

The state of the eastern North Pacific since autumn 1999

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Dr. Howard Freeland is a research scientist in the Ocean Science and Productivity Division at the Institute of Ocean Sciences (Fisheries and Oceans Canada). His research interests include the climatic state of the ocean and low frequency variability. Presently he has interests in the maintenance of Line P, a line of CTD stations that has been monitored for over 45 years between the mouth of the Juan de Fuca Strait and Ocean Station Papa at 50°N and 145°W. Howard is also on the international science team for project Argo which aims to deploy a global array of profiling ALACE floats to monitor the evolving state of the ocean. He is involved in various PICES activities as a member of the Physical Oceanography and Climate Committee and Chairman of the Publications Committee.



As is well known, climatic conditions in the eastern North Pacific are heavily determined by conditions in the equatorial Pacific. Figure 1 shows a plot of the daily values of the southern oscillation index from January 1, 1997, through to April 3, 2000. This is one of the indicators used to describe the tendency towards or away from El Niño or La Niña conditions. The red line is the 31-day running mean of the daily values. The El Niño event of 1997-98 is evident in the long period of negative values that started in the spring of 1997. In the spring of 1998 there was an abrupt transition to distinctly positive values, and we entered the La Niña phase. As is fairly evident in the recent observations, we passed through a period of apparent normalcy in the summer to autumn of 1999, and seem to be in a period since that time when the index appears somewhat unstable. A more interesting indicator is the distribution of subsurface temperature along the equator. Through the period of apparent normalcy in 1999, as suggested by Figure 1, it was also evident that though surface temperatures in the equatorial Pacific were close to normal, there was in fact a large pool of cool water rather close to the surface. The latest forecasts from the Climate Prediction Center (NOAA) do suggest a steady return towards normal conditions. Thus we should not expect any large climate anomalies during 2000.

Through the fall to winter to spring of 1999-2000 sea surface temperatures in the eastern North Pacific have been systematically below normal, though not greatly so, as shown by the sequence of maps comprising Figure 2.

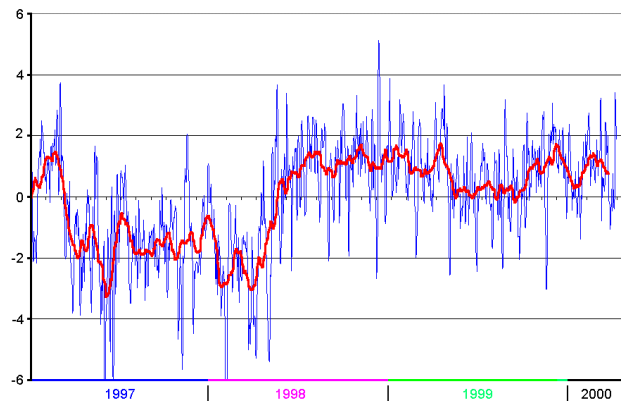


Fig. 1 The Southern Oscillation Index from January 1997 to present.

Unfortunately, we were unable to execute the usual winter survey along Line-P during February 2000, so for the first time I am unable to include any comments about ocean conditions along Line-P. However, 3 years ago a profiling Alace float (Webb Research P-Alace float, serial number 578) was launched at Ocean Station Papa. [See the **Project Argo** article following immediately after this article.] After three years it remains close to Line-P (Fig. 3). The three warm periods shown represent the summers of 1997, 1998 and 1999.

The drift diagram is shown to demonstrate the continued proximity to Line-P. Despite the fact that the float has remained in a climatologically homogeneous region, i.e. no

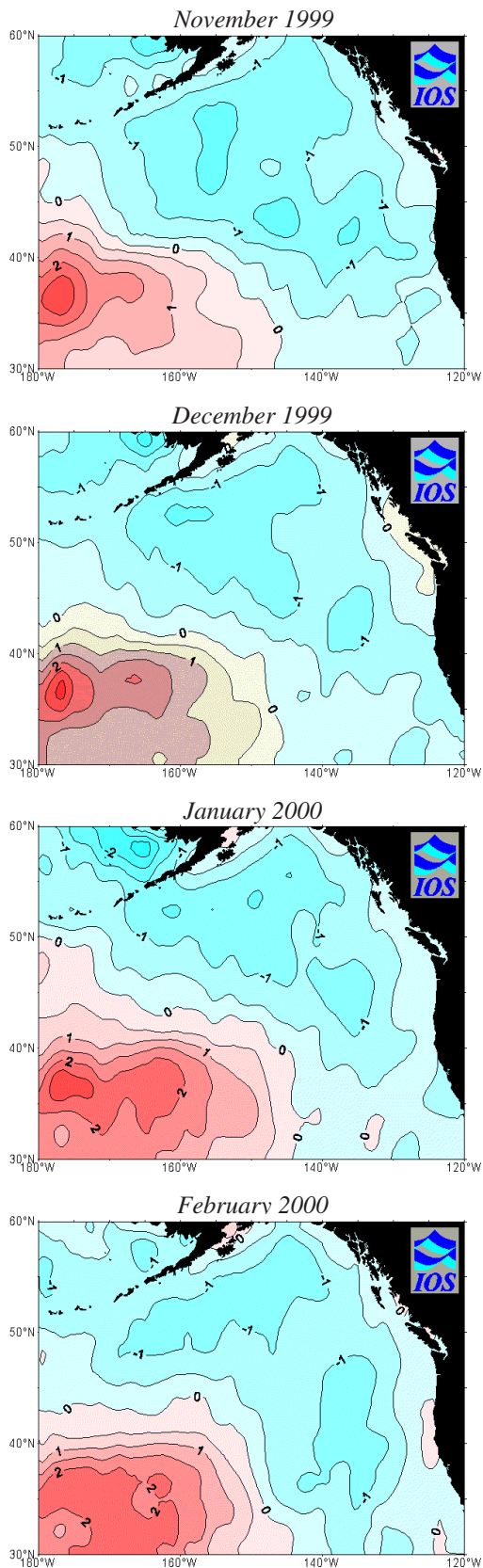


Fig. 2 Maps of sea-surface temperature anomaly in the eastern North Pacific for November 1999 through February 2000.

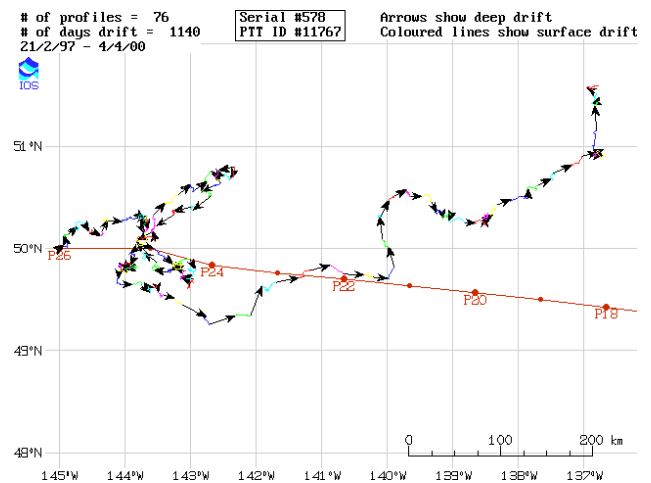
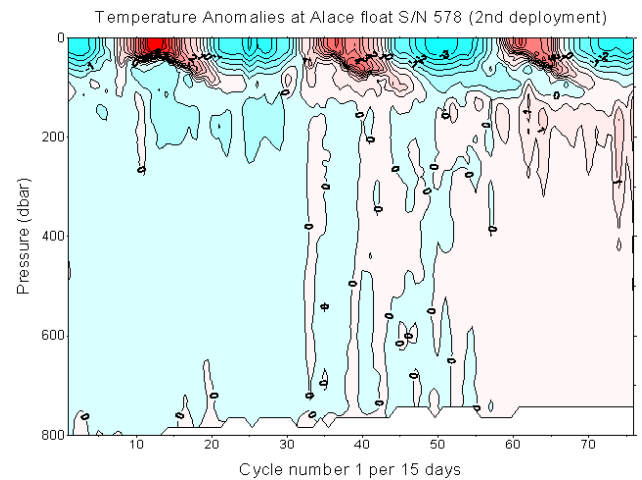
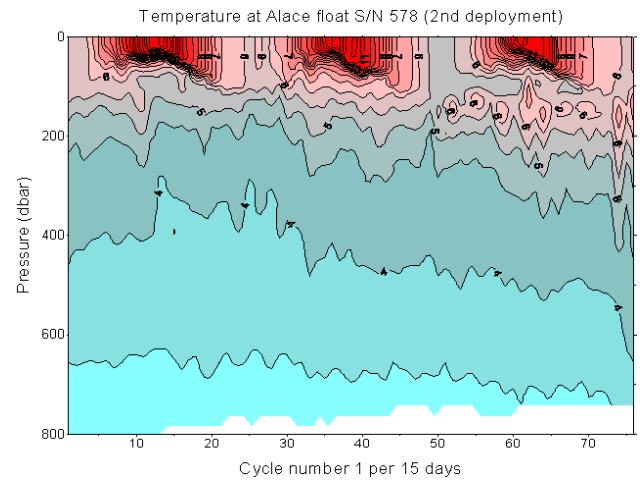


Fig. 3 Temperature and temperature anomaly distributions and drift of P-Alace float S/N 578 near Station Papa.

large temperature gradients are expected, a warm anomaly shows up in the temperature and its anomaly plots starting in the fall of 1998 centered near a depth of 200 dbar but also penetrating into deep water. This is presumably an advective feature and represents an influx of more southerly water masses into the N.E. Pacific. I would be interested in talking to anyone who can speculate on the origin of this water mass. More information about this float can be found on the web site:

<http://www-sci.pac.dfo-mpo.gc.ca/osap/projects/alace/578b.htm>