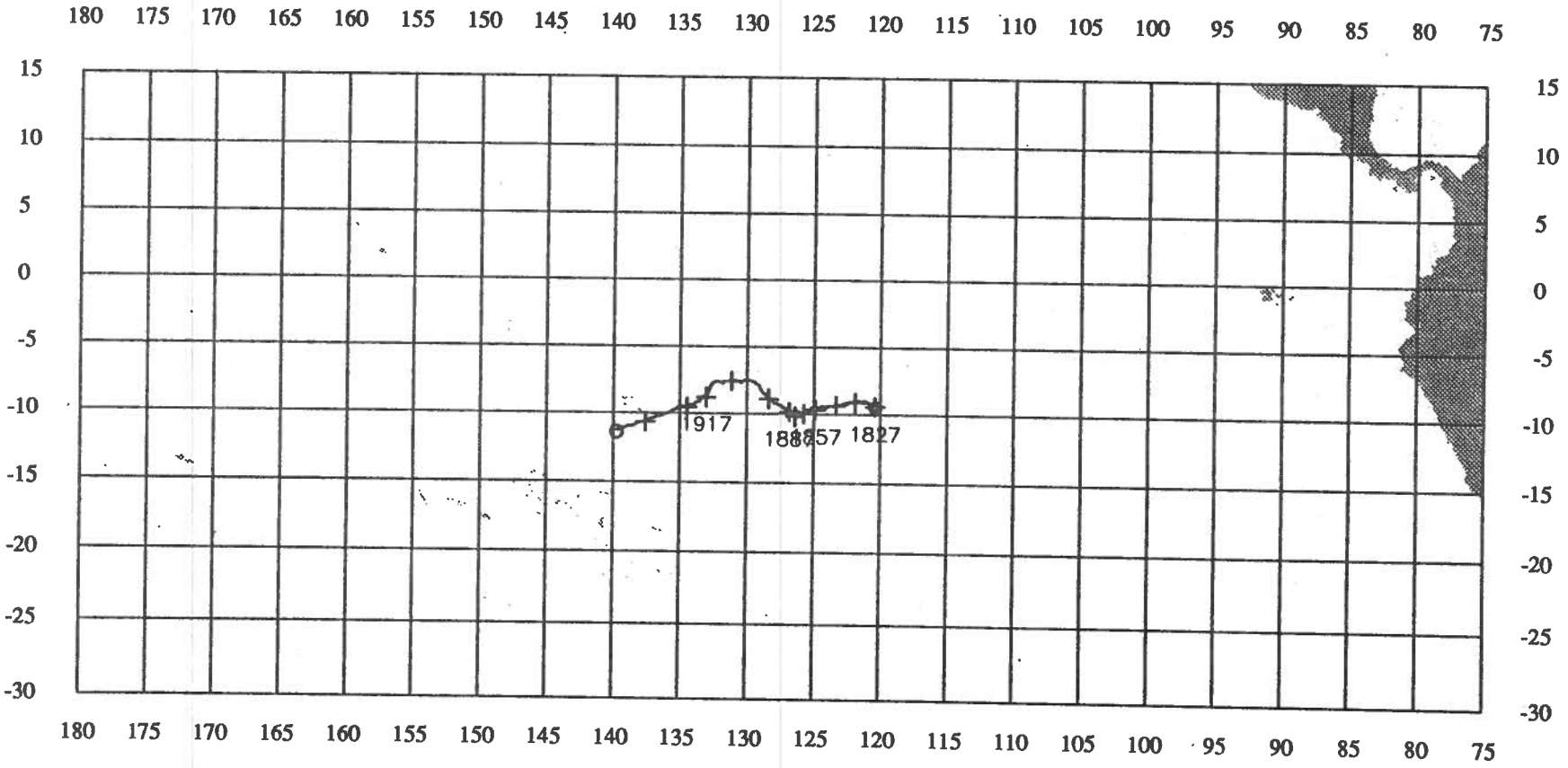
2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340
JULIAN DAYS

BUOY 2186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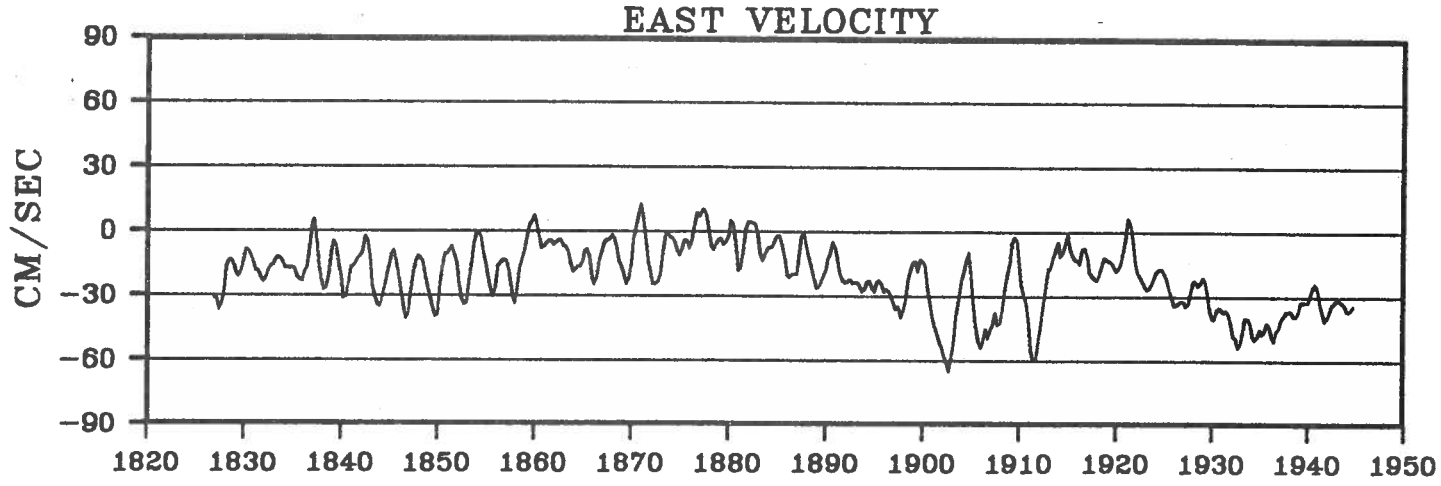
15 10 5 0 -5 -10 -15 -20 -25 -30
1917
1827

BUOY 2186


EAST VELOCITY
CM/SEC
90
60
30
0
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-60
-90
1820
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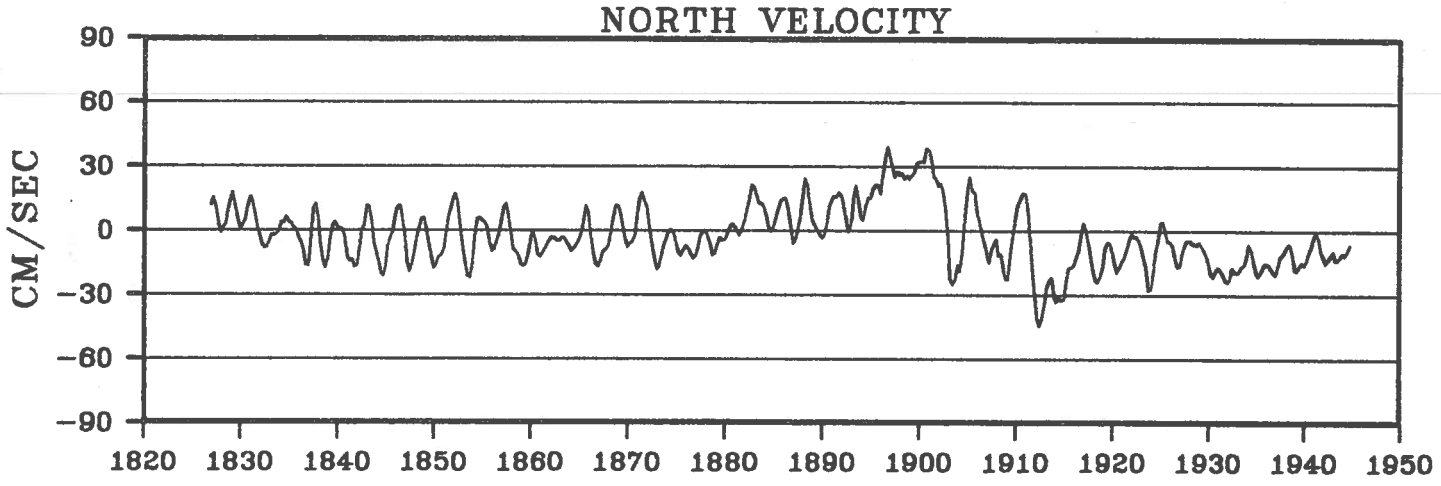
1870
1880
1890
1900
1910
1920
1930
1940
1950


NORTH VELOCITY
CM/SEC
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1910
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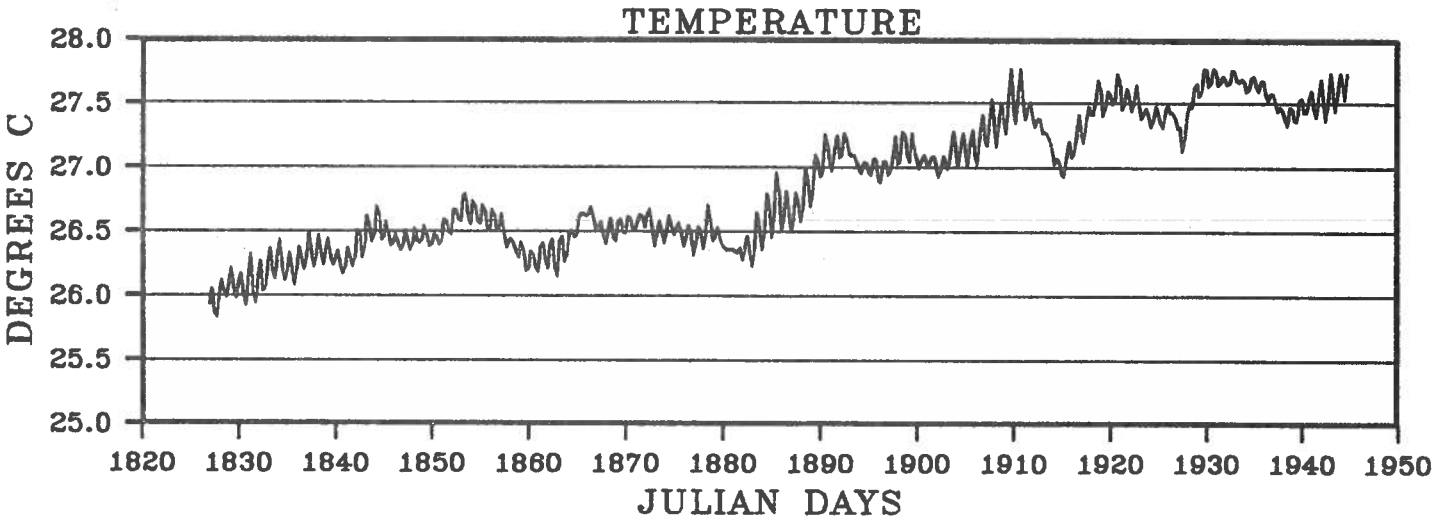
1930
1940
1950


TEMPERATURE
DEGREES C
28.0
27.5
27.0
26.5
26.0
25.5
25.0
1820
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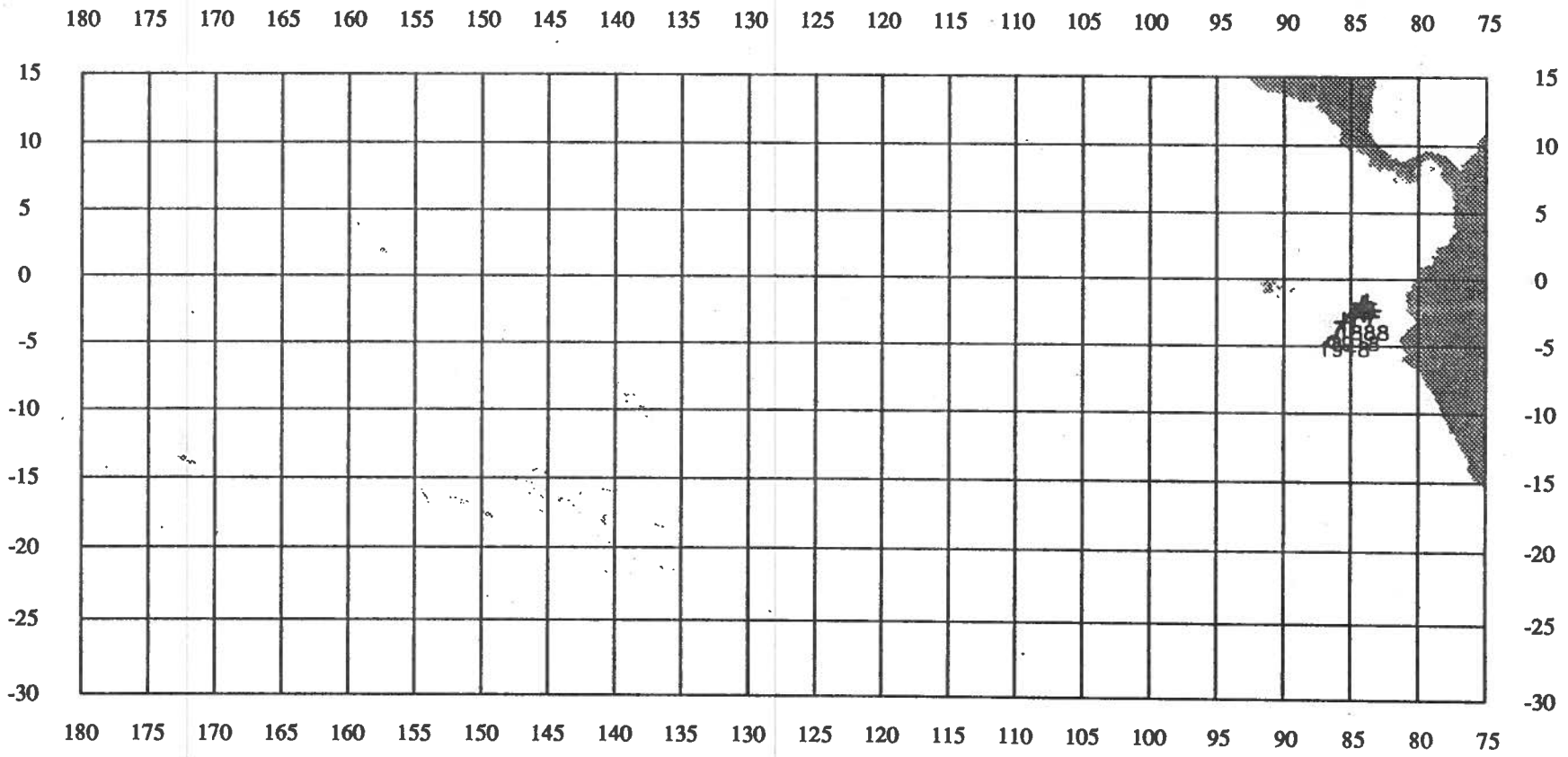
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
JULIAN DAYS

BUOY 2189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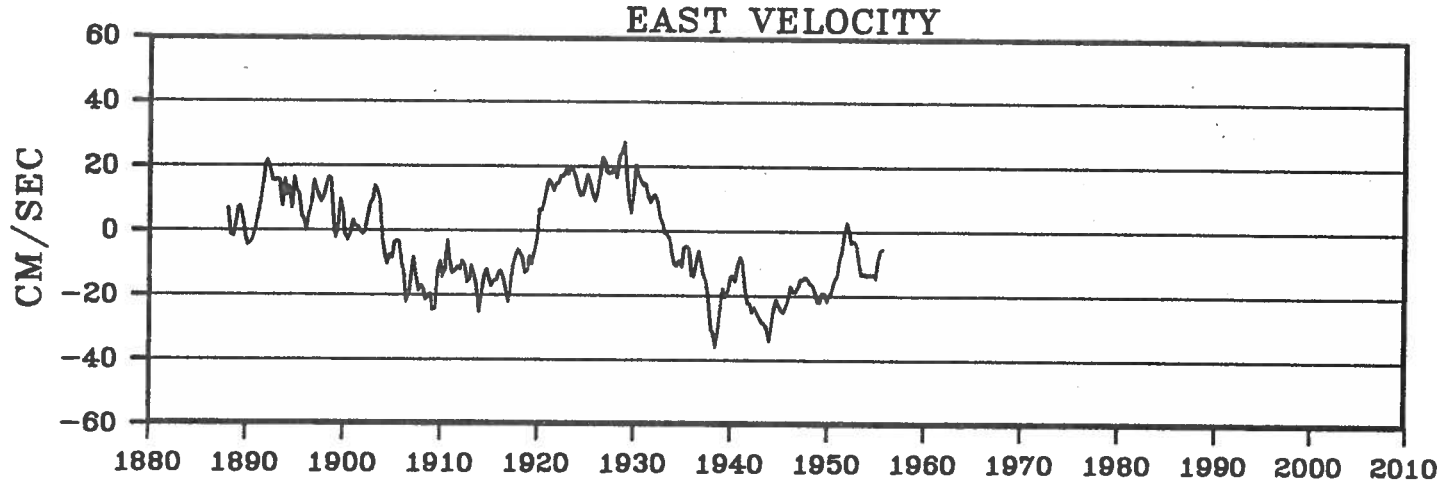
BUOY 2189


EAST VELOCITY
CM/SEC
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40
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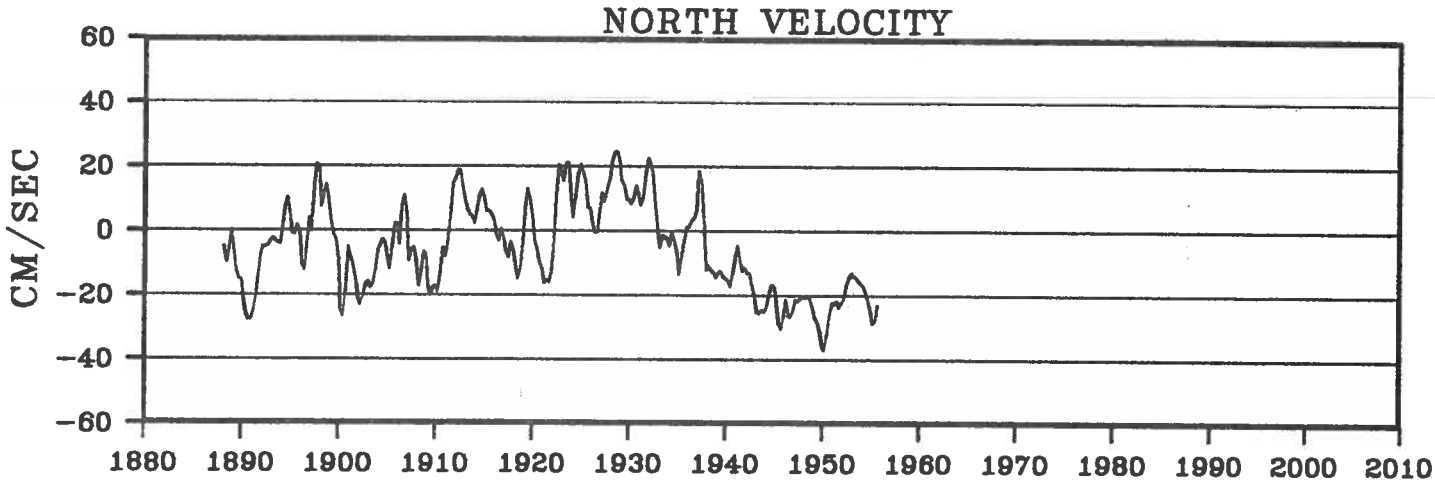
-20
-40
-60
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010


NORTH VELOCITY
CM/SEC
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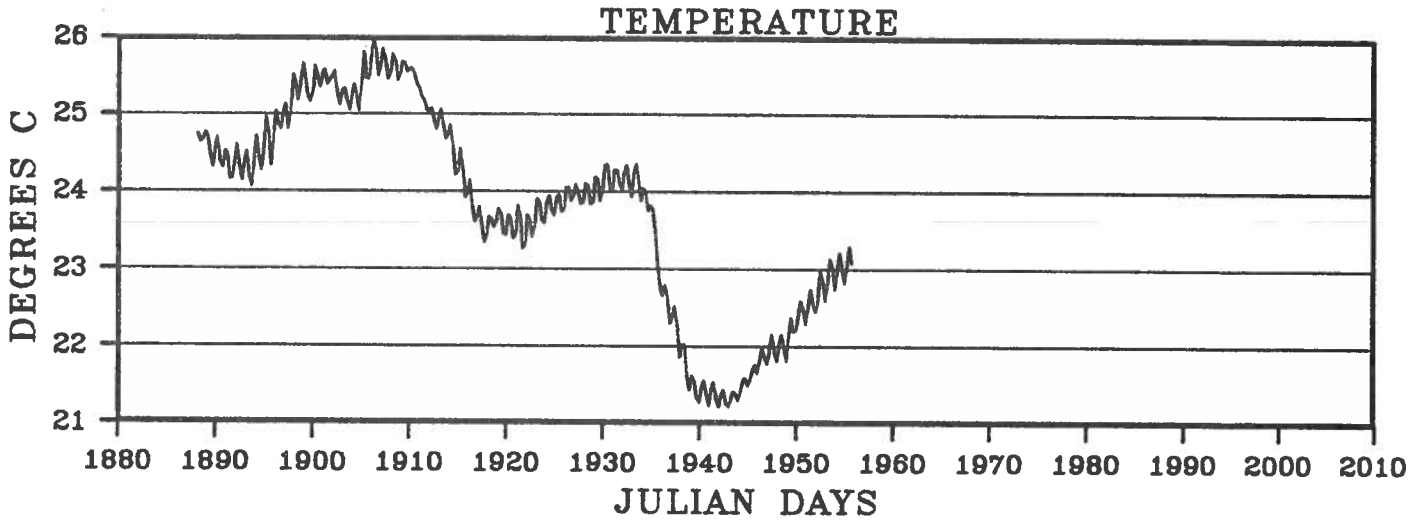
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010


TEMPERATURE
DEGREES C
26
25
24
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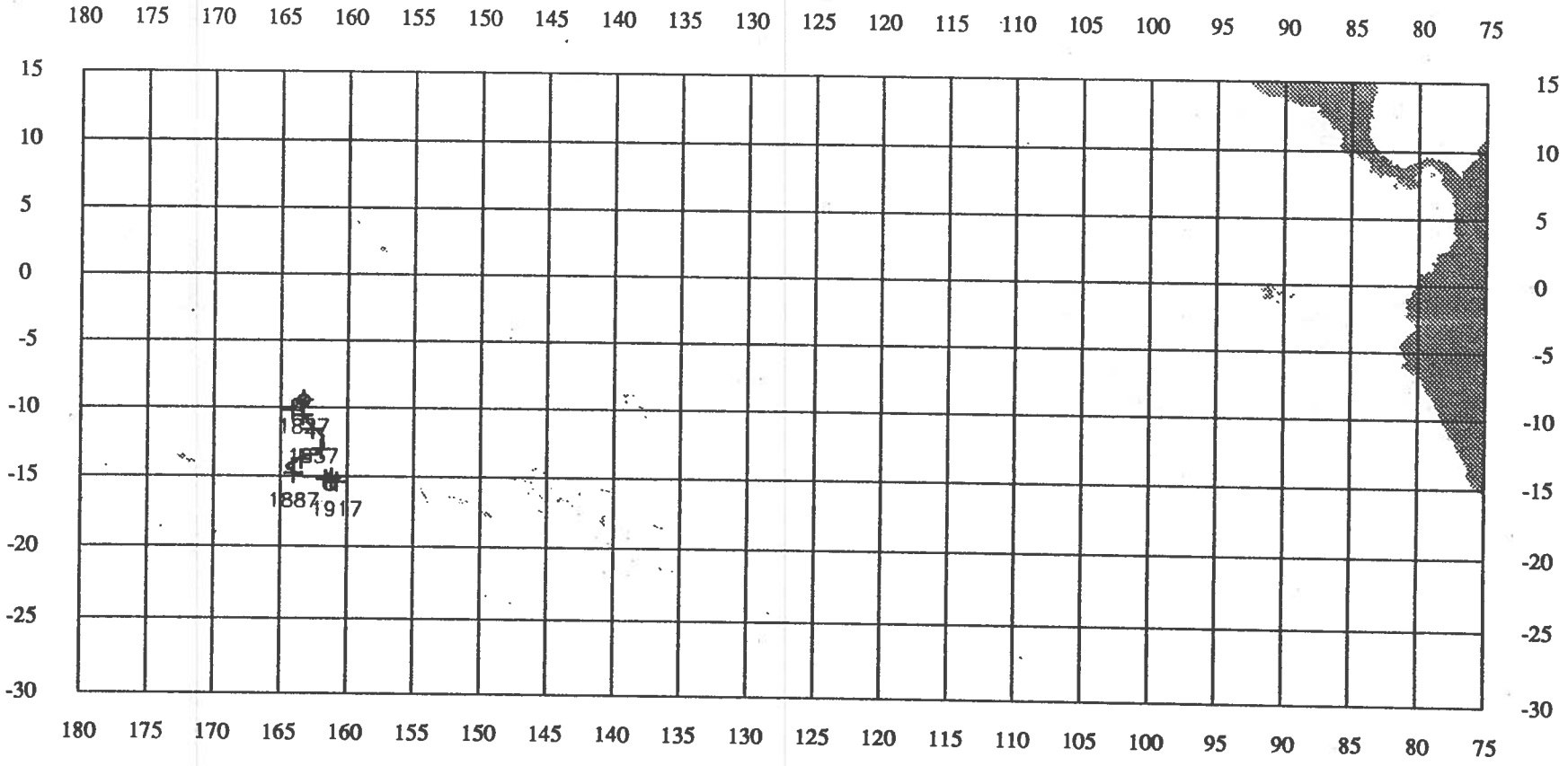
22
21
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010
JULIAN DAYS

BUOY 2192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1857
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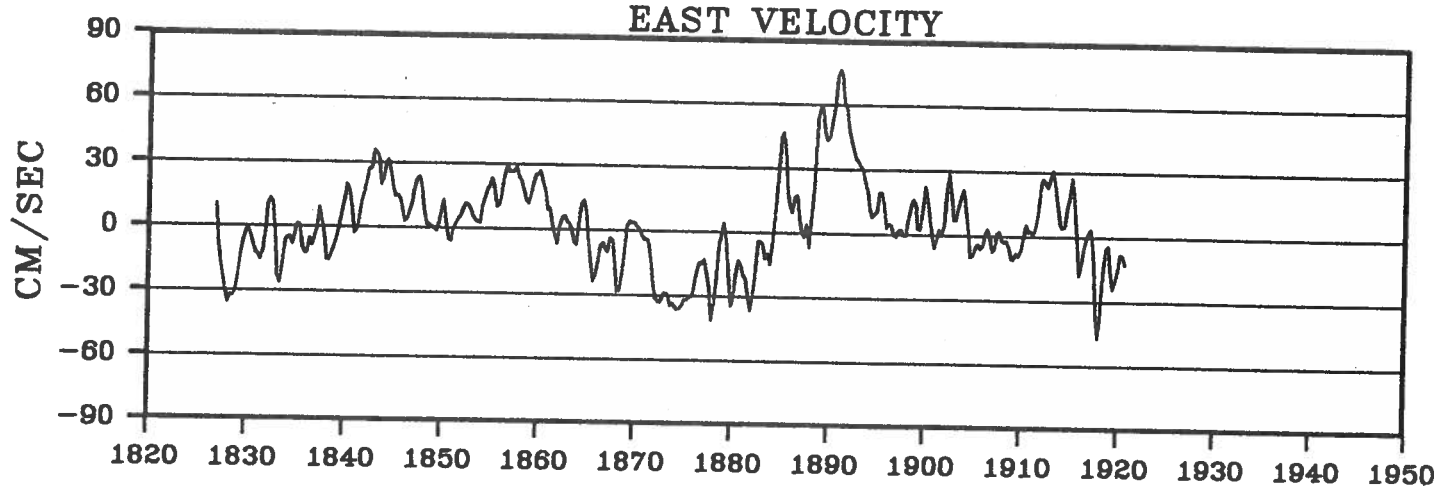
1887
1917

BUOY 2192


EAST VELOCITY
CM/SEC
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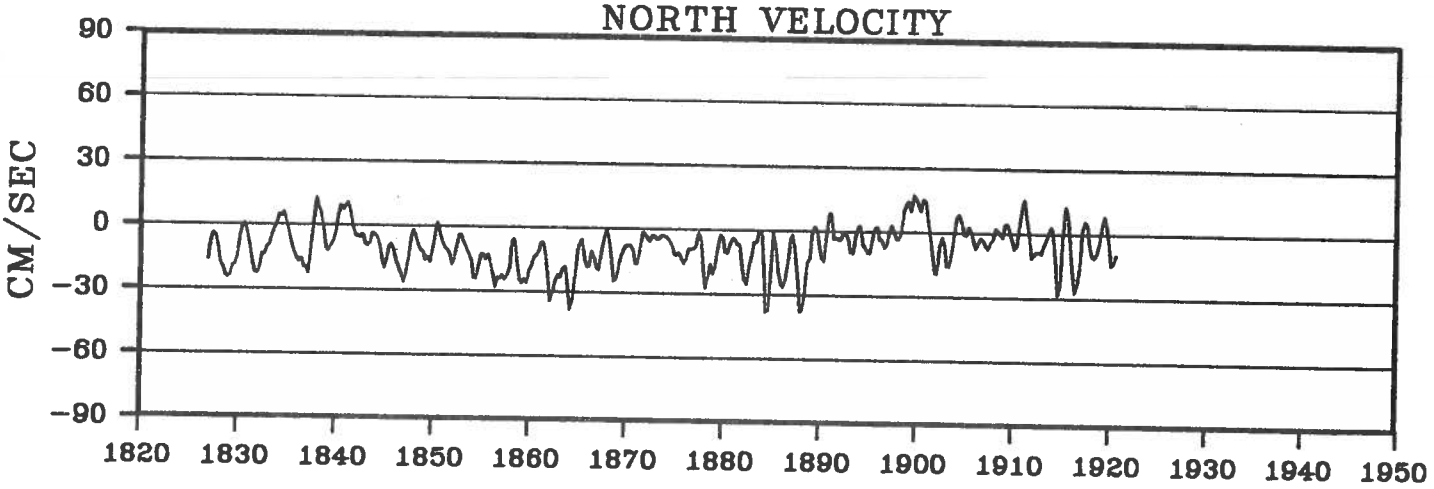
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950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CM/SEC
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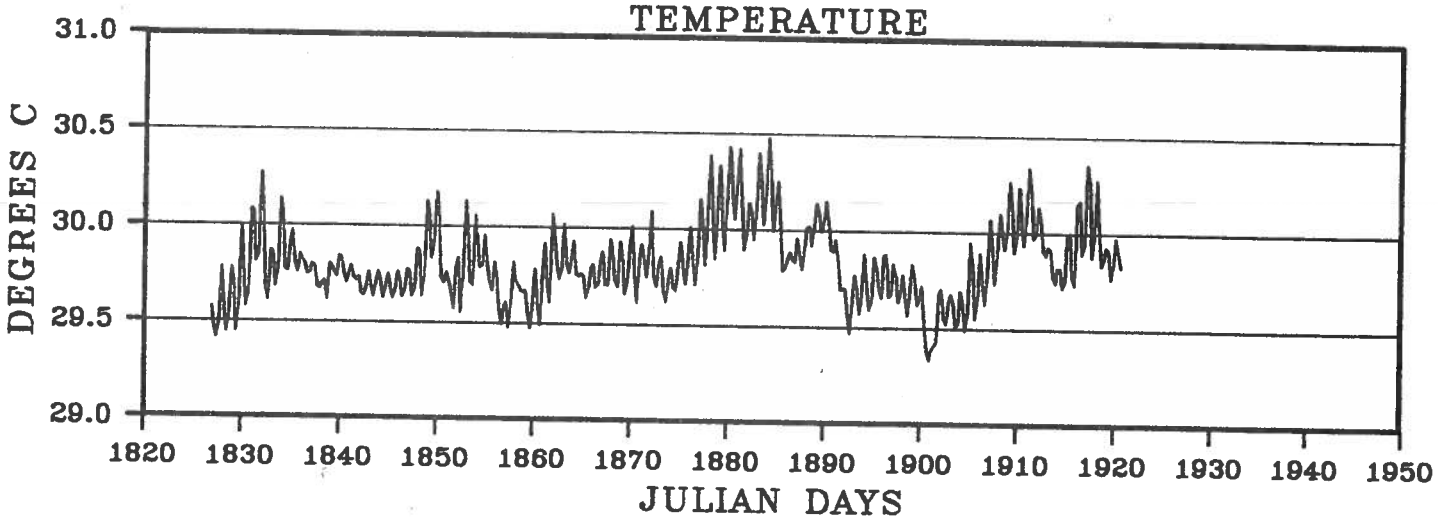
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


TEMPERATURE
DEGREES C
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30.0
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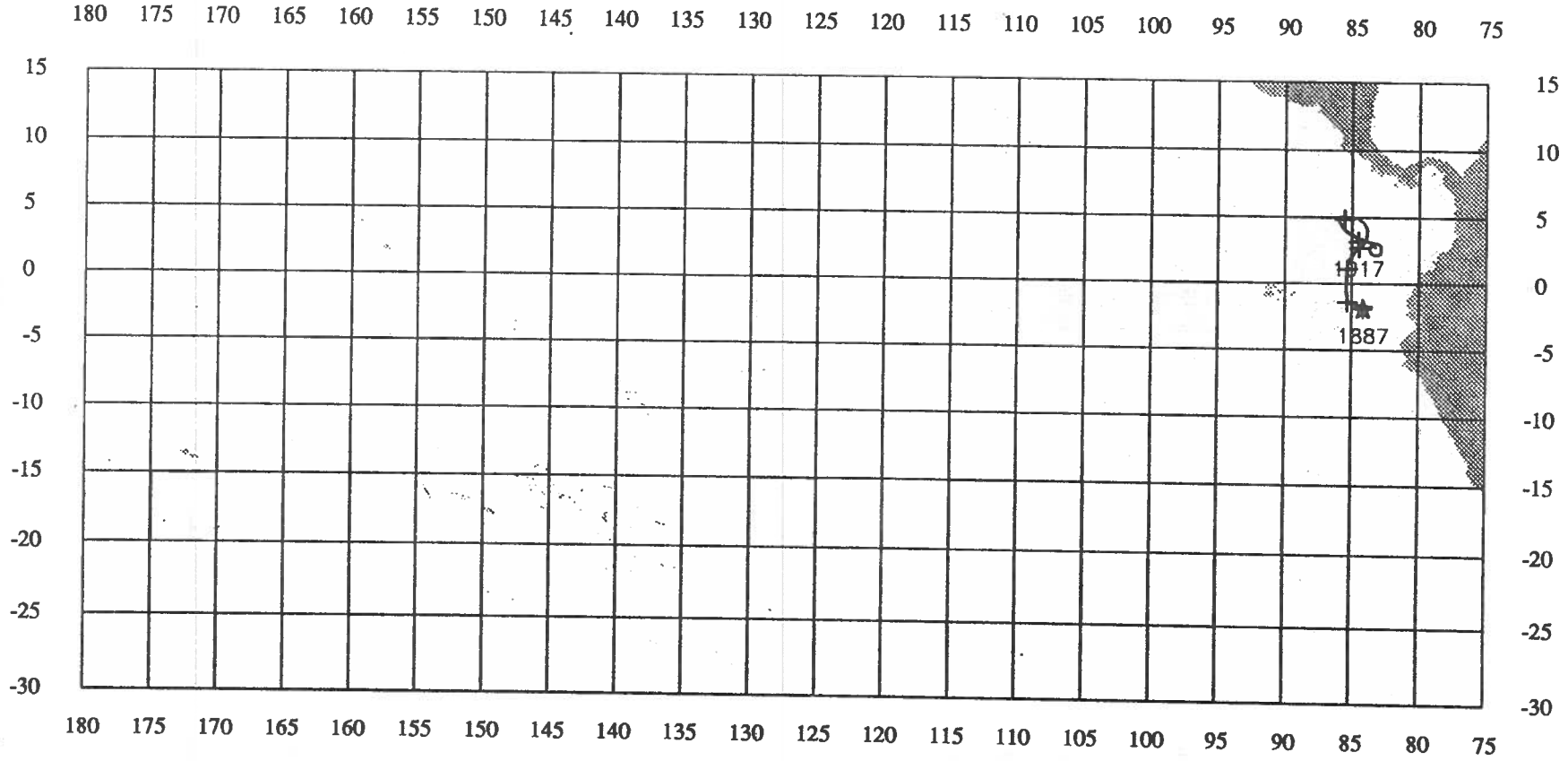
29.0
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 2193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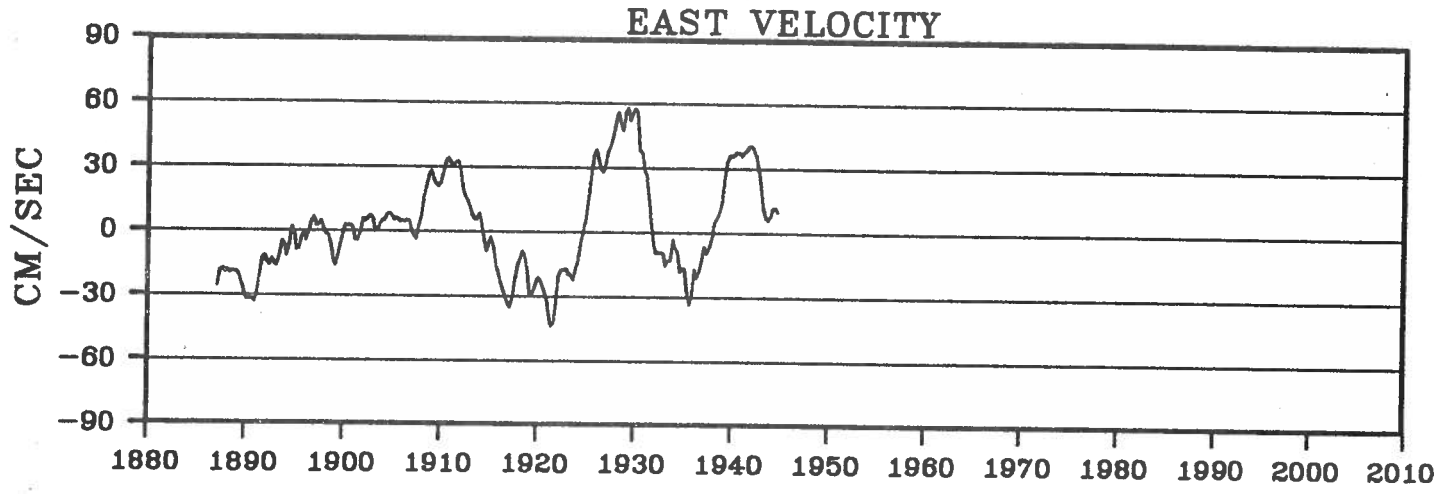
1917
1887

BUOY 2193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CM/SEC
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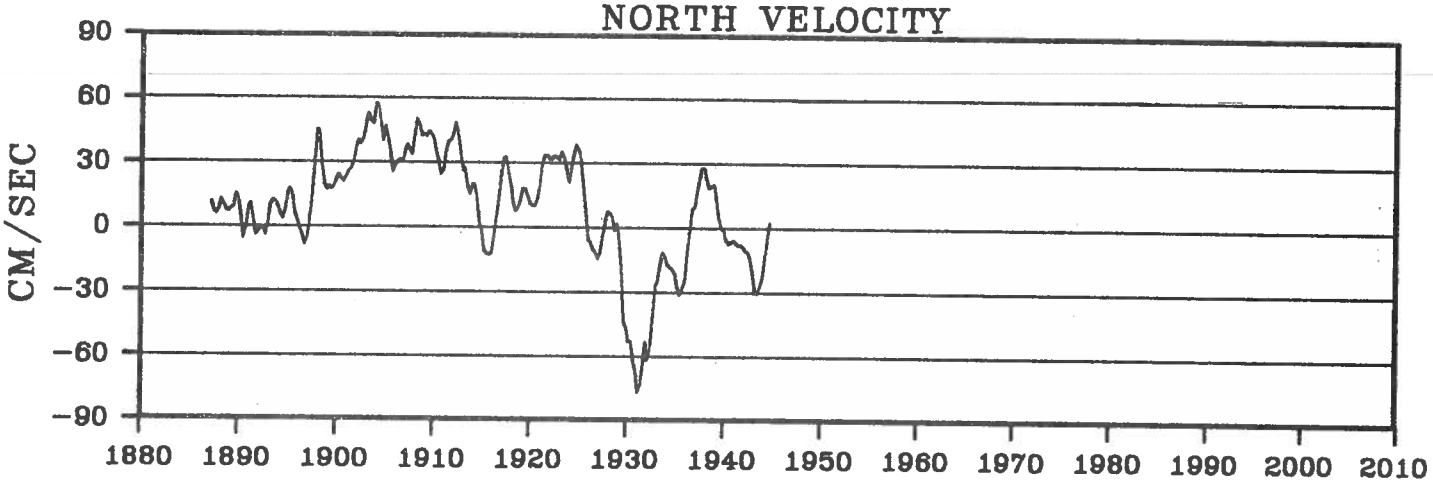
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010


NORTH VELOCITY
CM/SEC
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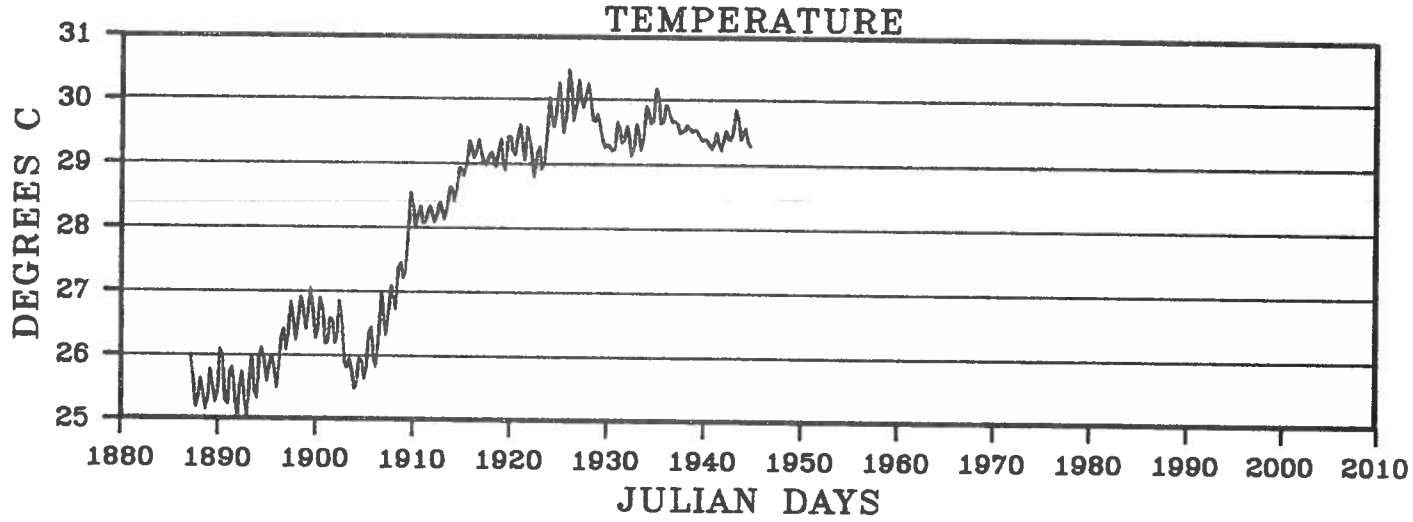
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010


TEMPERATURE
DEGREES C
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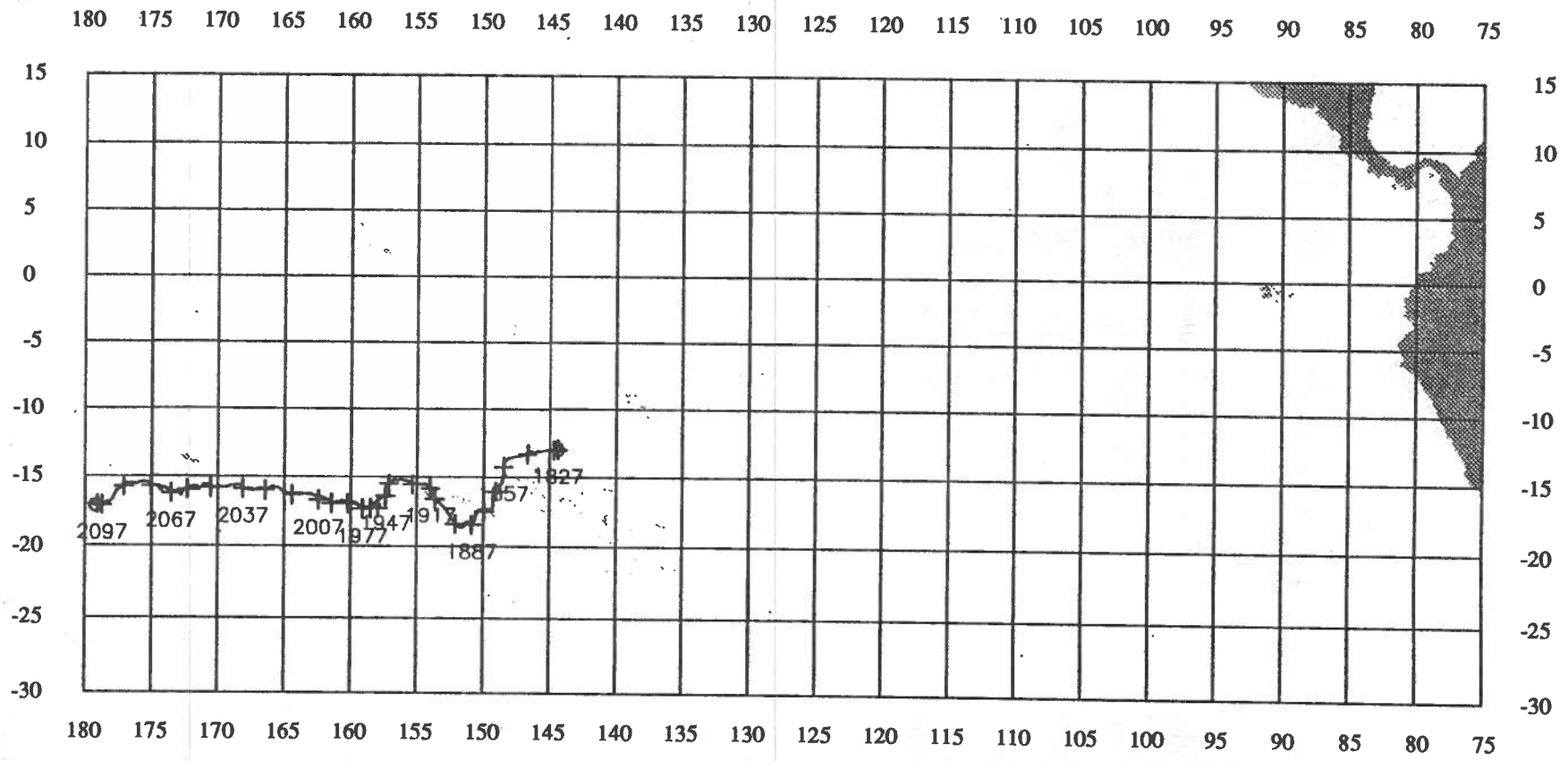
26
25
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010
JULIAN DAYS

BUOY 4400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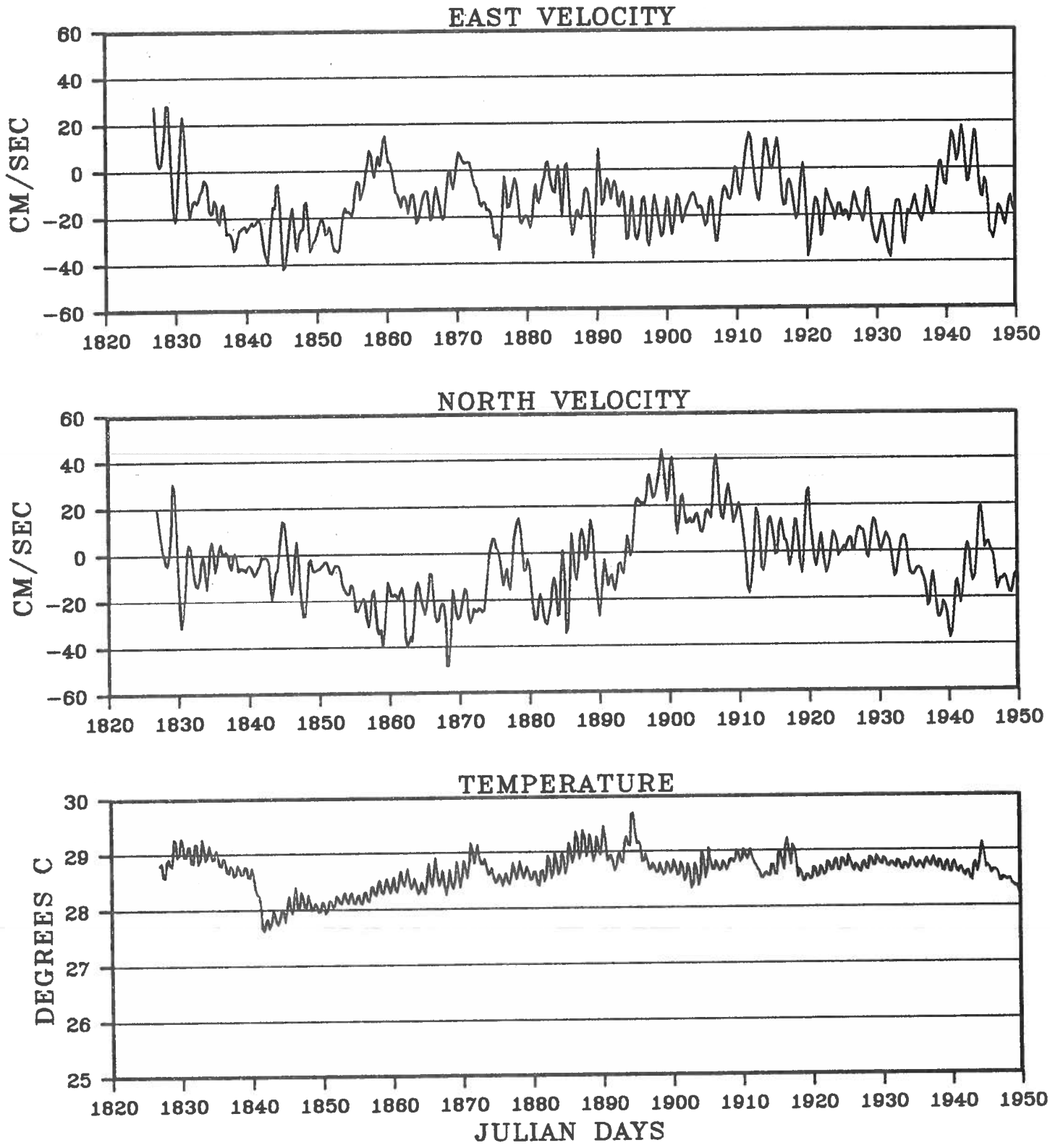
2067
2037
2007
1977
1947
1917
1887
1857
1827

BUOY 4400


EAST VELOCITY
CM/SEC
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1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
30
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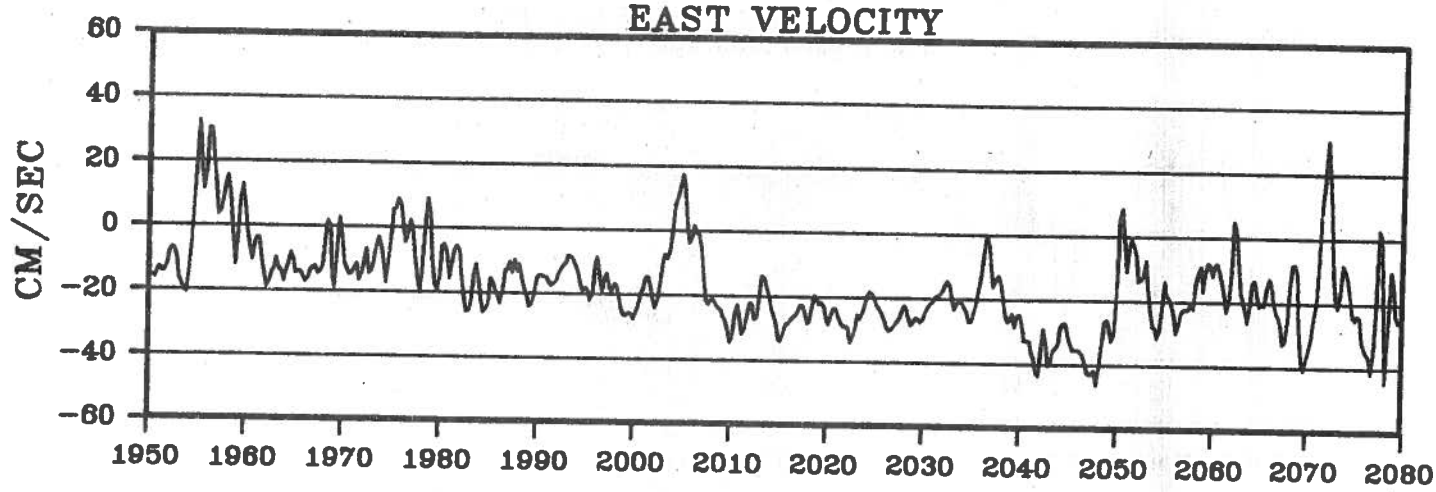
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 4400


EAST VELOCITY
CM/SEC
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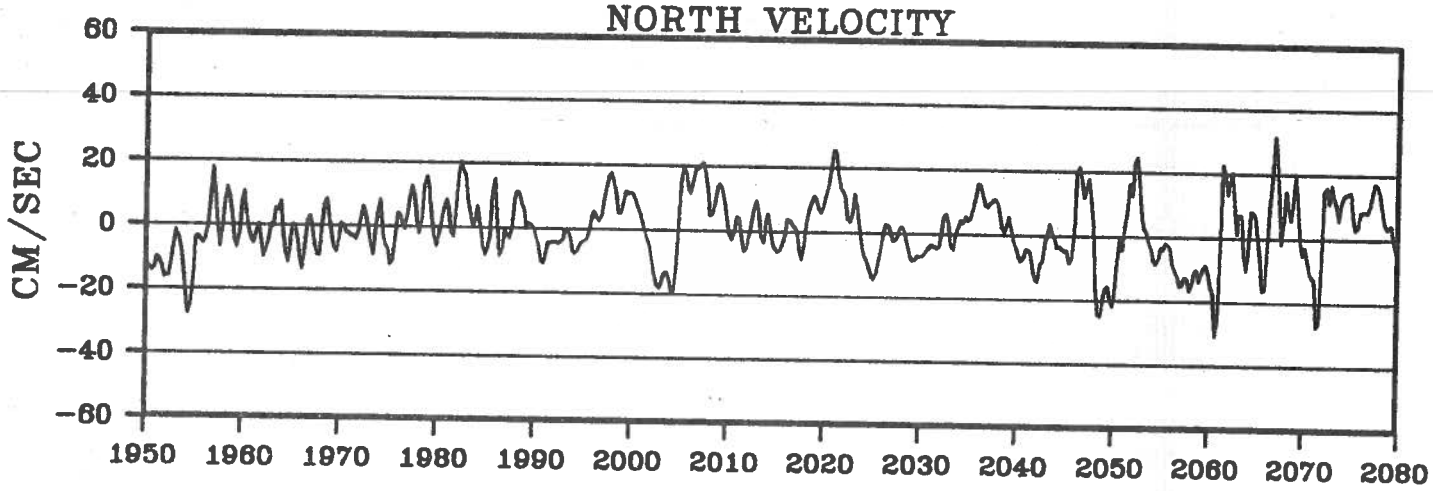
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


NORTH VELOCITY
CM/SEC
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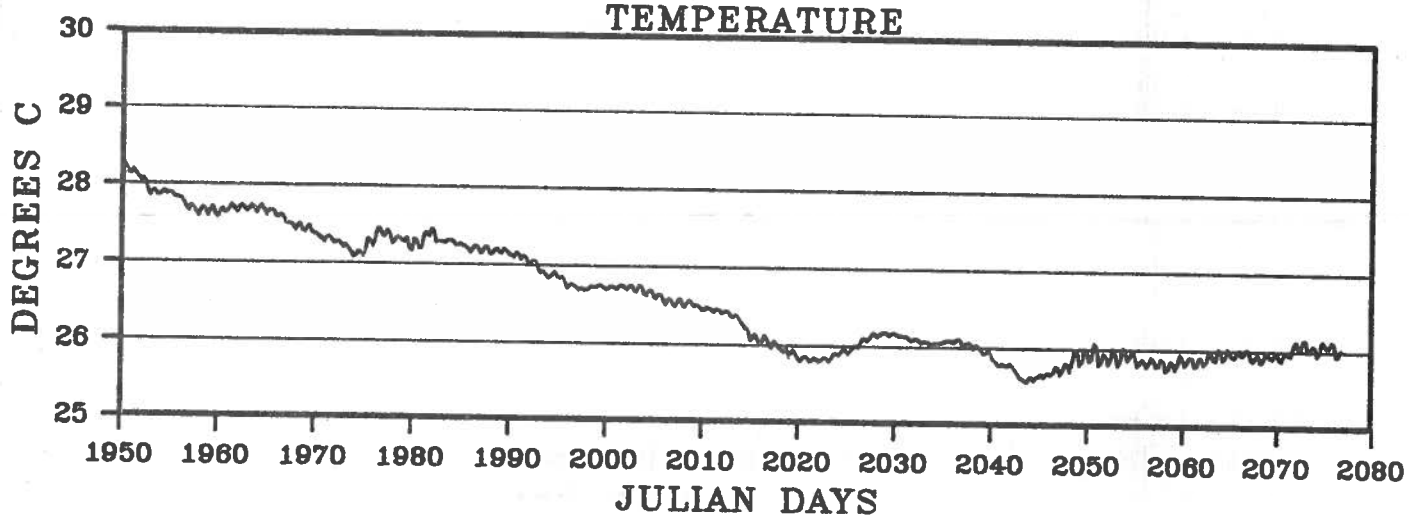
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


TEMPERATURE
DEGREES C
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29
28
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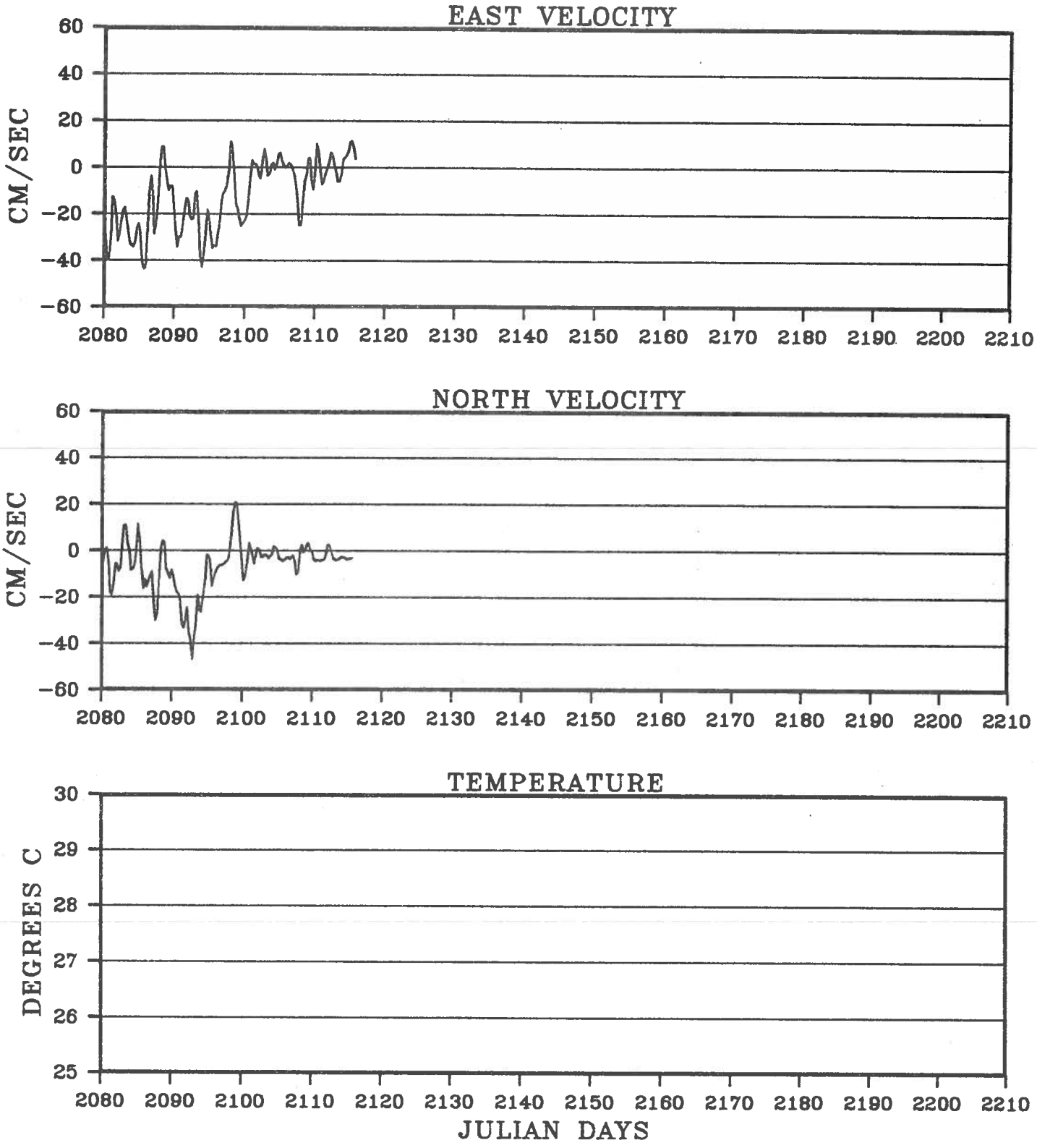
25
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4400


EAST VELOCITY
CM/SEC
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2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
TEMPERATURE
DEGREES C
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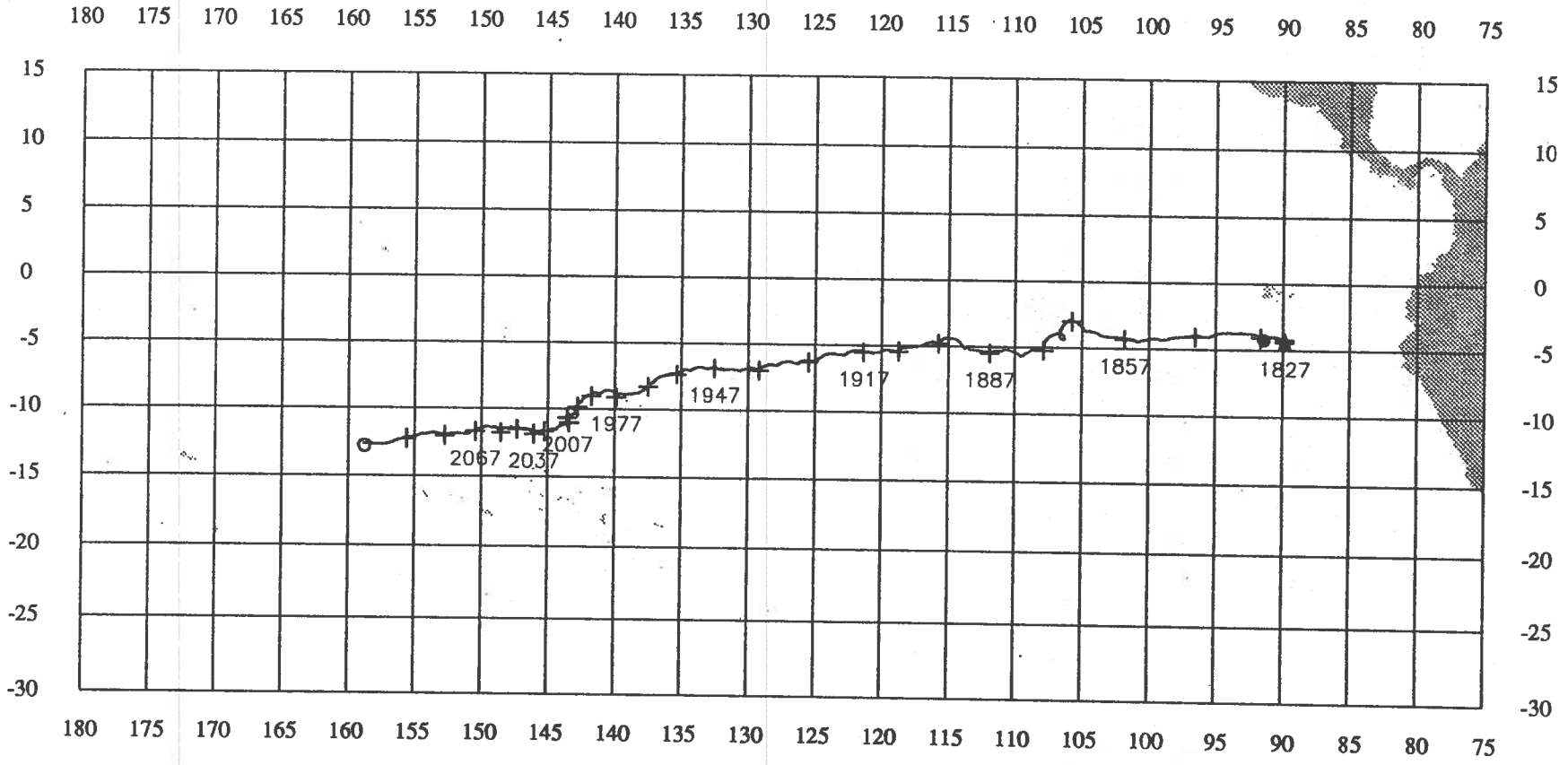
JULIAN DAYS

BUOY 4403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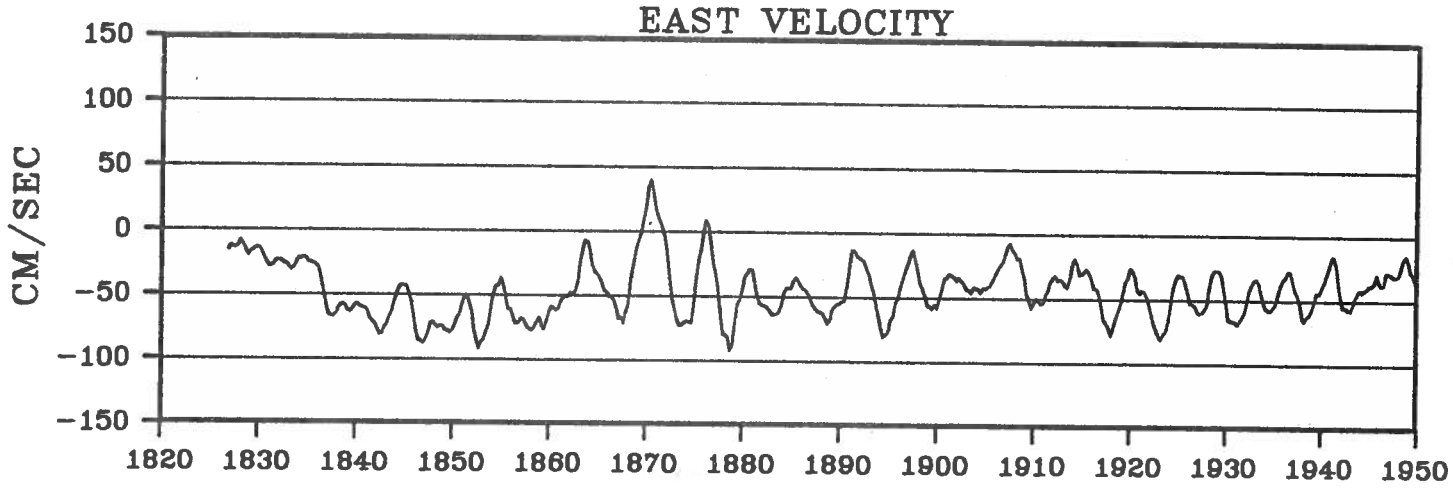
2037
2007
1977
1947
1917
1887
1857
1827

BUOY 4403


EAST VELOCITY
CM/SEC
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-100
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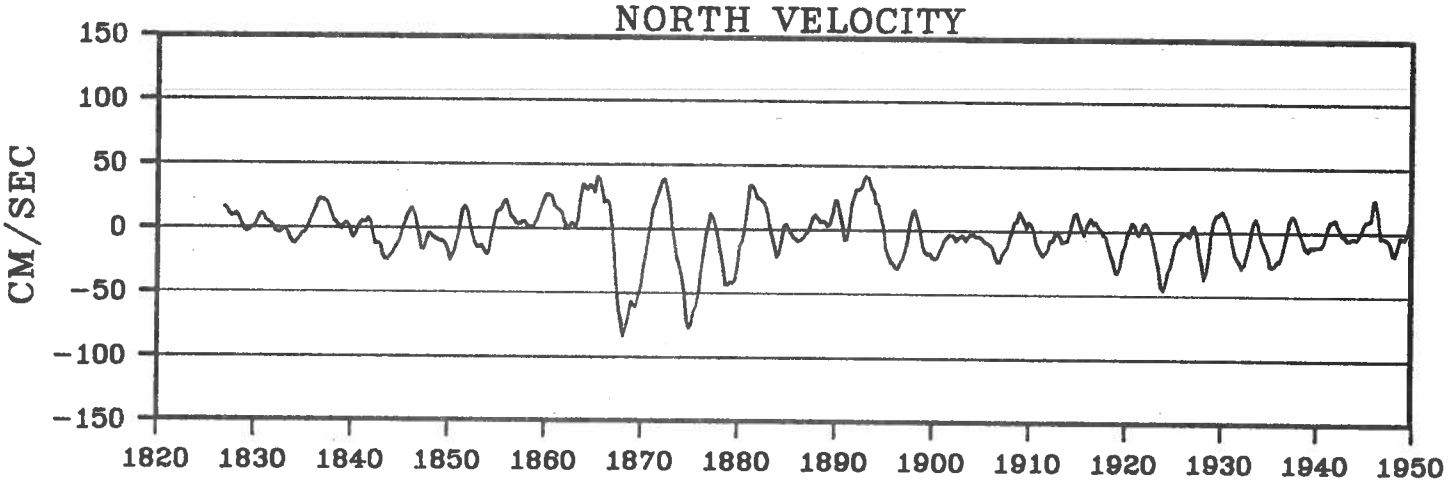
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


NORTH VELOCITY
CM/SEC
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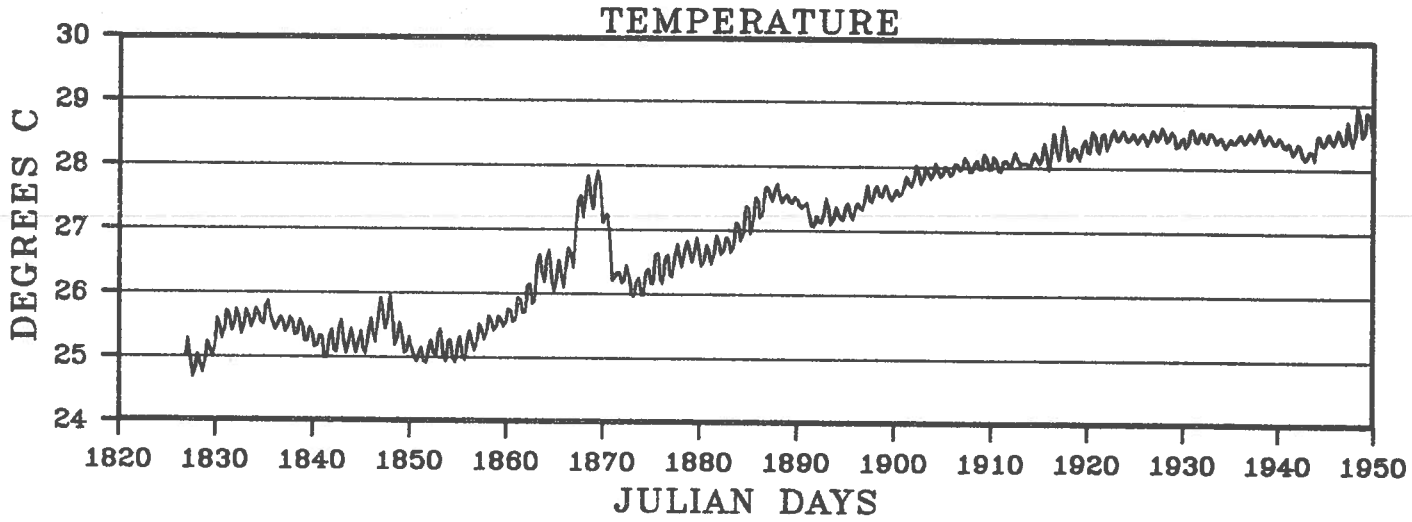
0
-50
-100
-150
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950


TEMPERATURE
DEGREES C
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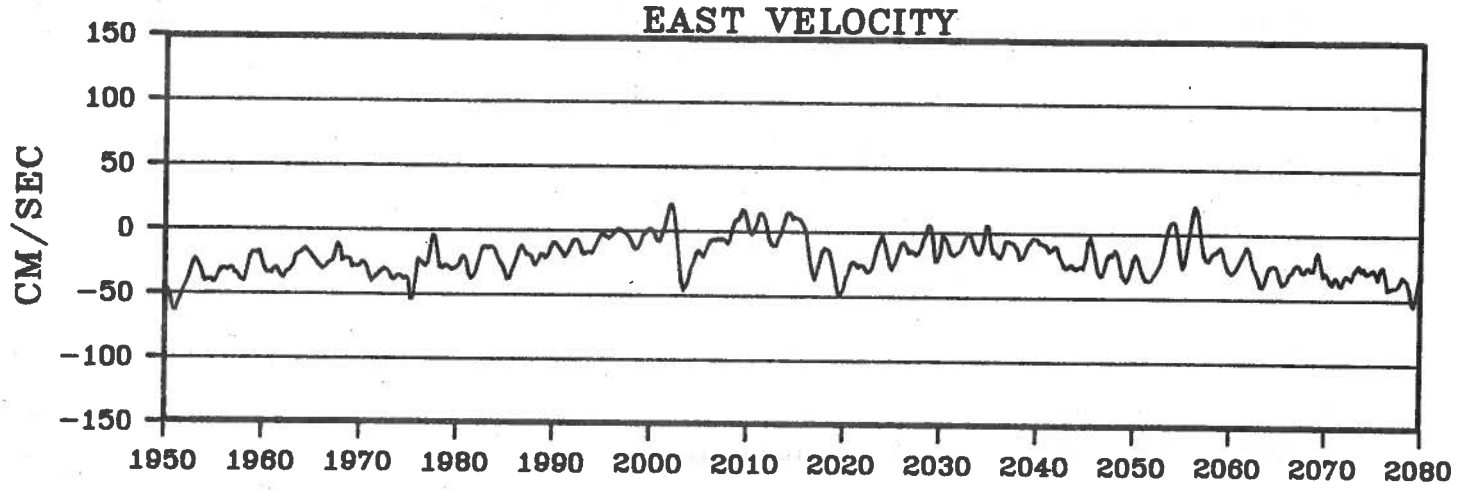
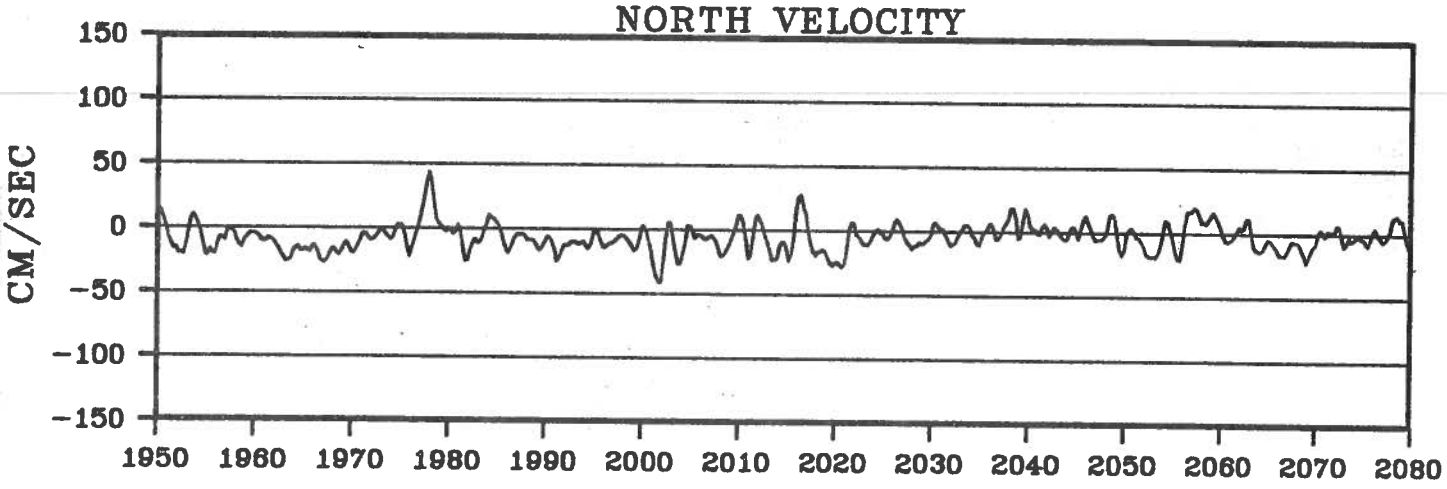
24
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 4403


EAST VELOCITY
CM/SEC
150
100
50
0
−50
−100
−150
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


NORTH VELOCITY
CM/SEC
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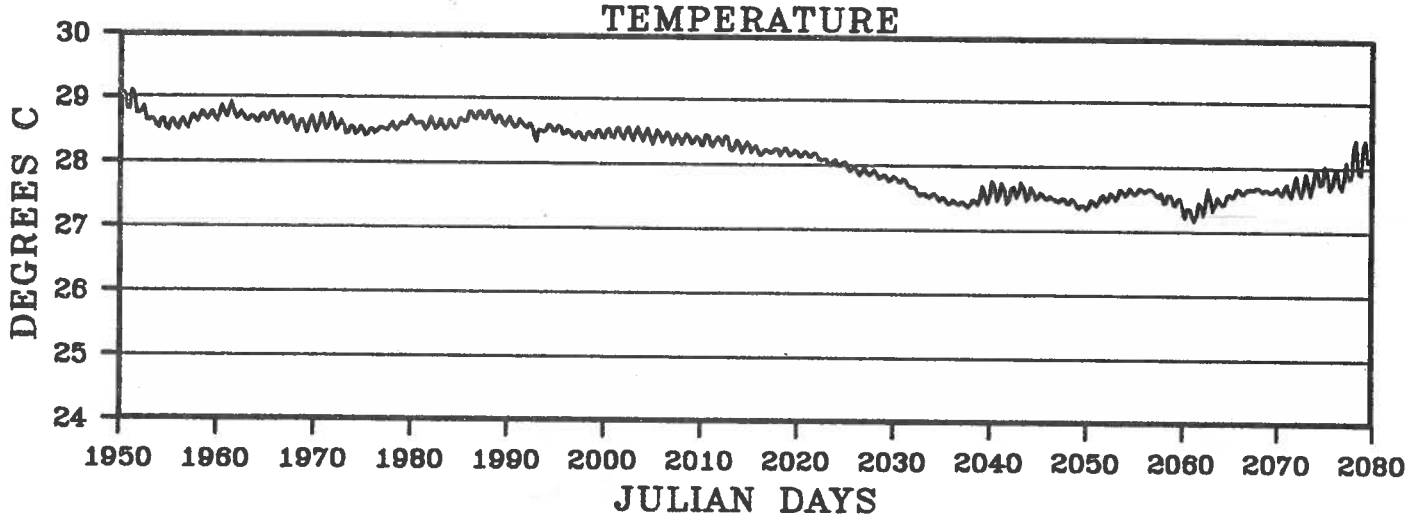
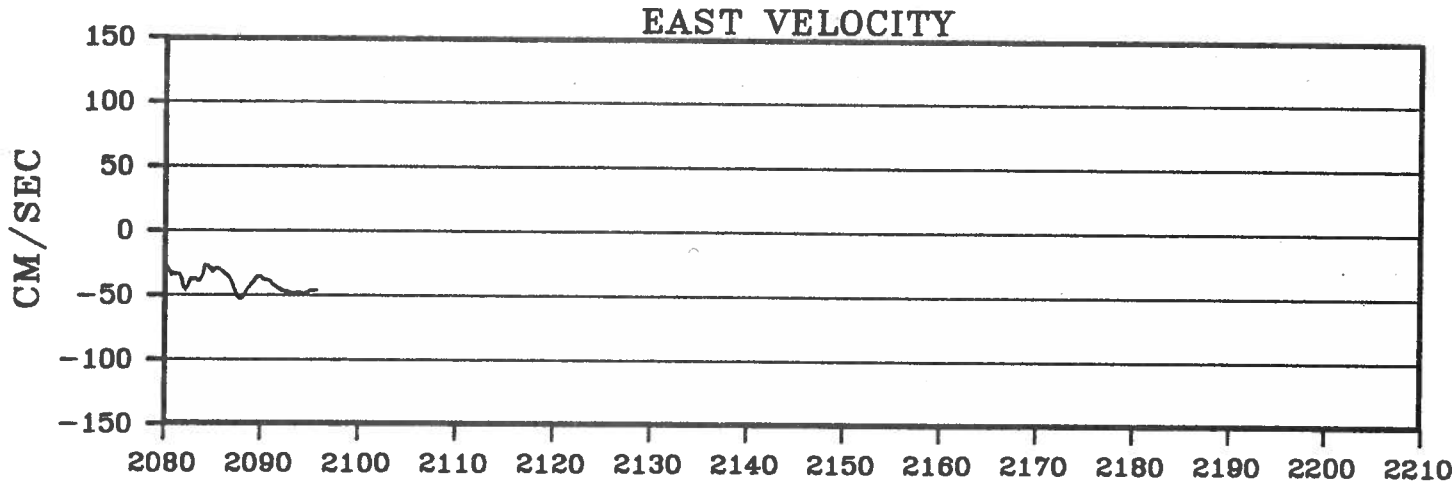
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


TEMPERATURE
DEGREES C
30
29
28
27
26
25
24
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4403


EAST VELOCITY
CM/SEC
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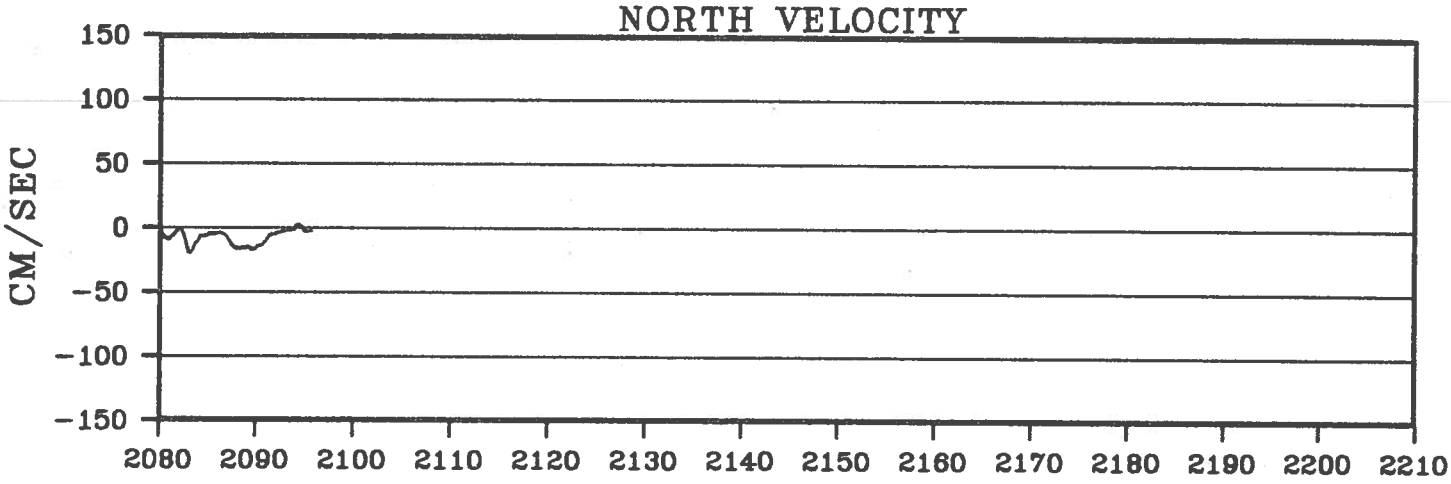
-150
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210


NORTH VELOCITY
CM/SEC
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-150
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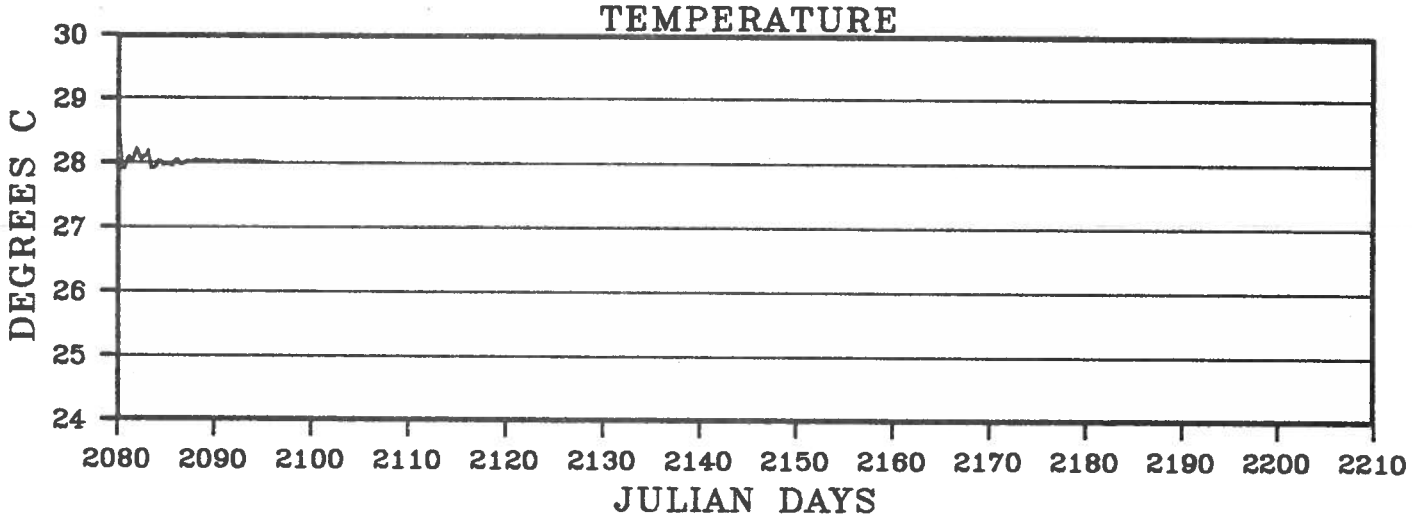
TEMPERATURE
DEGREES C
30
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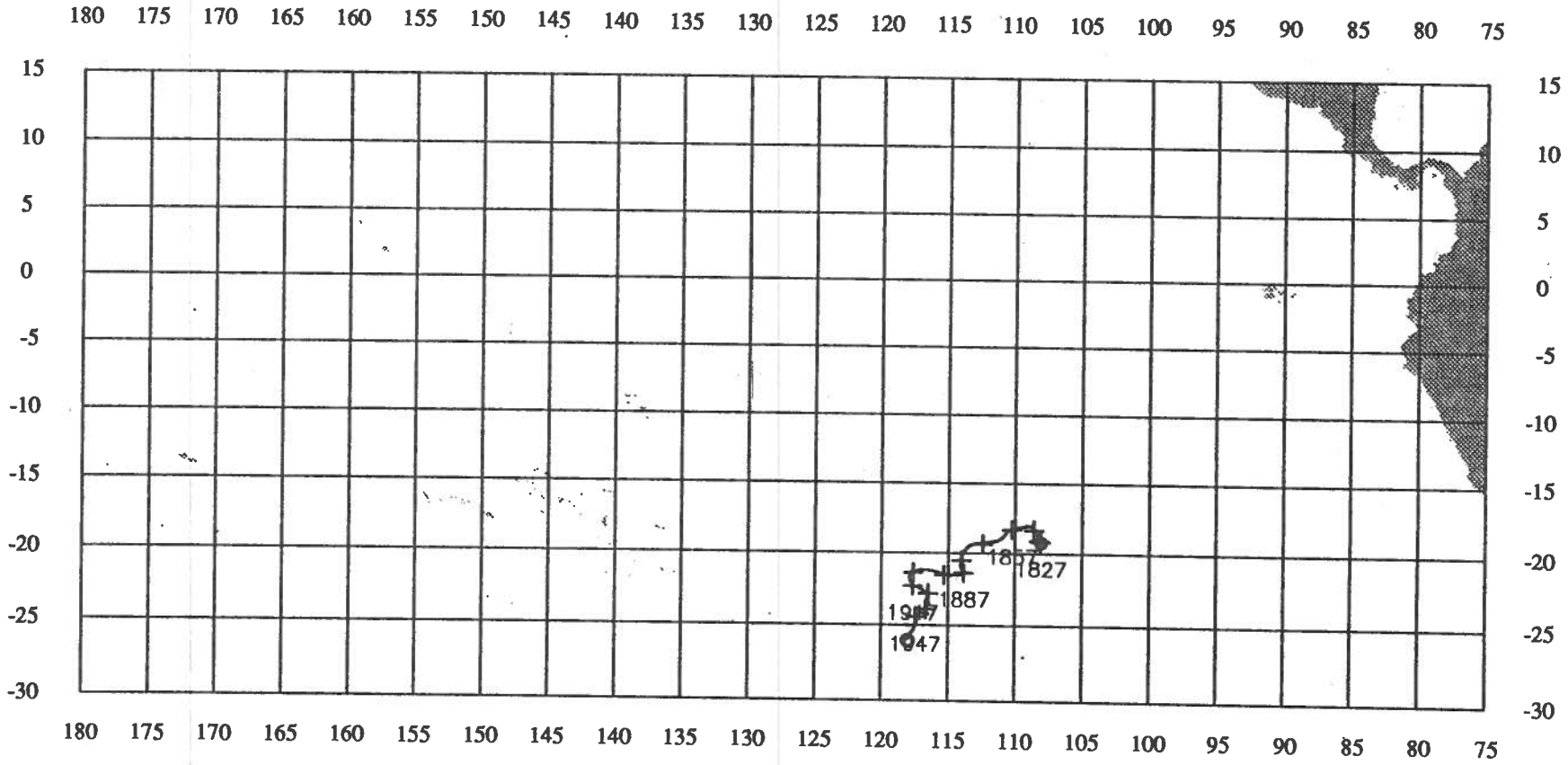
JULIAN DAYS

BUOY 4404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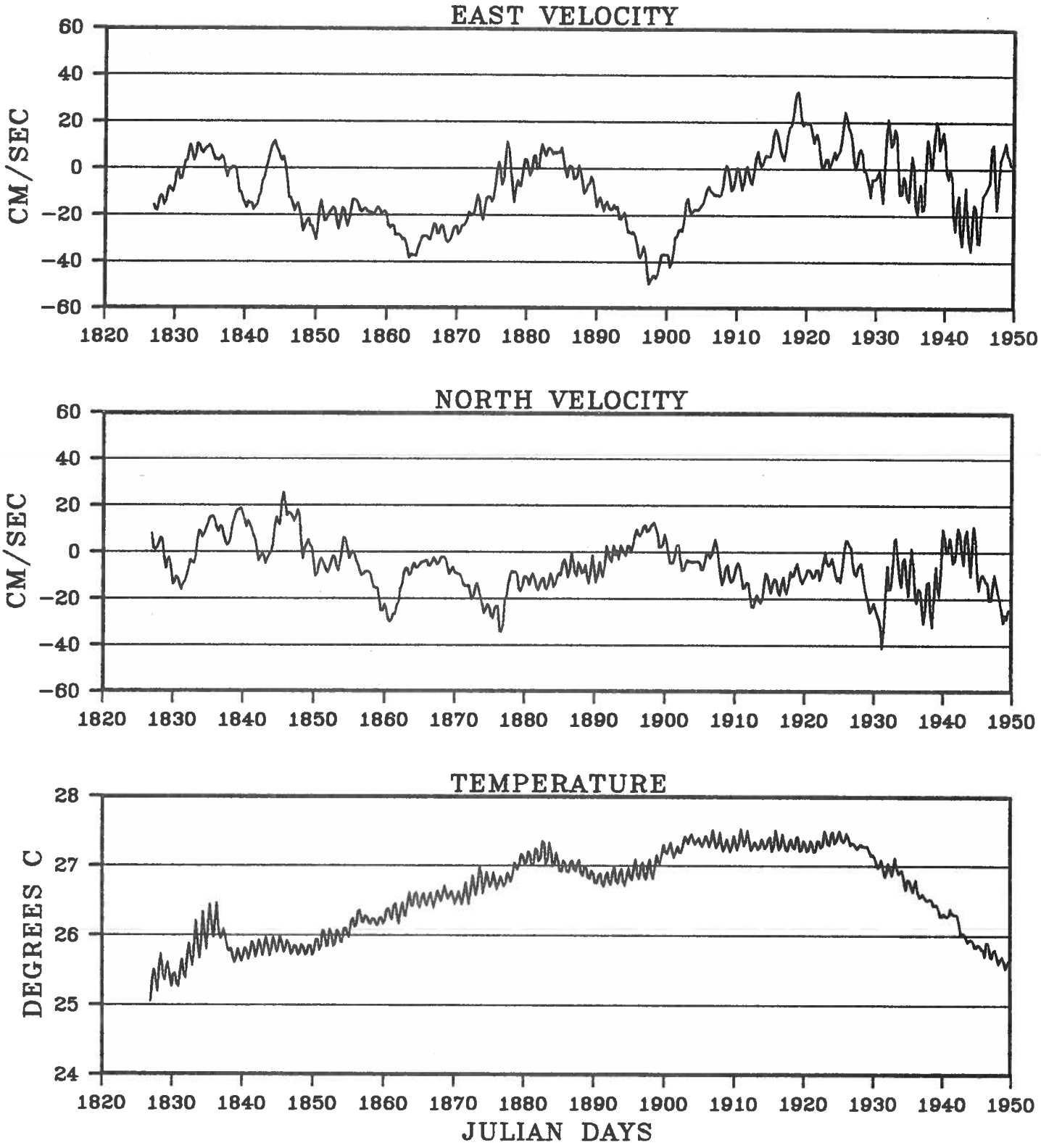
1887
1947

BUOY 4404


EAST VELOCITY
CM/SEC
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1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
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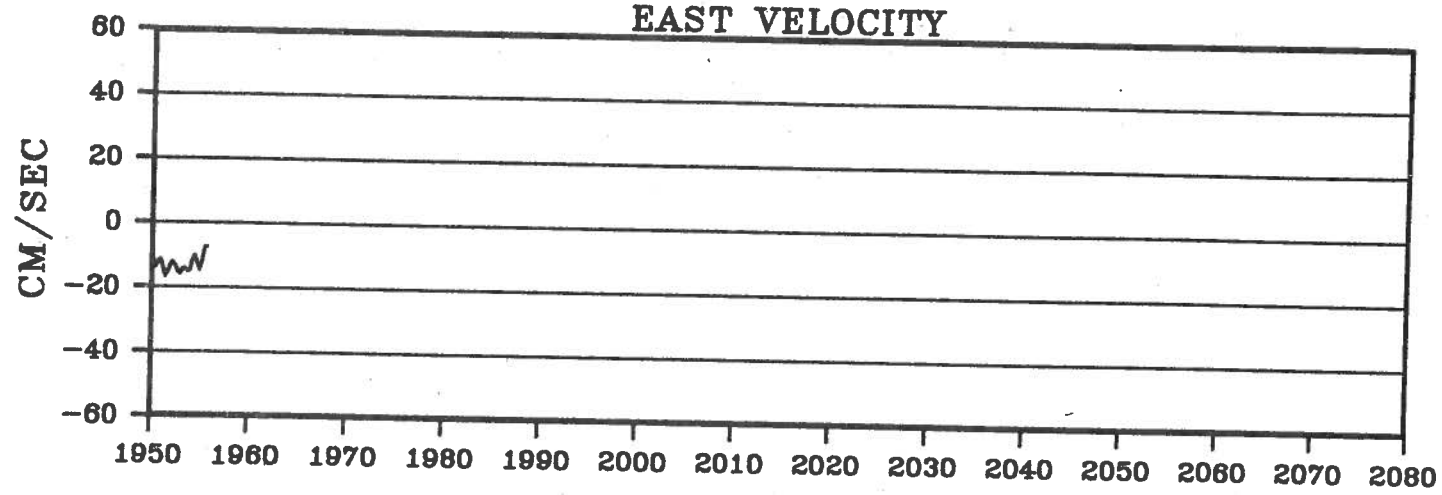
JULIAN DAYS

BUOY 4404


EAST VELOCITY
CM/SEC
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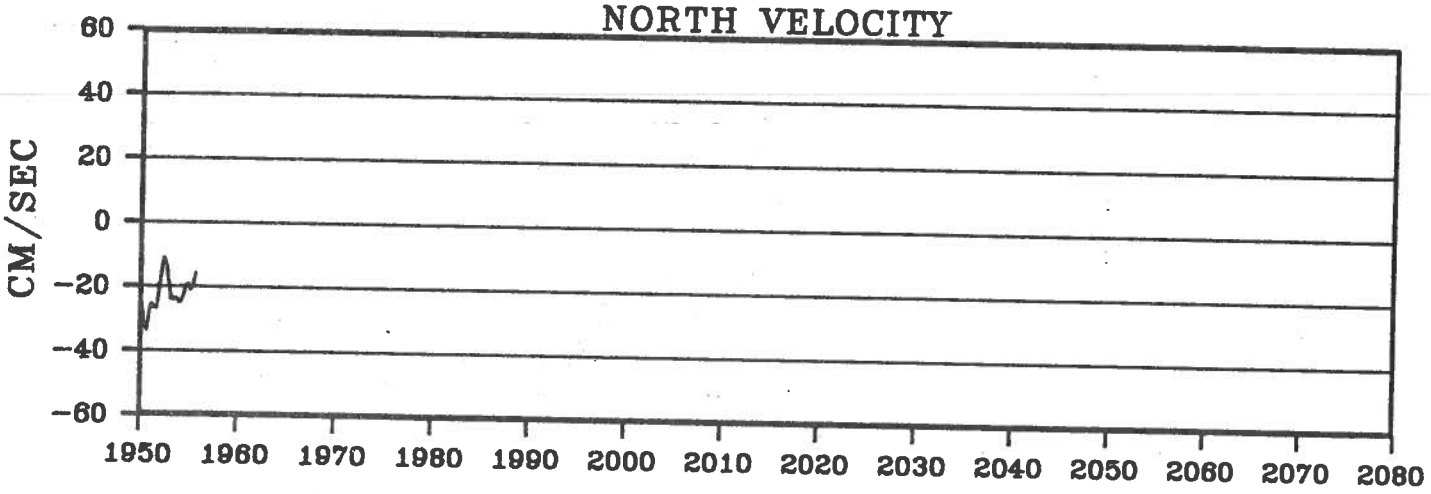
NORTH VELOCITY
CM/SEC
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0
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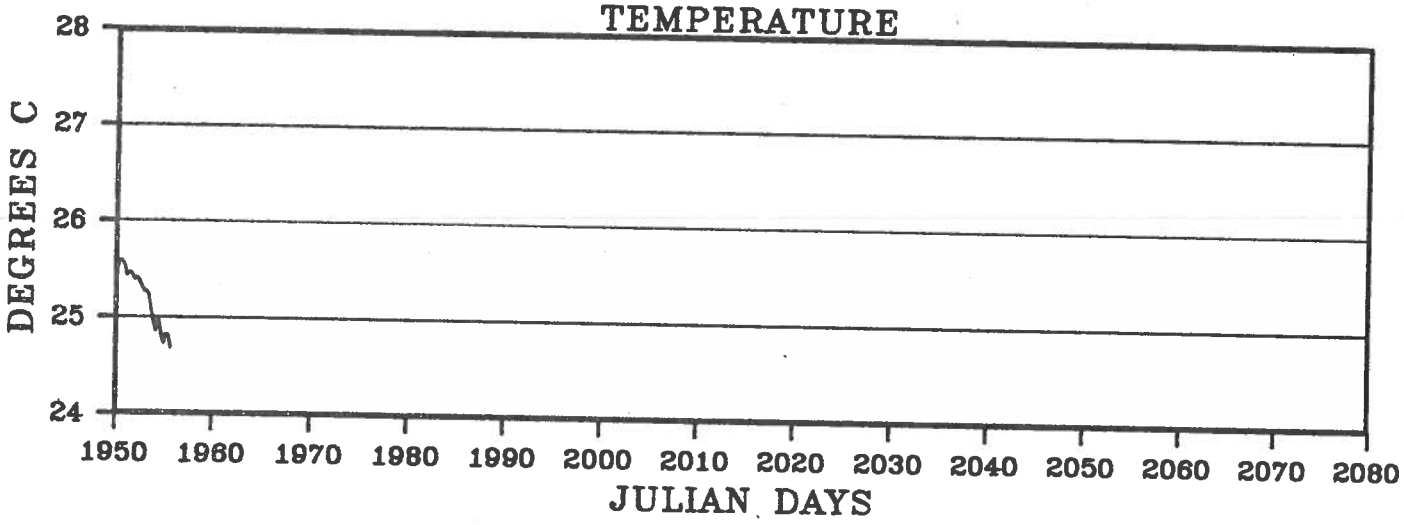
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080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DEGREES C
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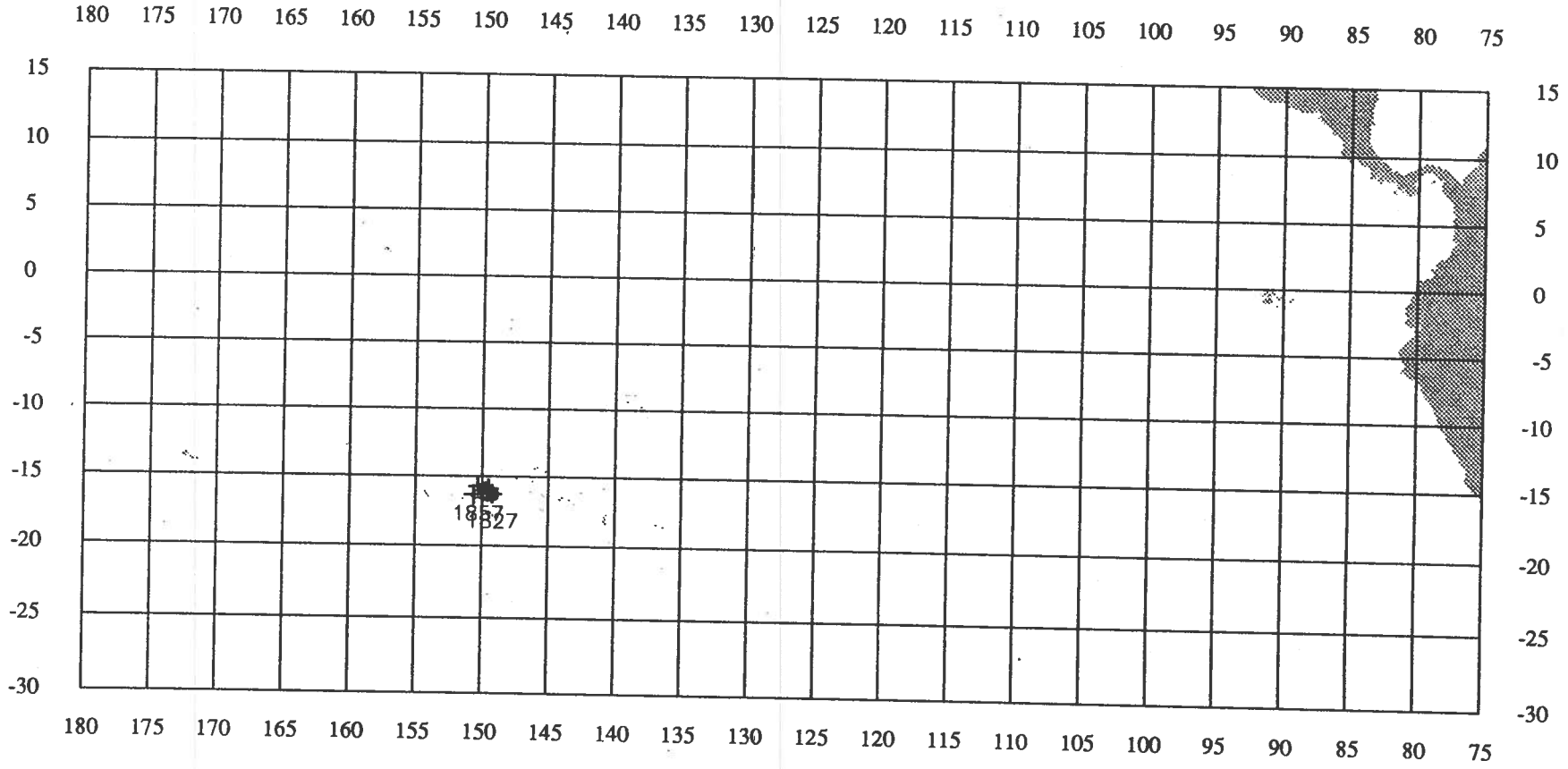
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4405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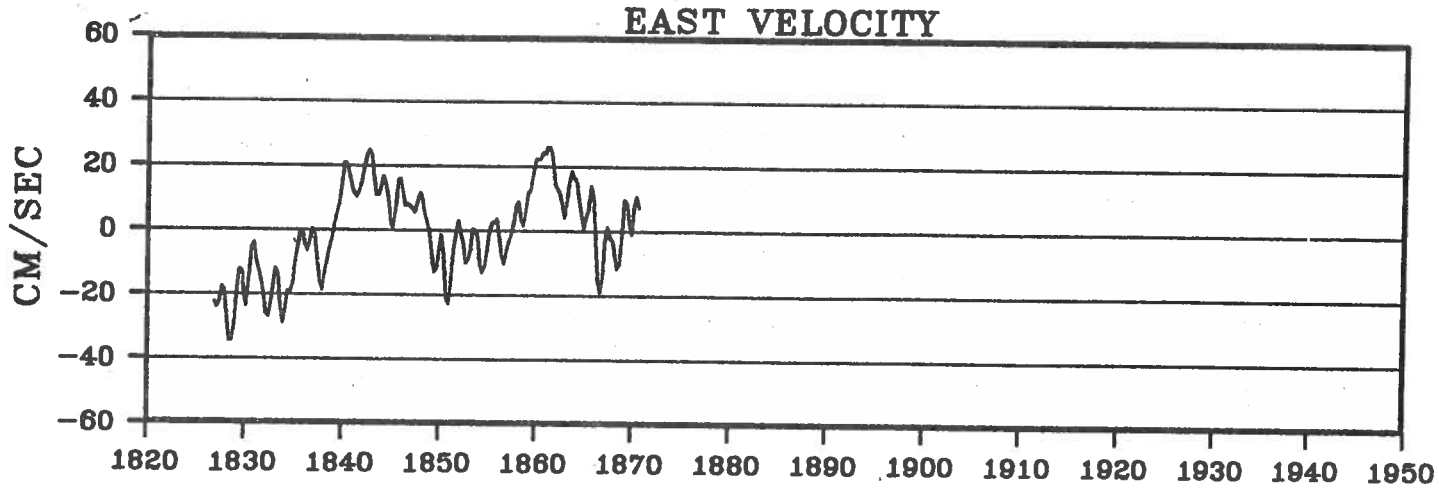
1857
1827

BUOY 4405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CM/SEC
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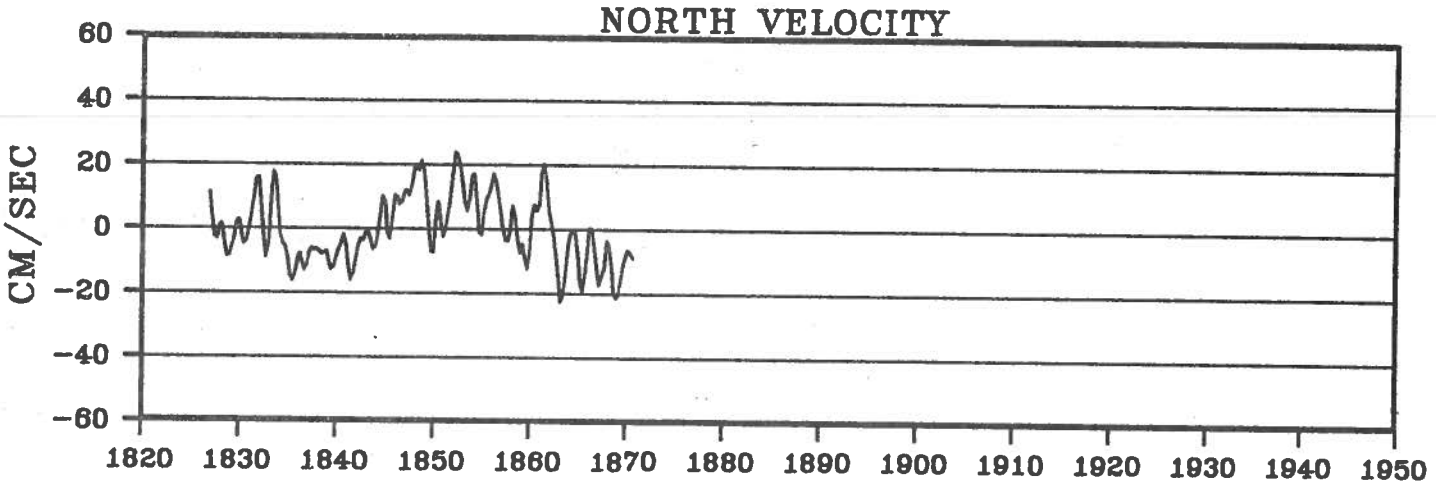
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950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CM/SEC
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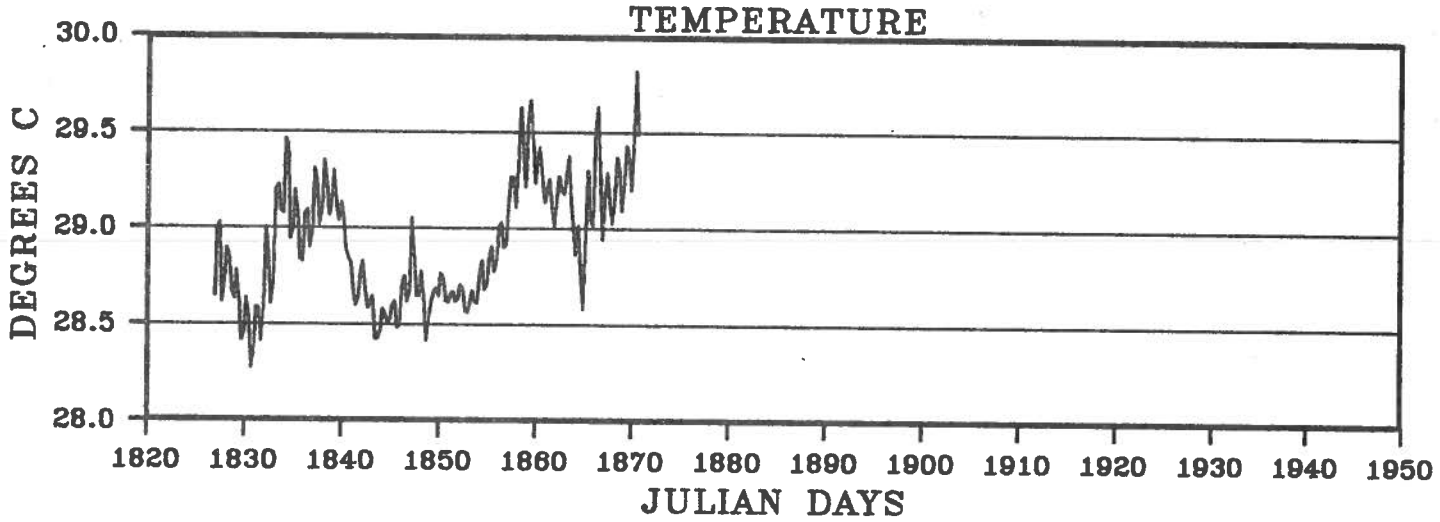
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950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DEGREES C
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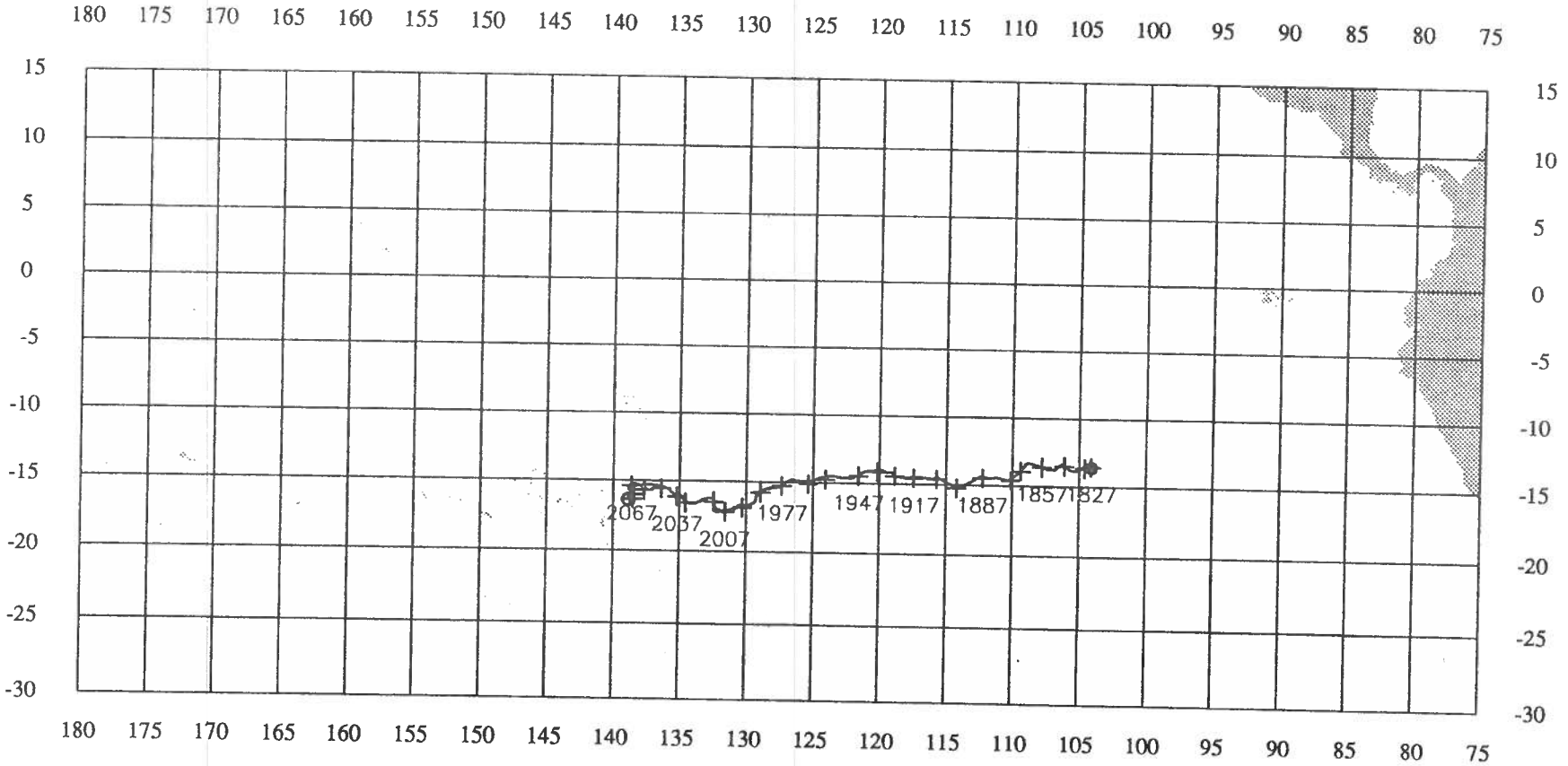
28.0
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 4406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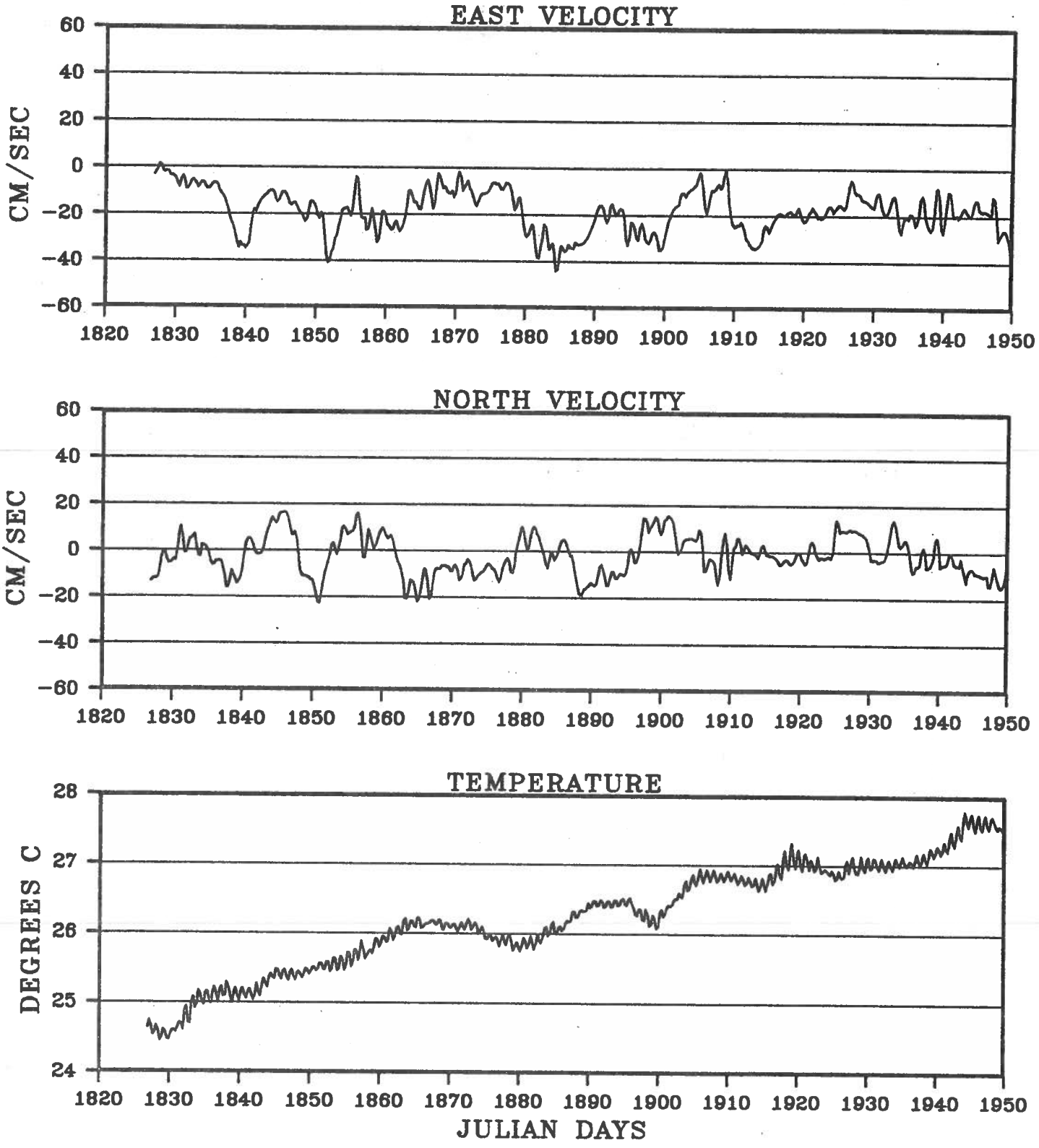
2067
2037
2007
1977
1947
1917
1887
1857
1827

BUOY 4406


EAST VELOCITY
CM/SEC
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-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
28
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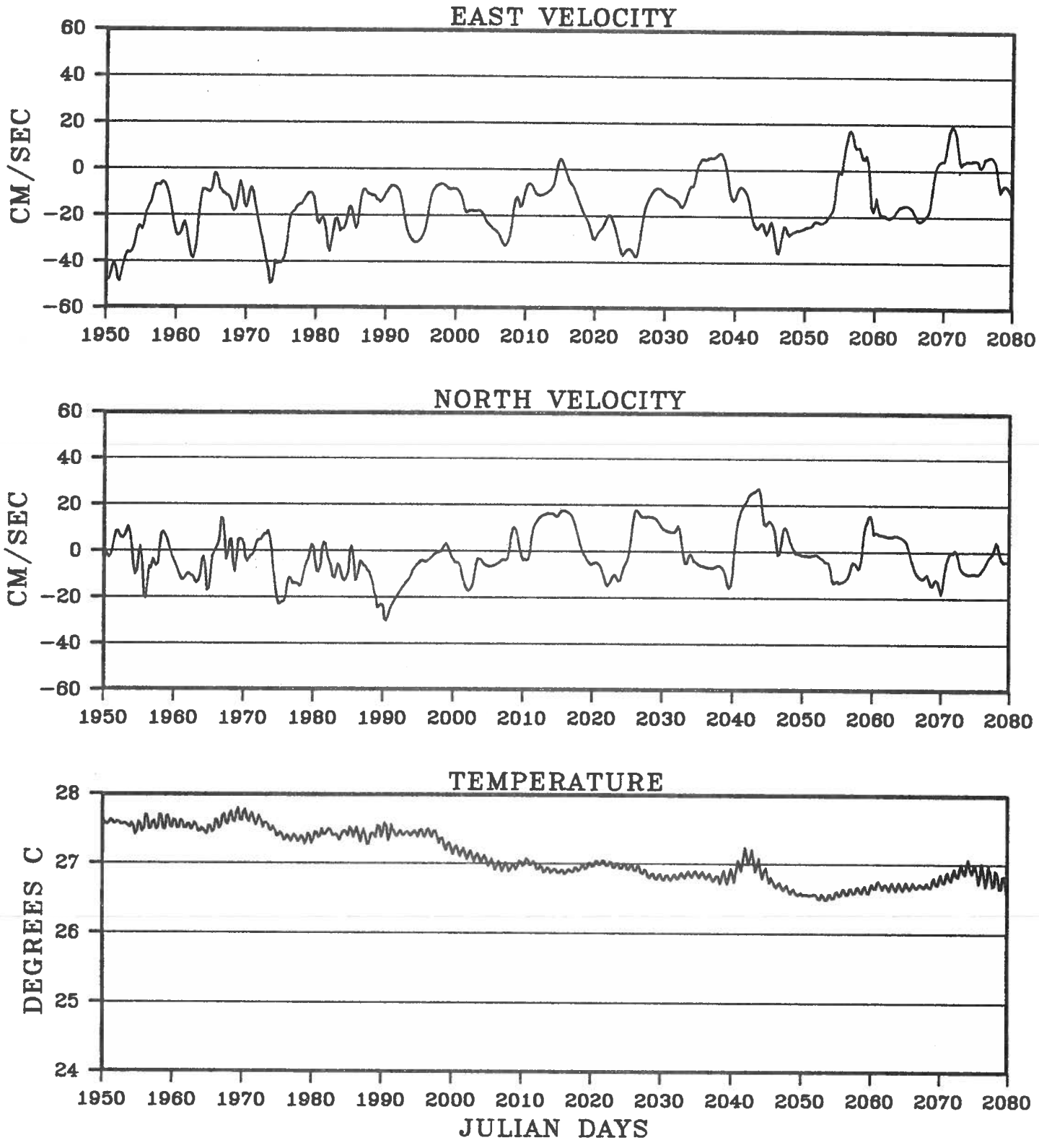
26
25
24
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 4406


EAST VELOCITY
CM/SEC
60
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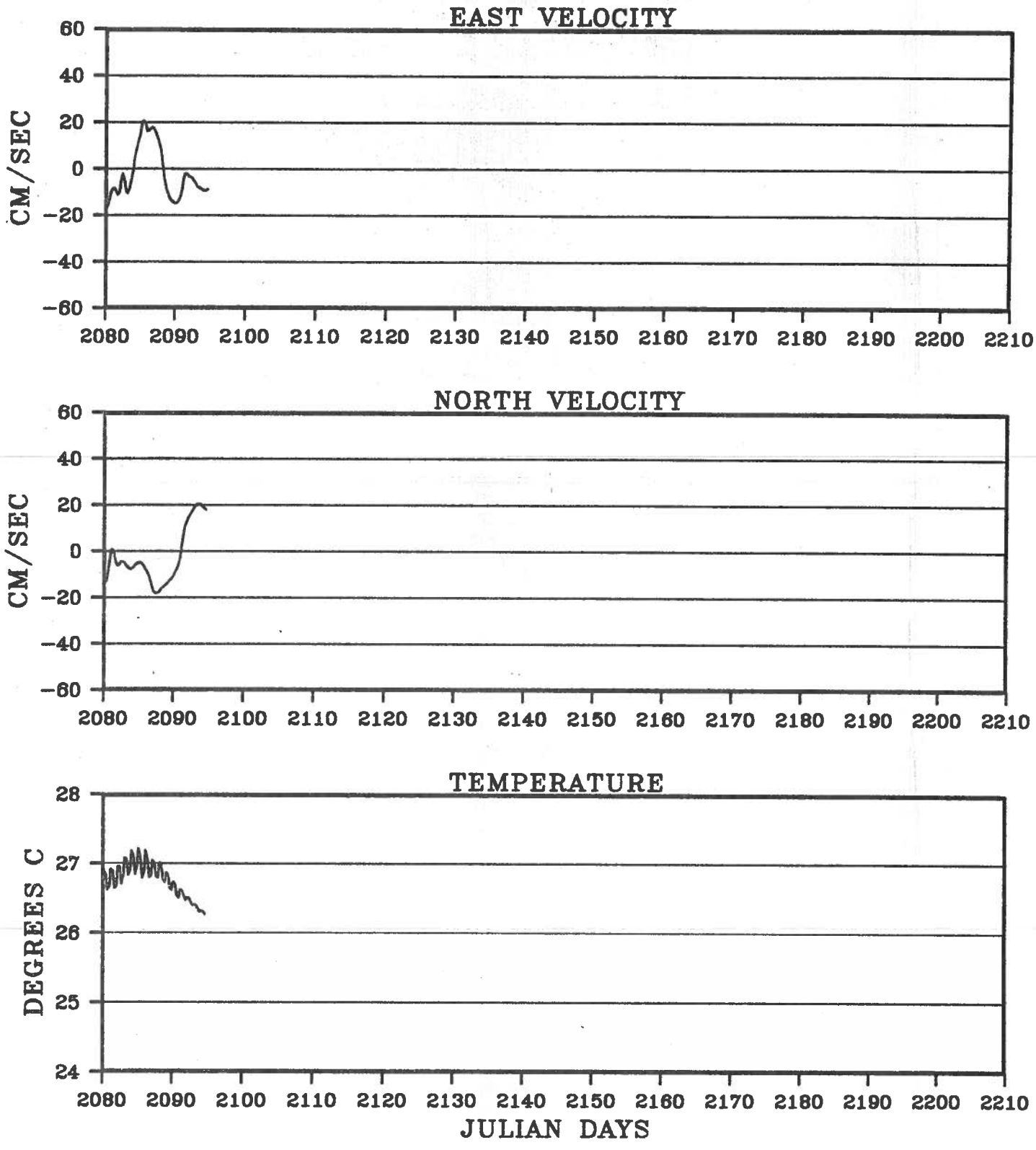
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
TEMPERATURE
DEGREES C
28
27
26
25
24
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4406


EAST VELOCITY
CM/SEC
60
40
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-20
-40
-60
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
TEMPERATURE
DEGREES C
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25
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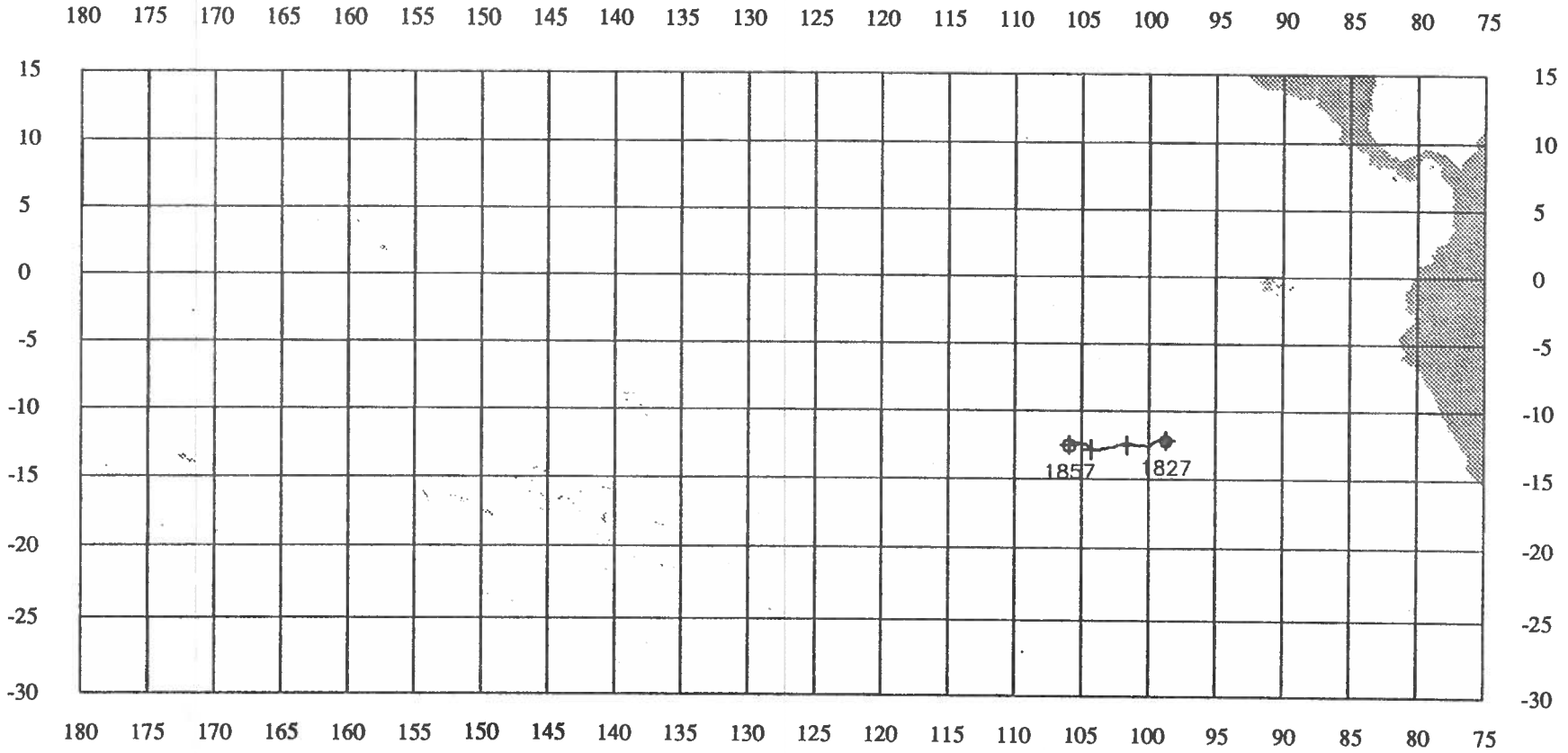
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
JULIAN DAYS

BUOY 4408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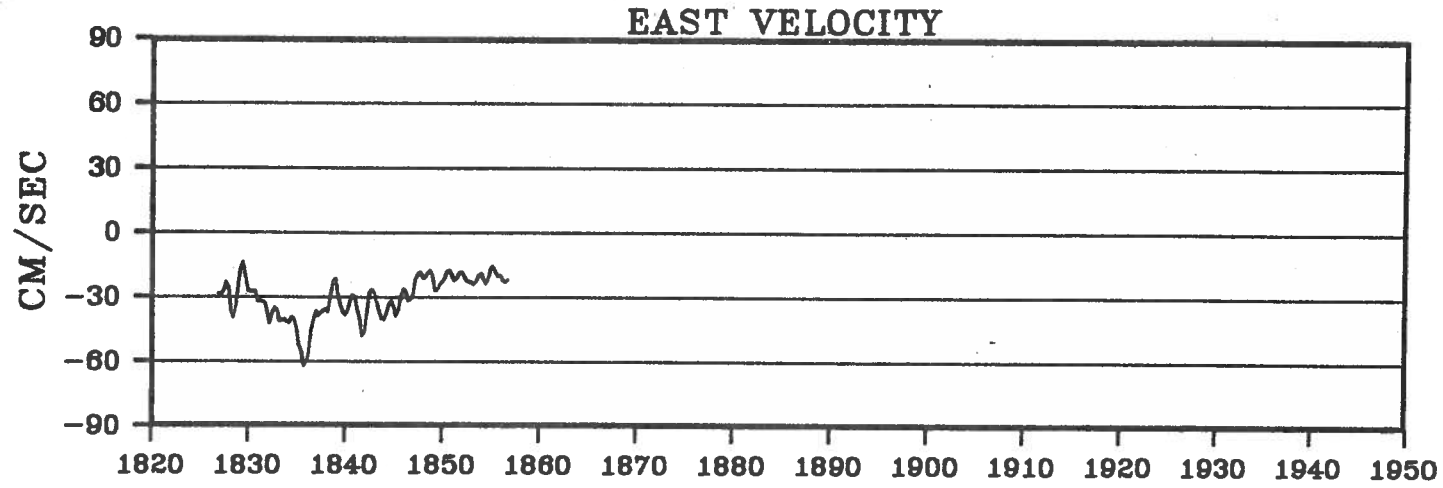
15 10 5 0 -5 -10 -15 -20 -25 -30
1857
1827

BUOY 4408


EAST VELOCITY
CM/SEC
90
60
30
0
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1830
1840
1850
1860
1870
1880
1890
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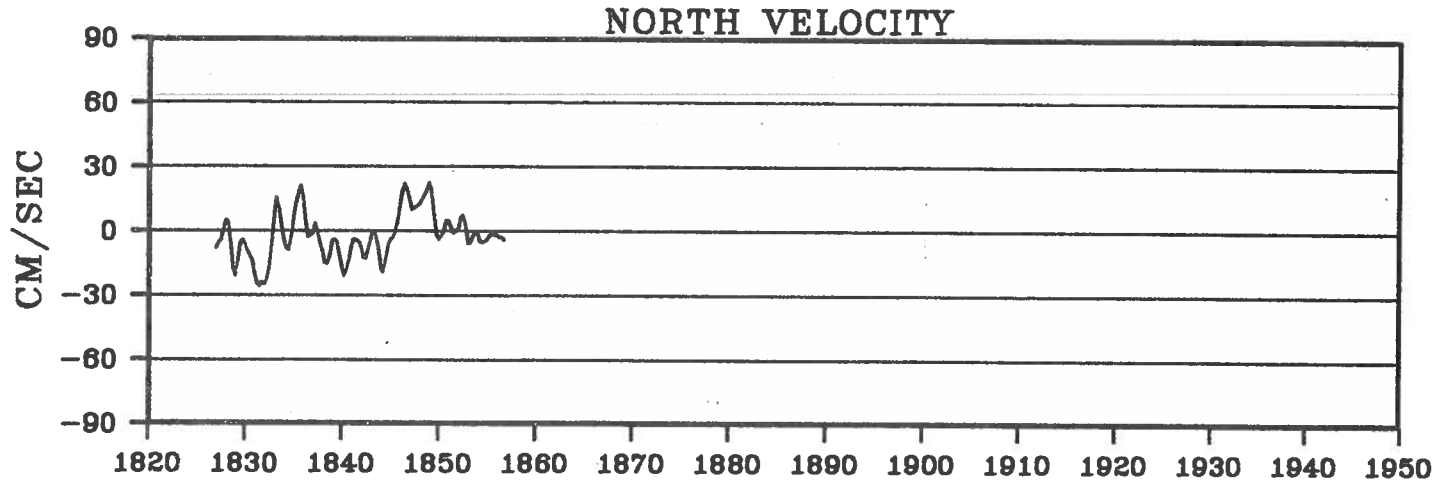
1910
1920
1930
1940
1950


NORTH VELOCITY
CM/SEC
90
60
30
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1870
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1890
1900
1910
1920
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1940
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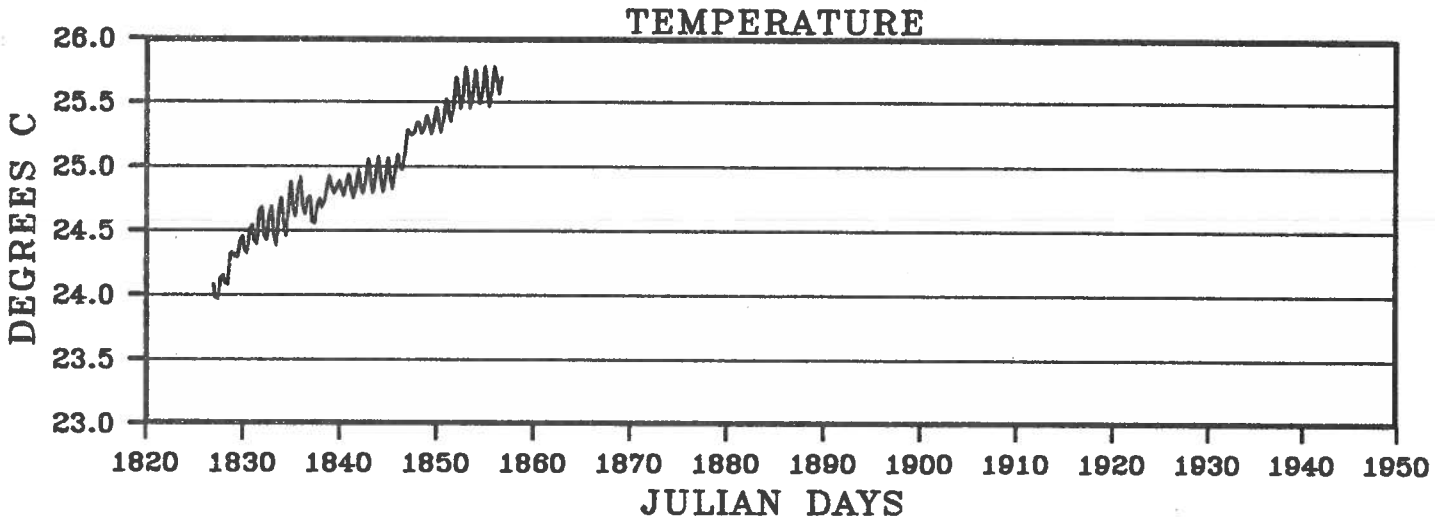
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DEGREES C
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25.5
25.0
24.5
24.0
23.5
23.0
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1870
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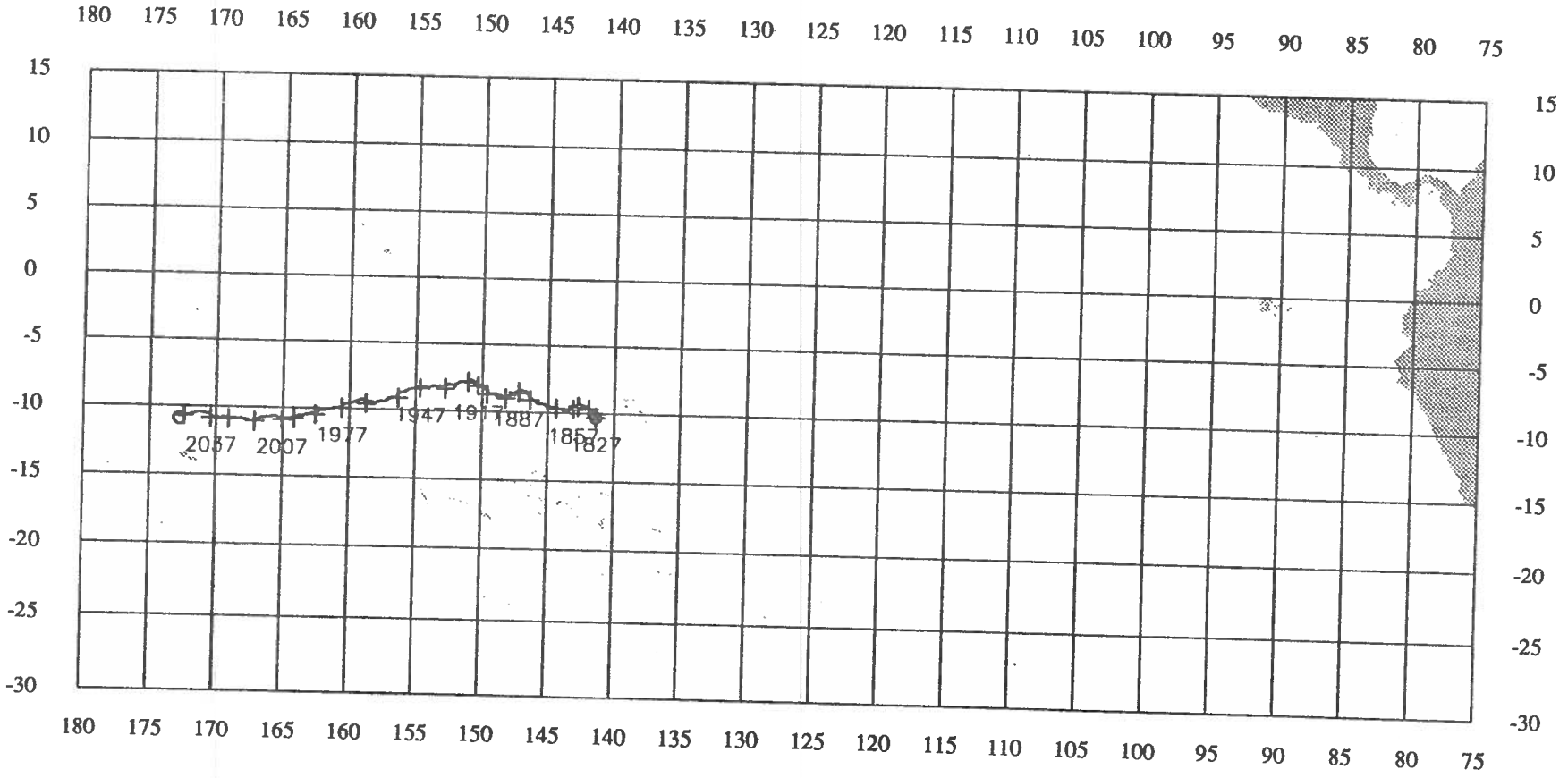
1890
1900
1910
1920
1930
1940
1950
JULIAN DAYS

BUOY 4414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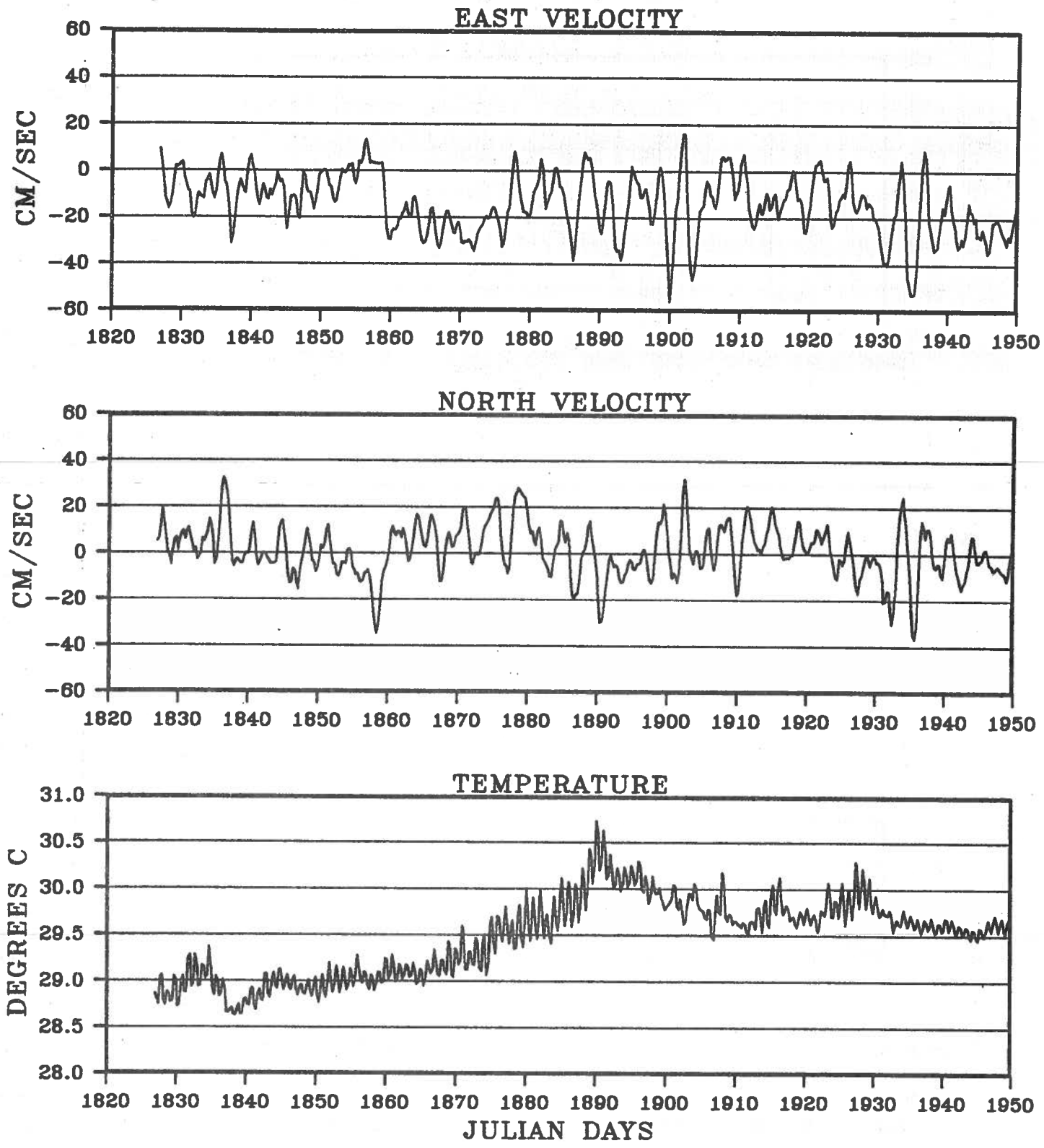
BUOY 4414


EAST VELOCITY
CM/SEC
60
40
20
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-20
-40
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1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
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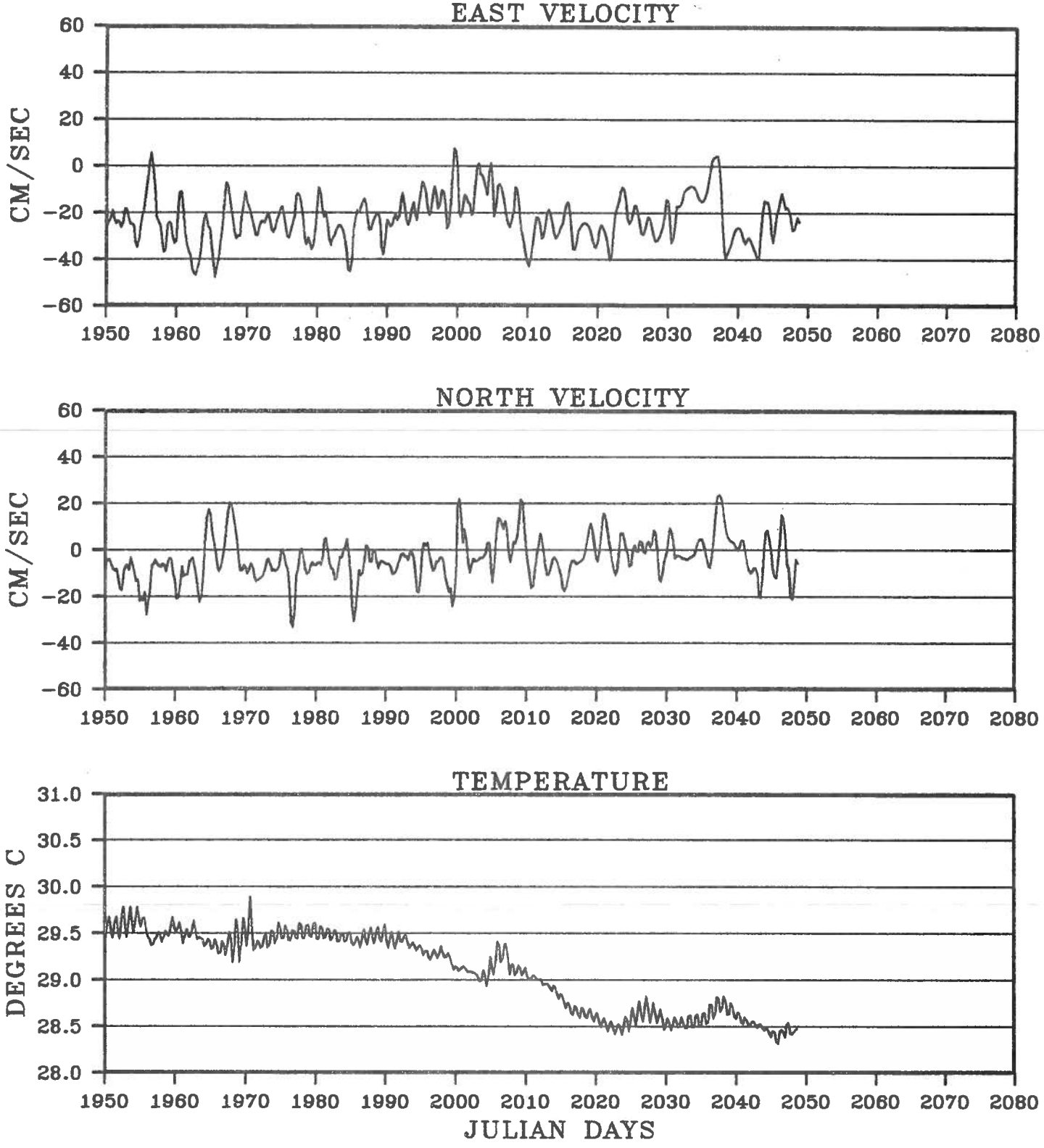
JULIAN DAYS

BUOY 4414


EAST VELOCITY
CM/SEC
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1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
TEMPERATURE
DEGREES C
31.0
30.5
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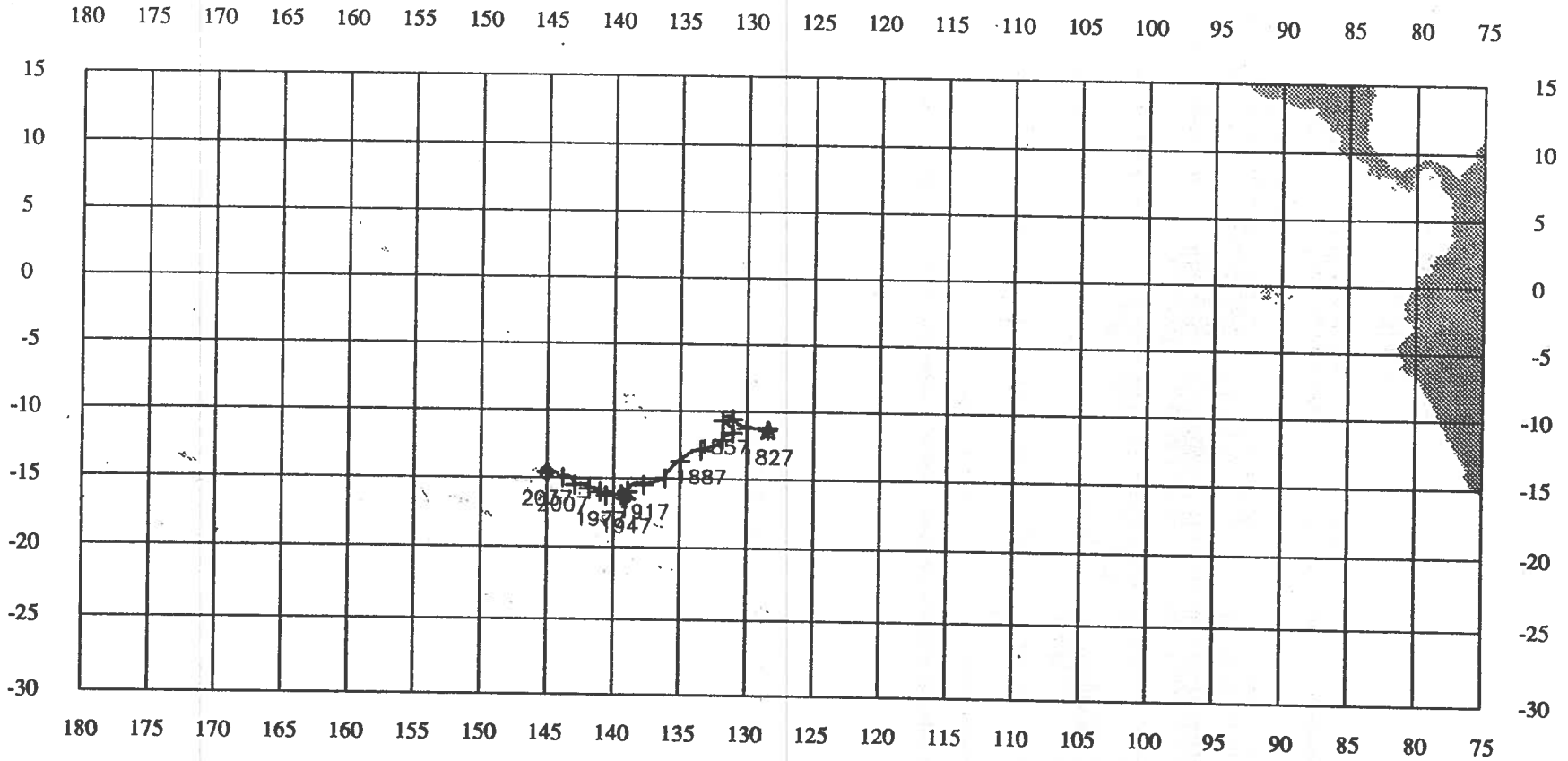
JULIAN DAYS

BUOY 4415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1827
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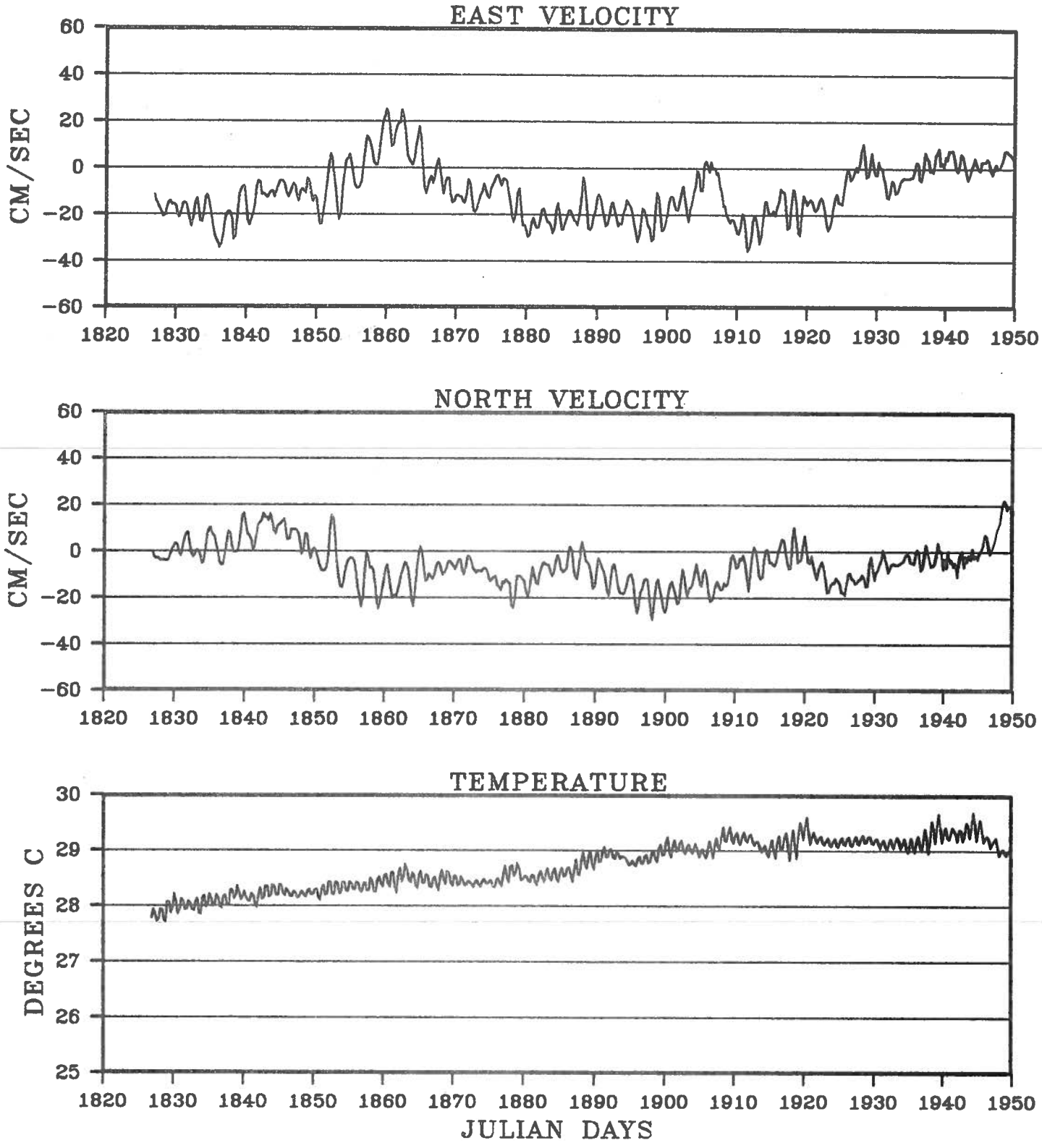
1947
2007

BUOY 4415


EAST VELOCITY
CM/SEC
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1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
60
40
20
0
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-40
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1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
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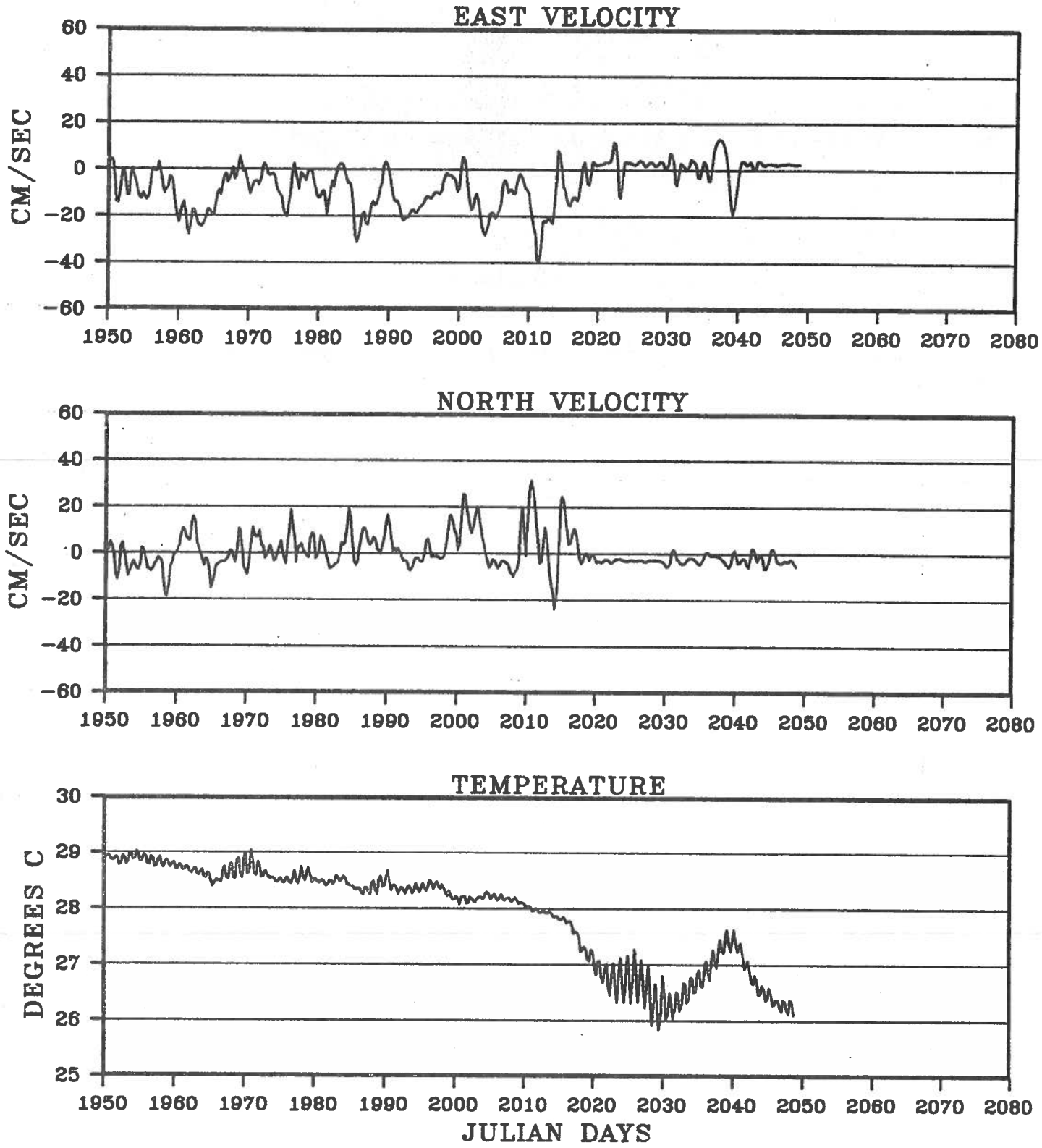
JULIAN DAYS

BUOY 4415


EAST VELOCITY
CM/SEC
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-20
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1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
NORTH VELOCITY
CM/SEC
60
40
20
0
-20
-40
-60
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
TEMPERATURE
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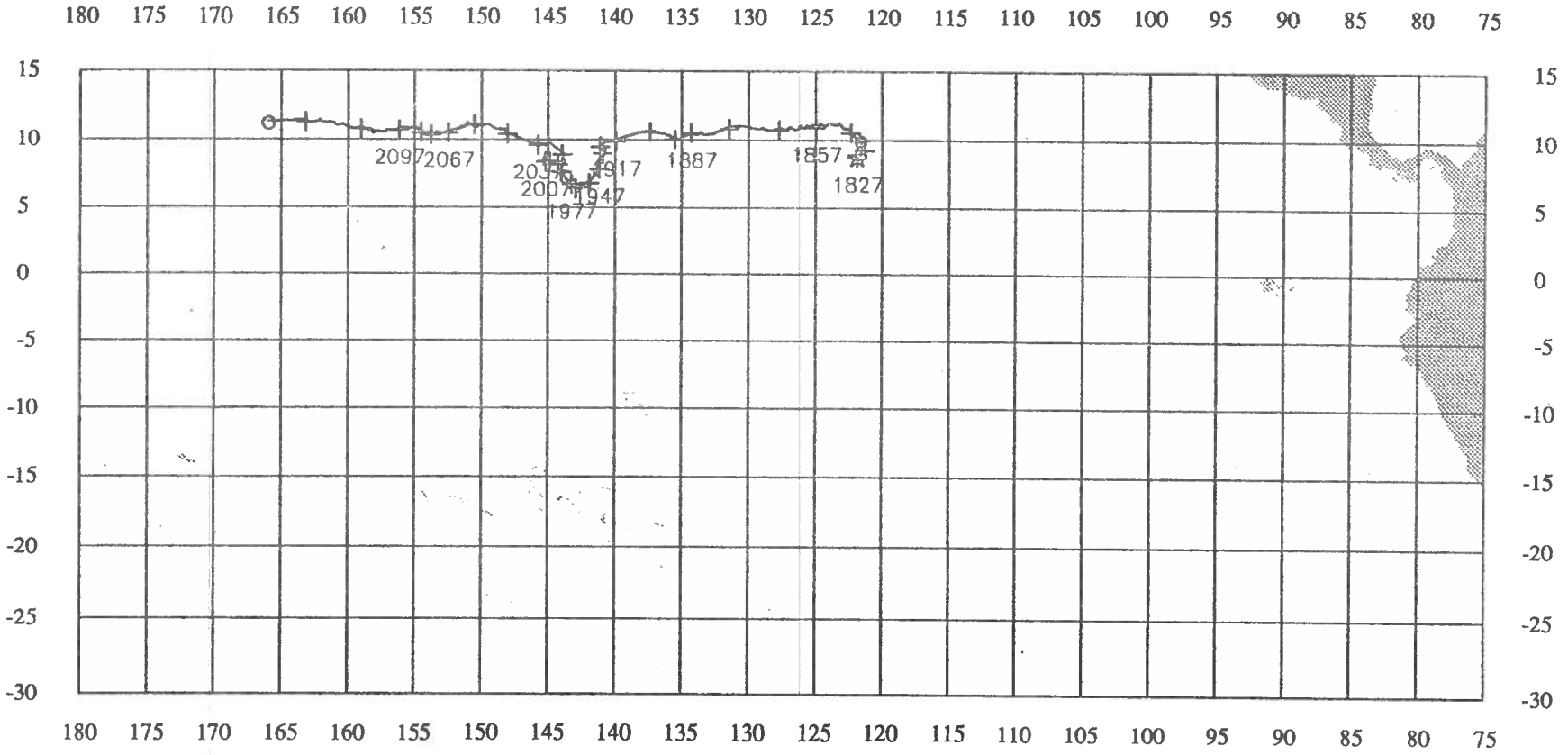
25
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4416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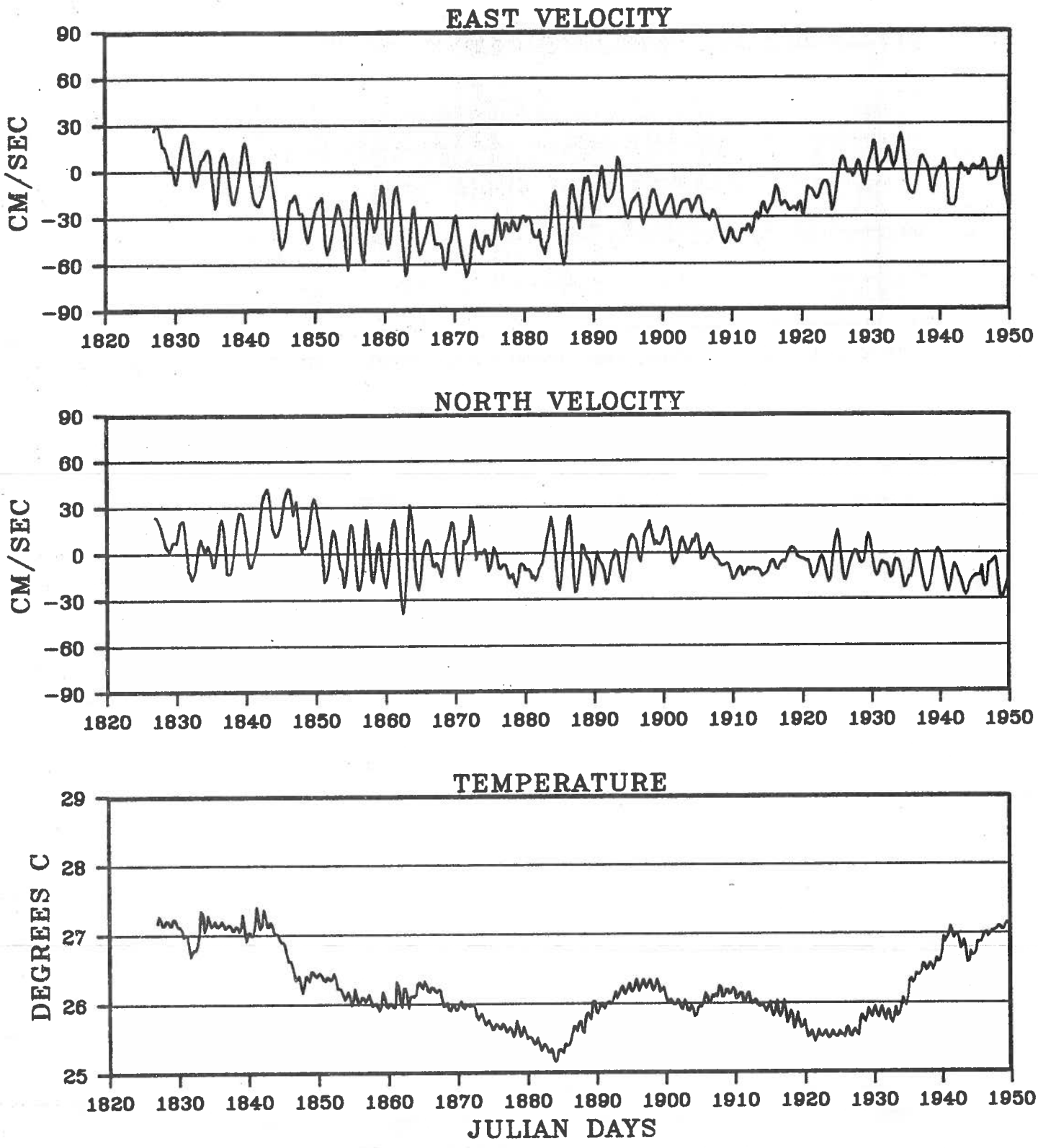
1947
1917
1887
1857
1827

BUOY 4416


EAST VELOCITY
CM/SEC
90
60
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-30
-60
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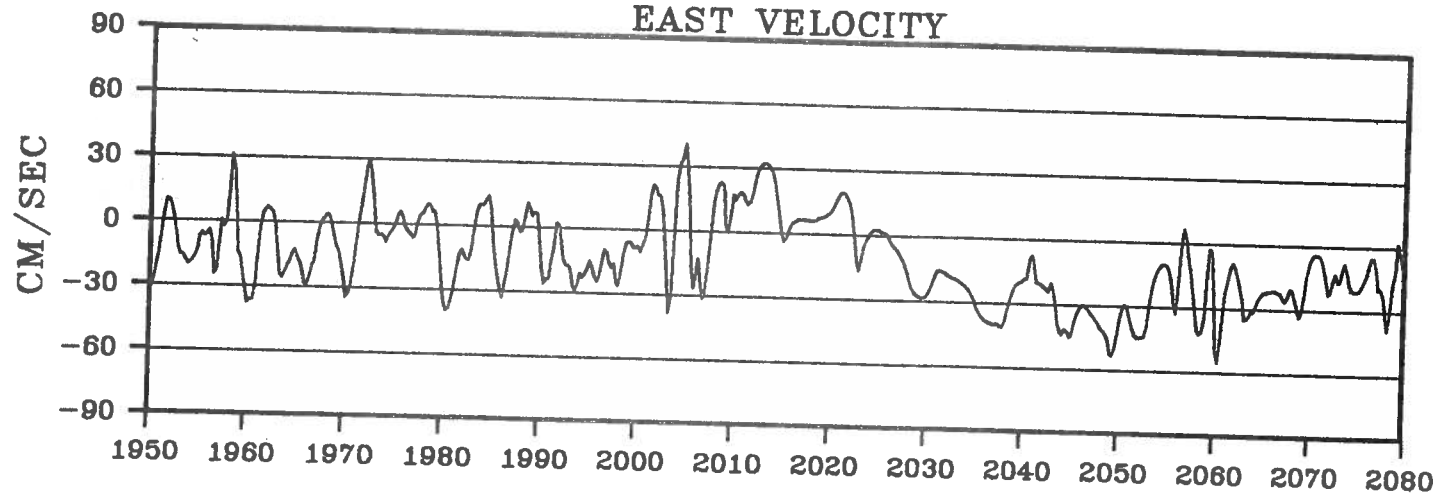
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
NORTH VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
TEMPERATURE
DEGREES C
29
28
27
26
25
1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
JULIAN DAYS

BUOY 4416


EAST VELOCITY
CM/SEC
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30
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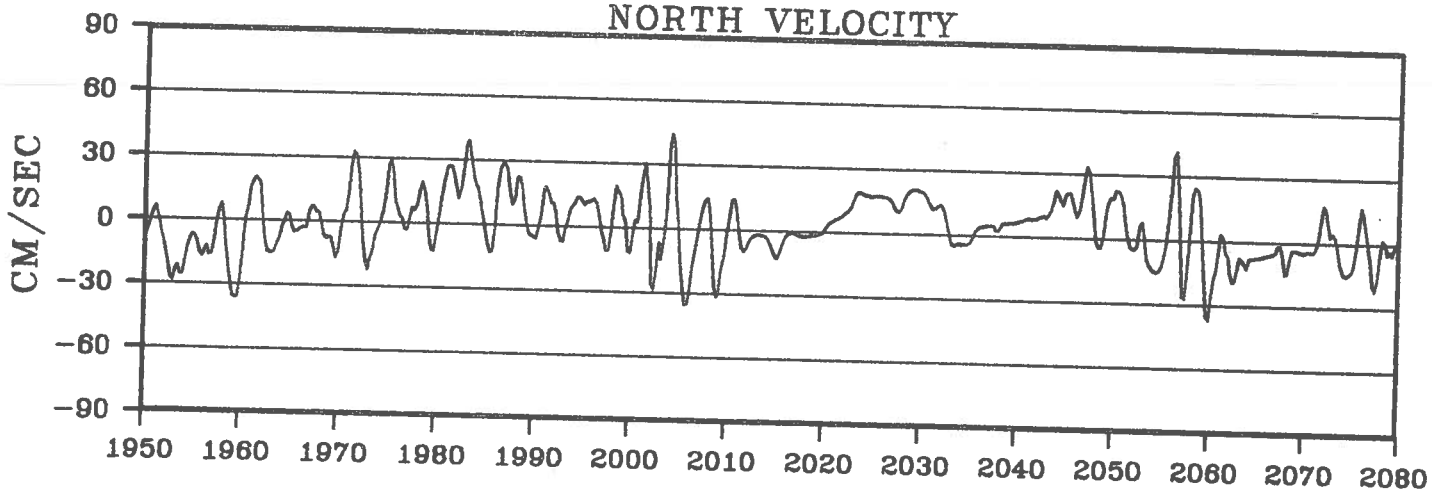
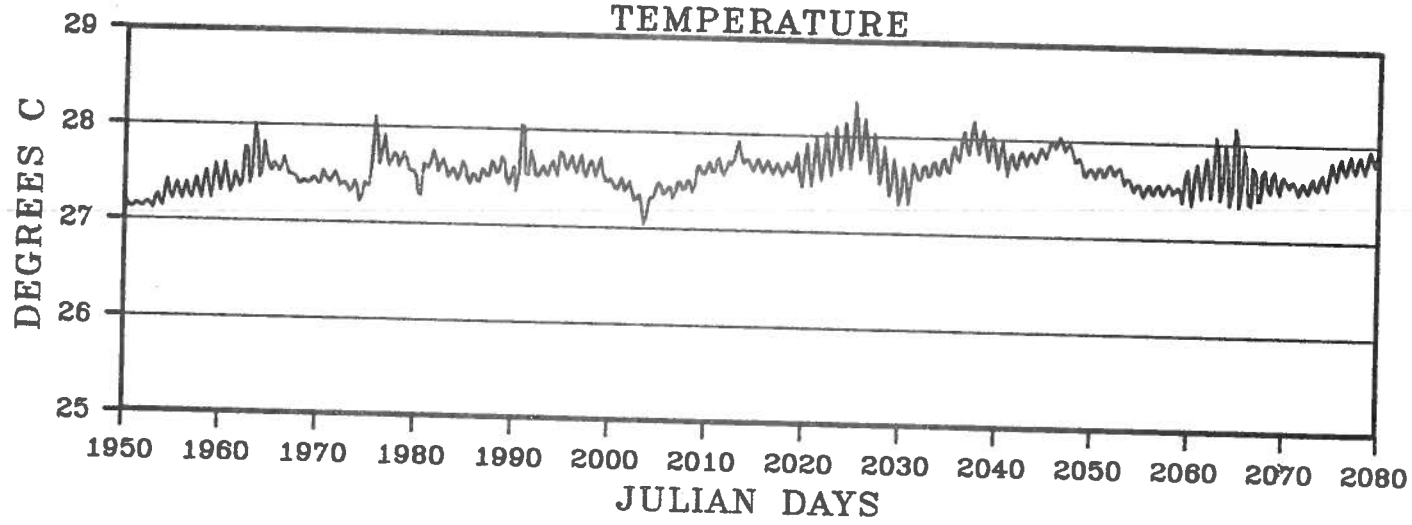
-30
-60
-90
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


NORTH VELOCITY
CM/SEC
90
60
30
0
-30
-60
-90
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080


TEMPERATURE
DEGREES C
29
28
27
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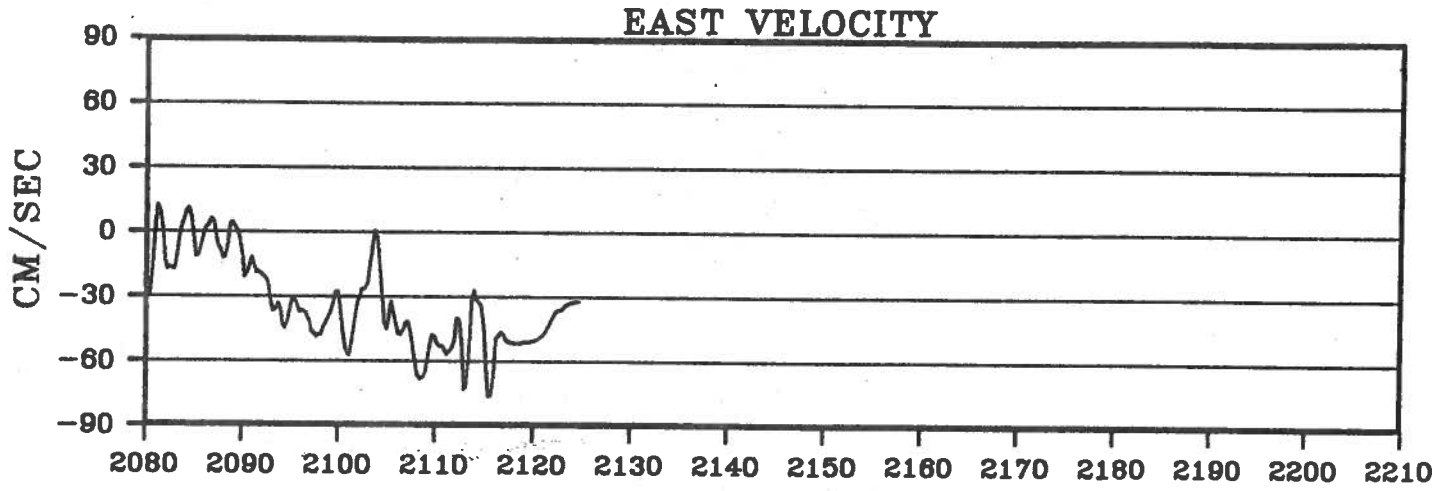
25
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080
JULIAN DAYS

BUOY 4416


EAST VELOCITY
CM/SEC
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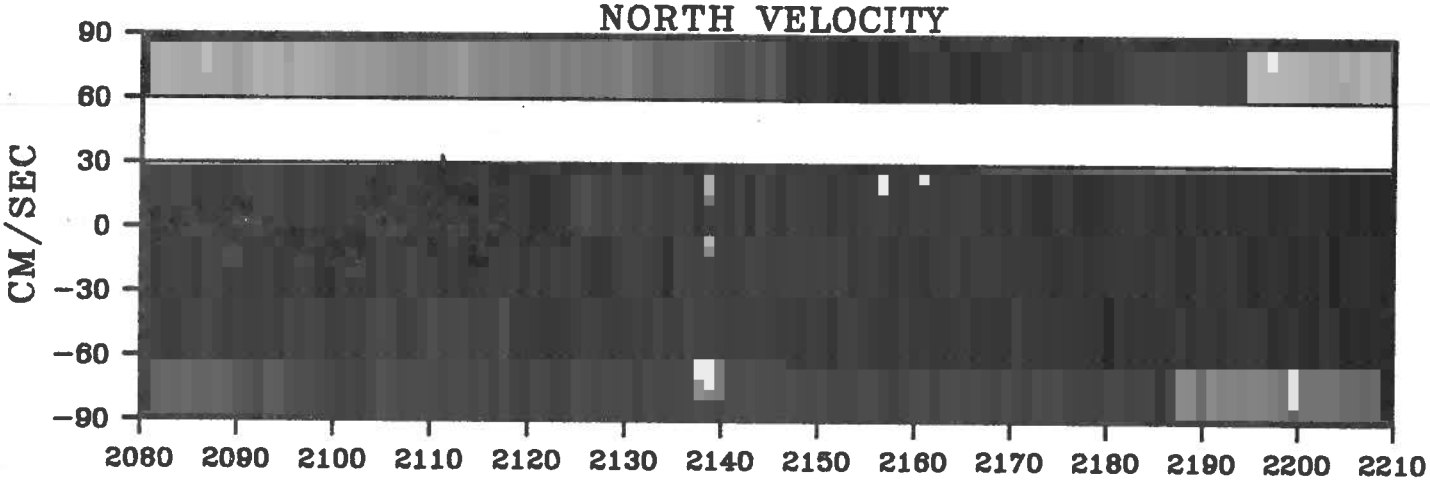
-30
-60
-90
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210


NORTH VELOCITY
CM/SEC
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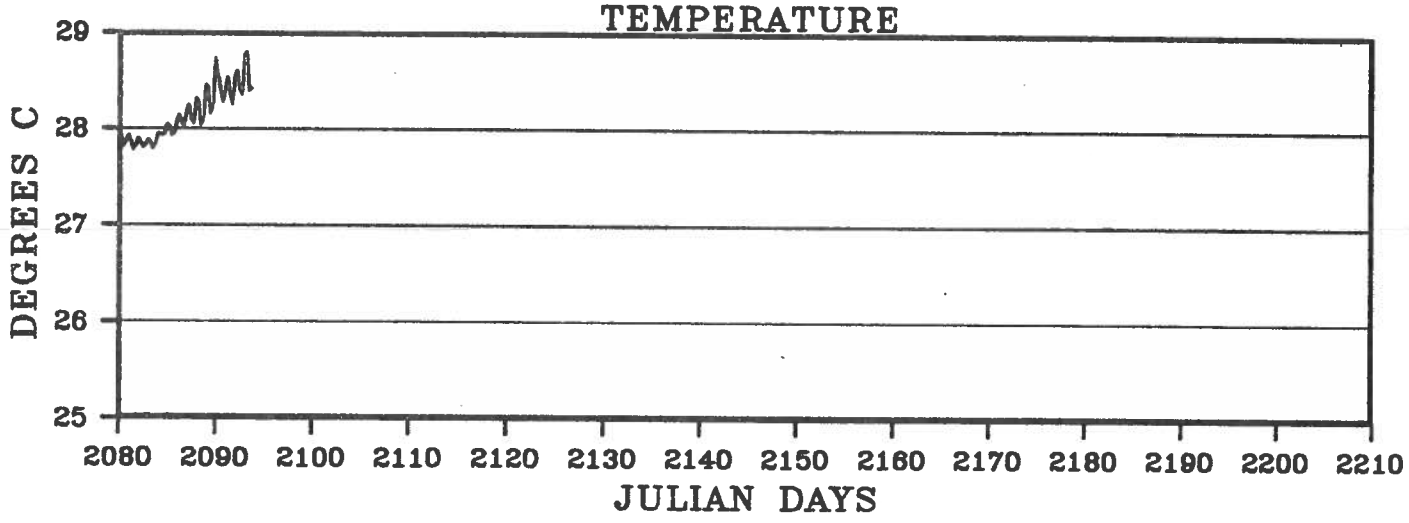
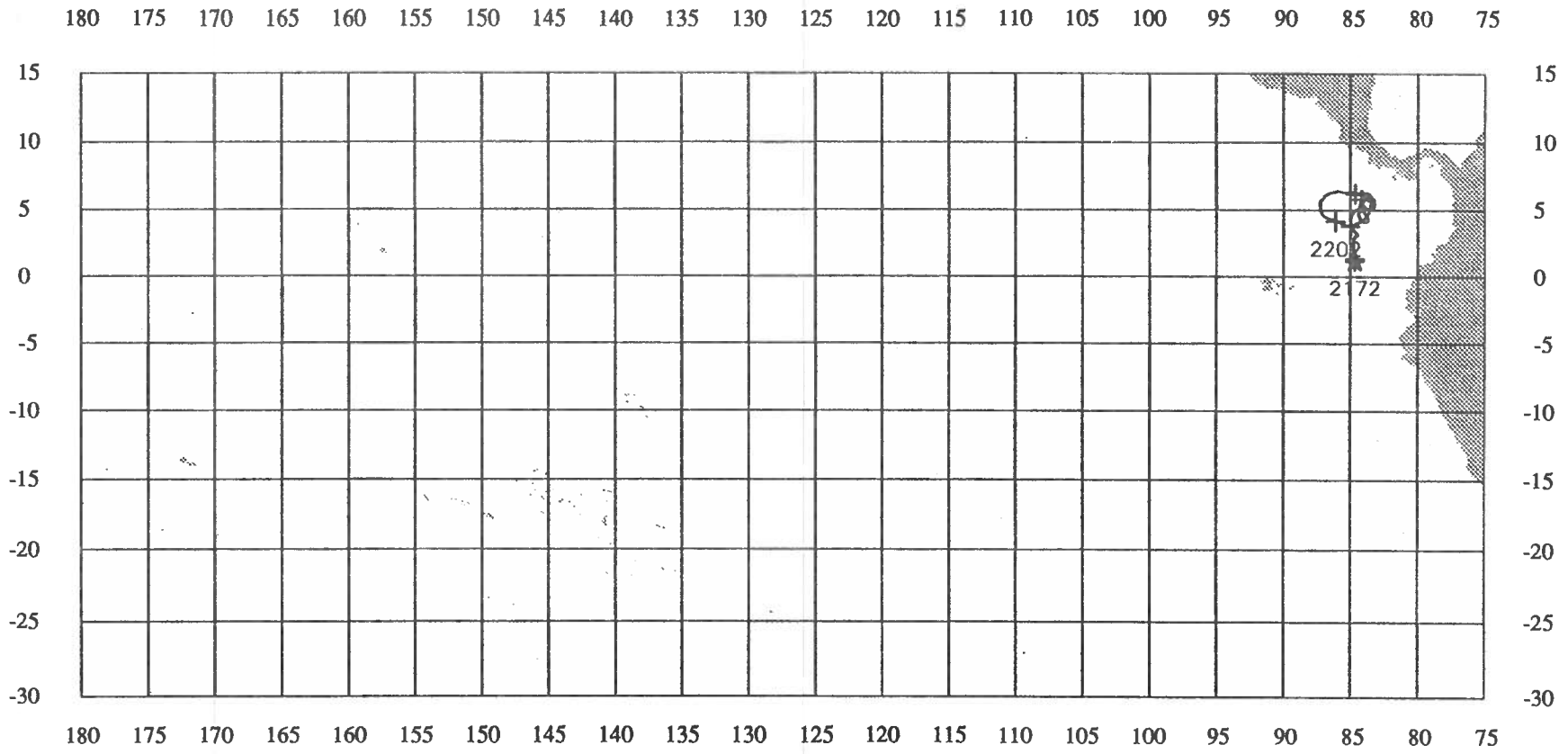
0
-30
-60
-90
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210


TEMPERATURE
DEGREES C
29
28
27
26
25
2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210
JULIAN DAYS

BUOY 4418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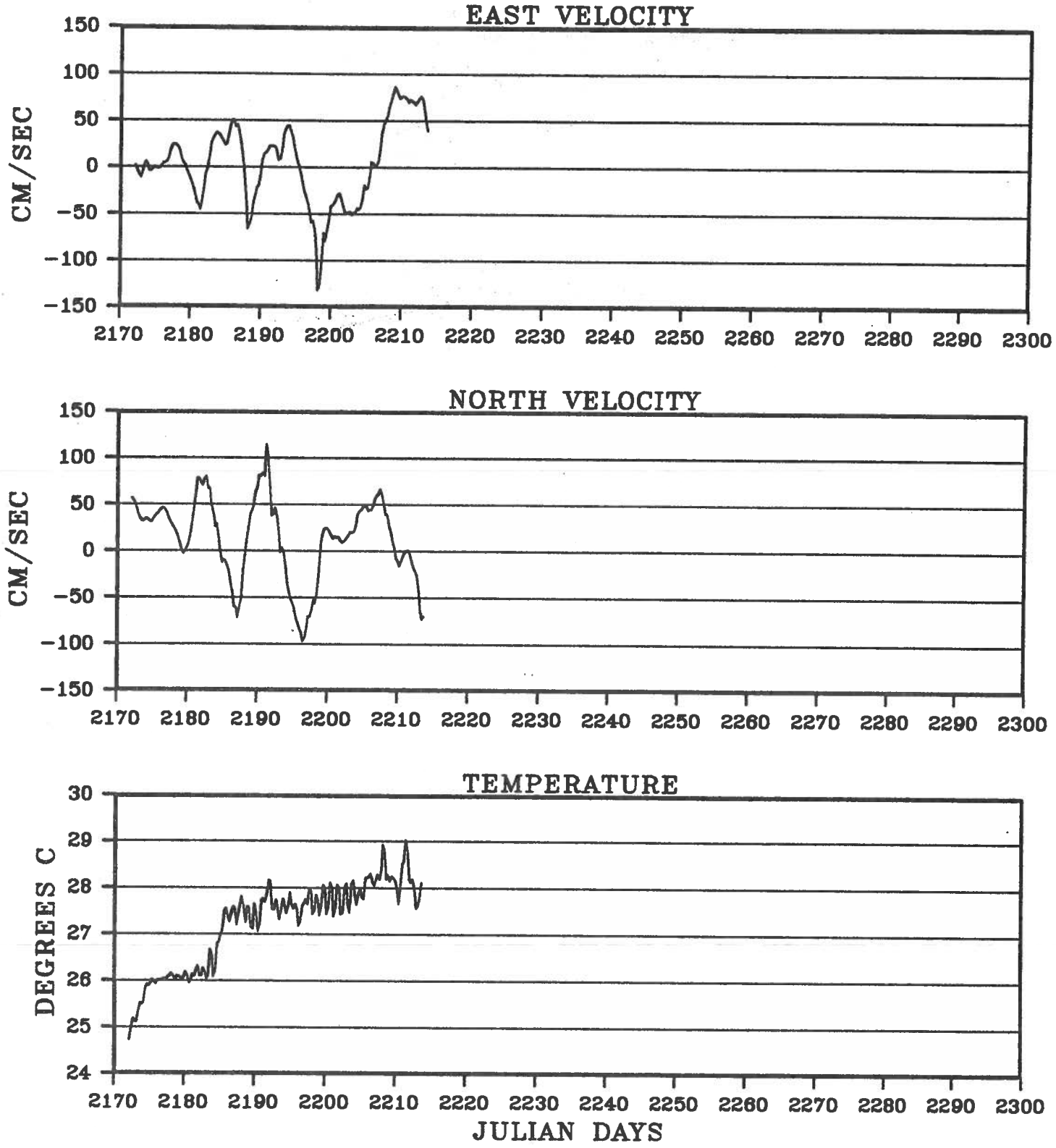
15 10 5 0 -5 -10 -15 -20 -25 -30
2202
2172

BUOY 4418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CM/SEC
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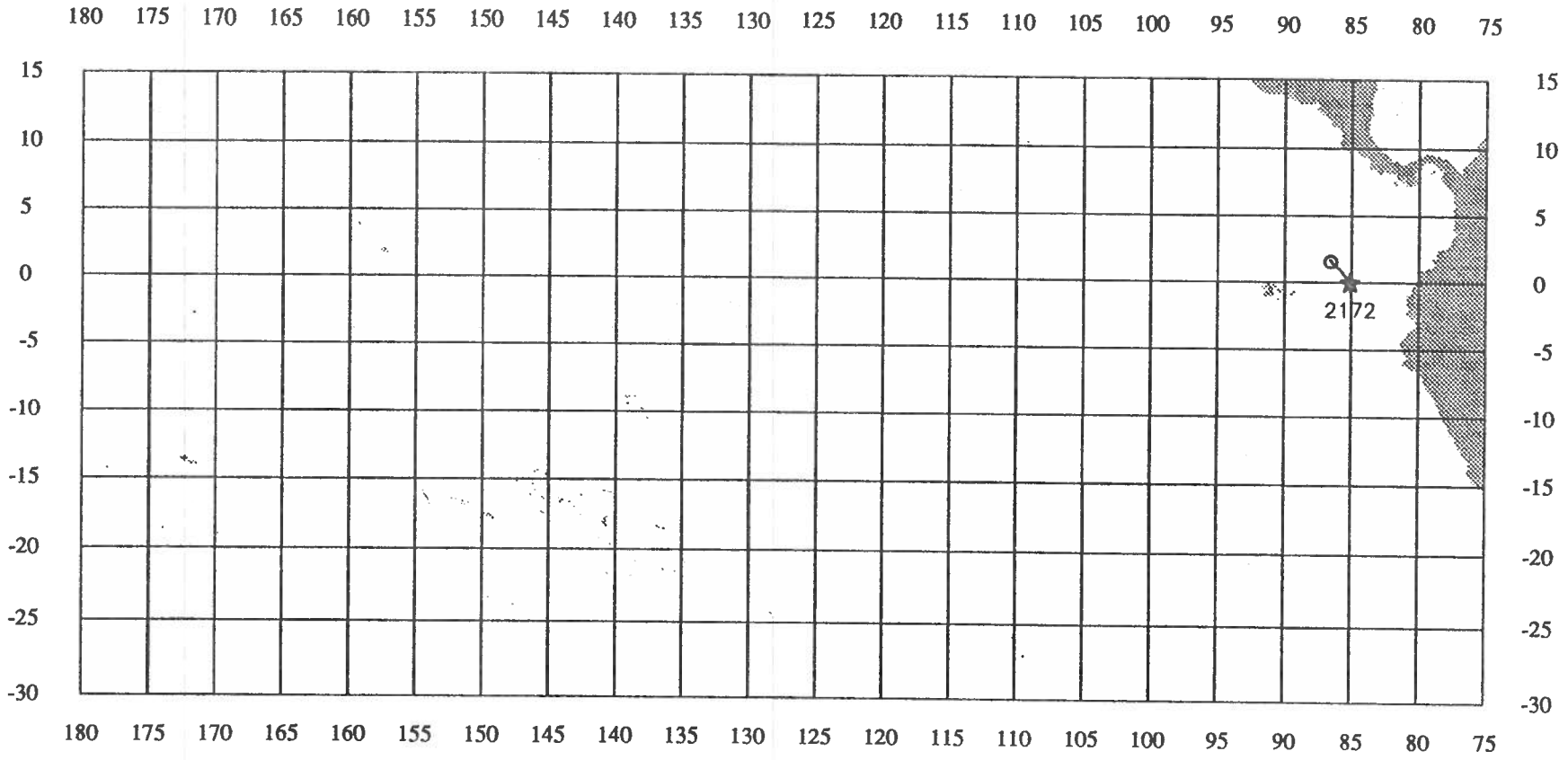
100
50
0
-50
-100
-150
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
NORTH VELOCITY
CM/SEC
150
100
50
0
-50
-100
-150
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
TEMPERATURE
DEGREES C
30
29
28
27
26
25
24
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
JULIAN DAYS

BUOY 4419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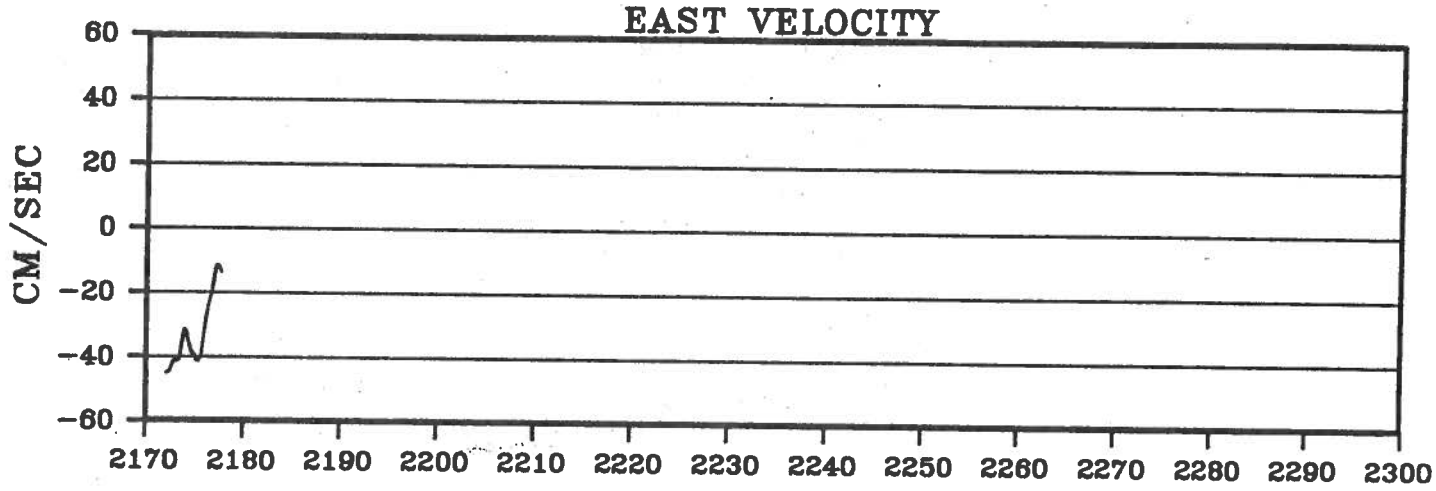
BUOY 4419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CM/SEC
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40
20
0
-20
-40
-60
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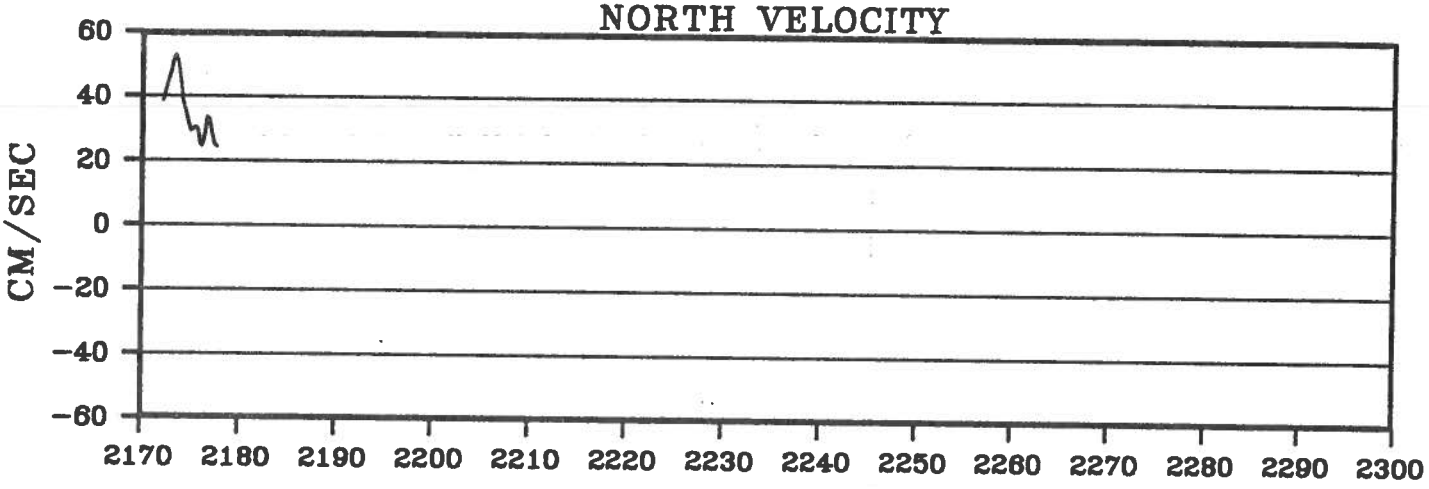
NORTH VELOCITY
CM/SEC
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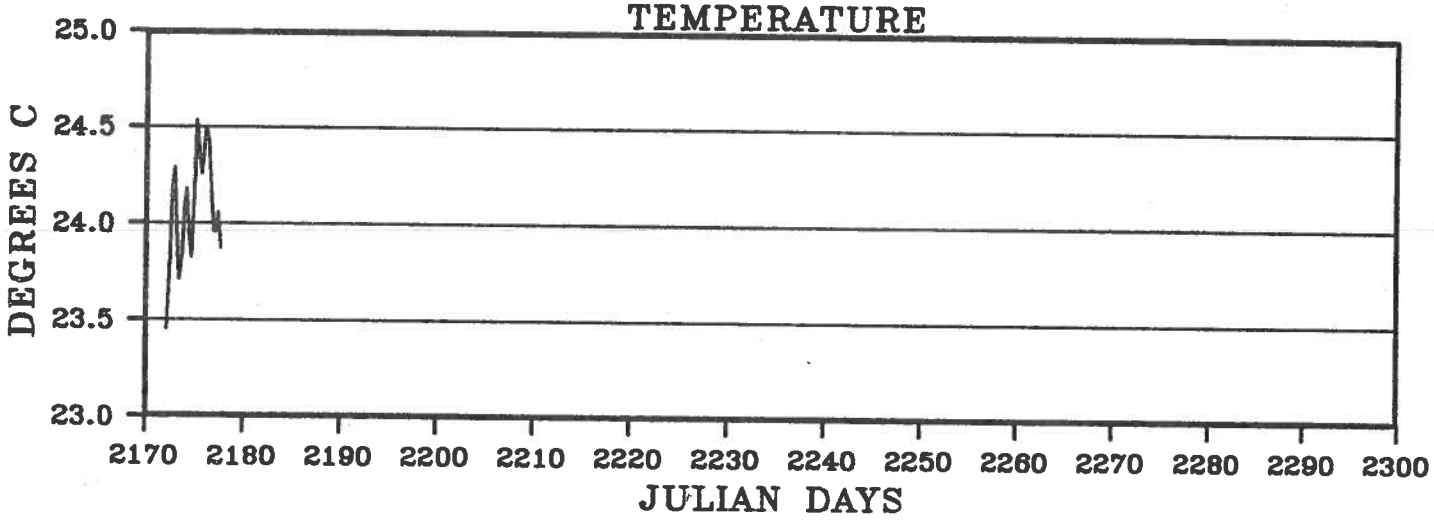
40
20
0
-20
-40
-60
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300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DEGREES C
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24.0
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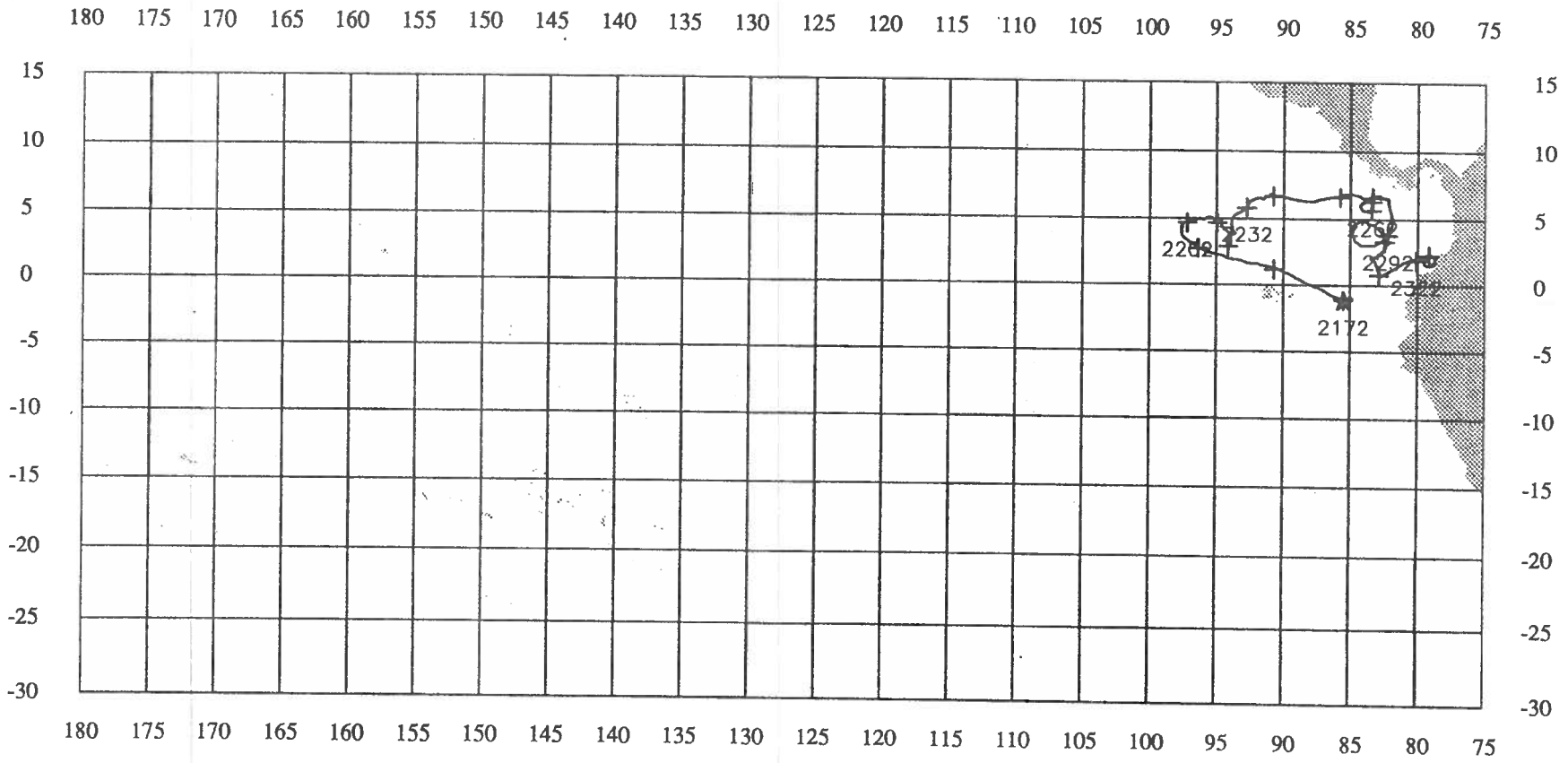
JULIAN DAYS

BUOY 4421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2292
2322
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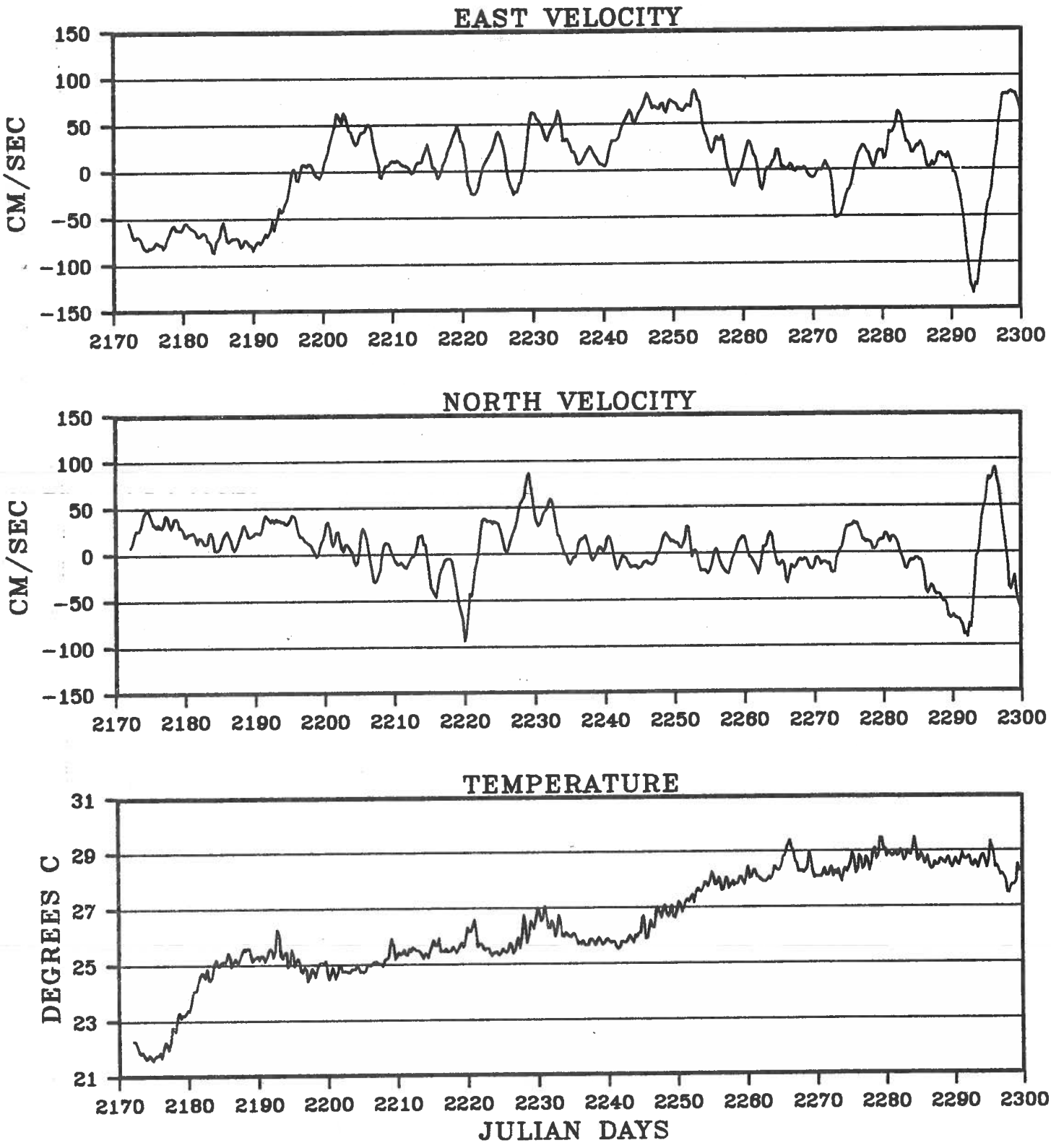
BUOY 4421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-100
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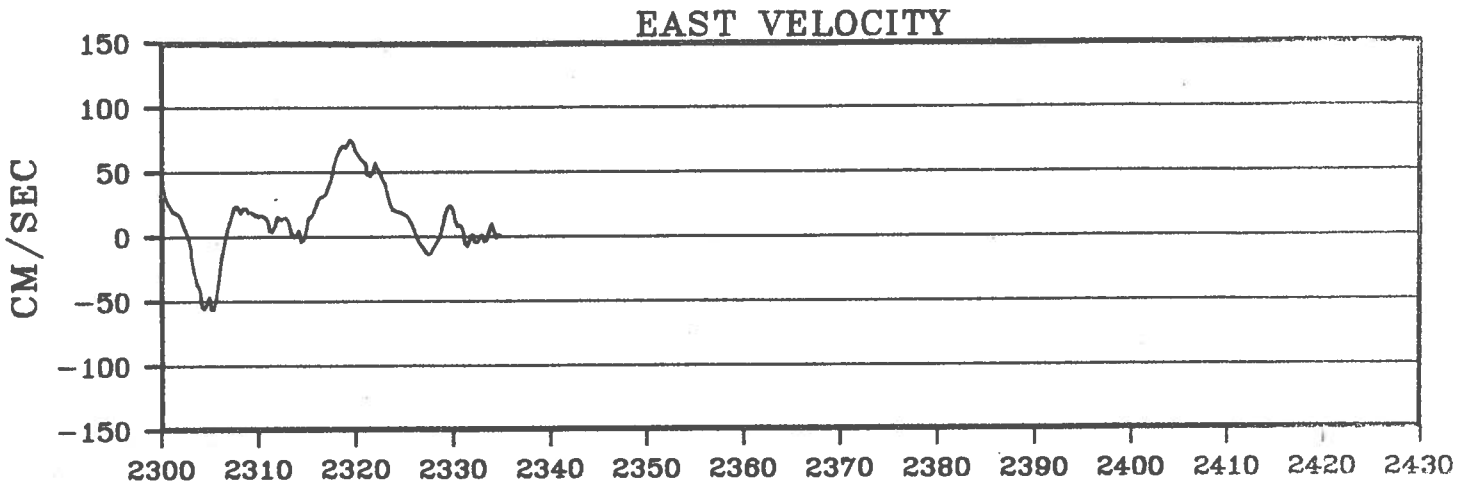
NORTH VELOCITY
CM/SEC
150
100
50
0
-50
-100
-150
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
TEMPERATURE
DEGREES C
31
29
27
25
23
21
2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300
JULIAN DAYS

BUOY 4421


EAST VELOCITY
CM/SEC
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−100
−150
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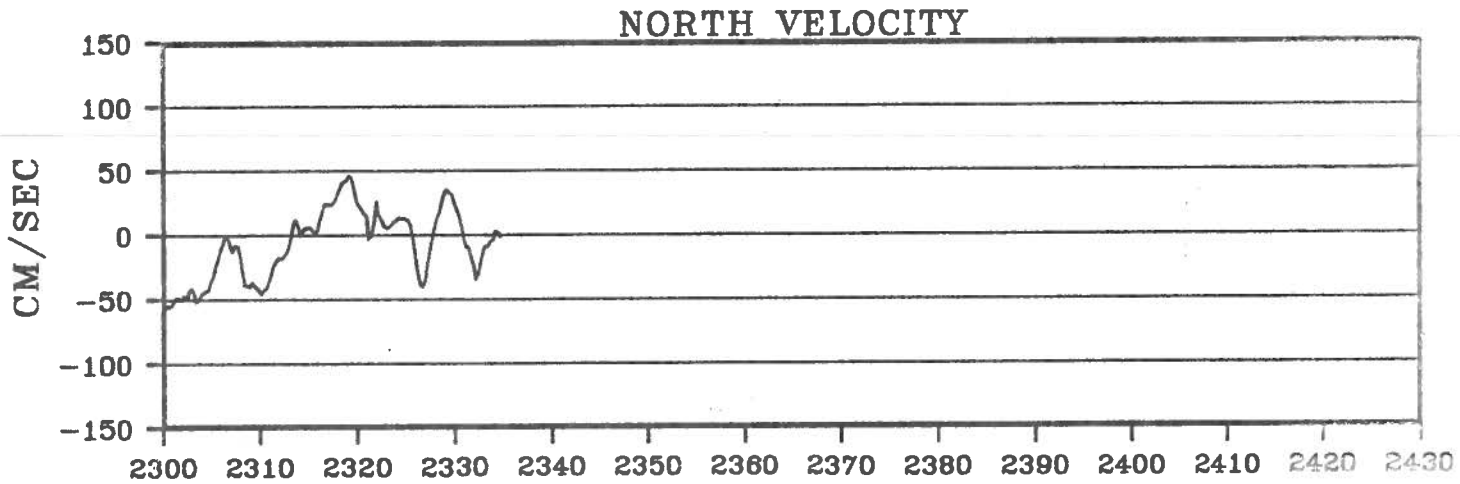
NORTH VELOCITY
CM/SEC
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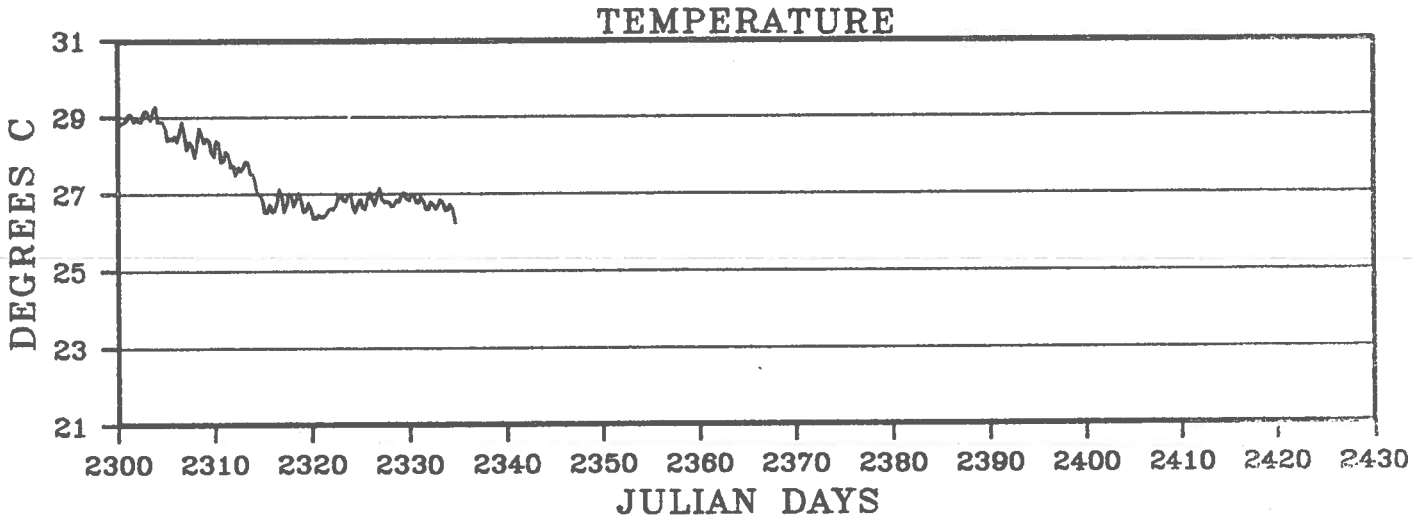
2300 2310 2320 2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430


TEMPERATURE
DEGREES C
31
29
27
25
23
21
2300 2310 2320 2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430
JULIAN DAYS