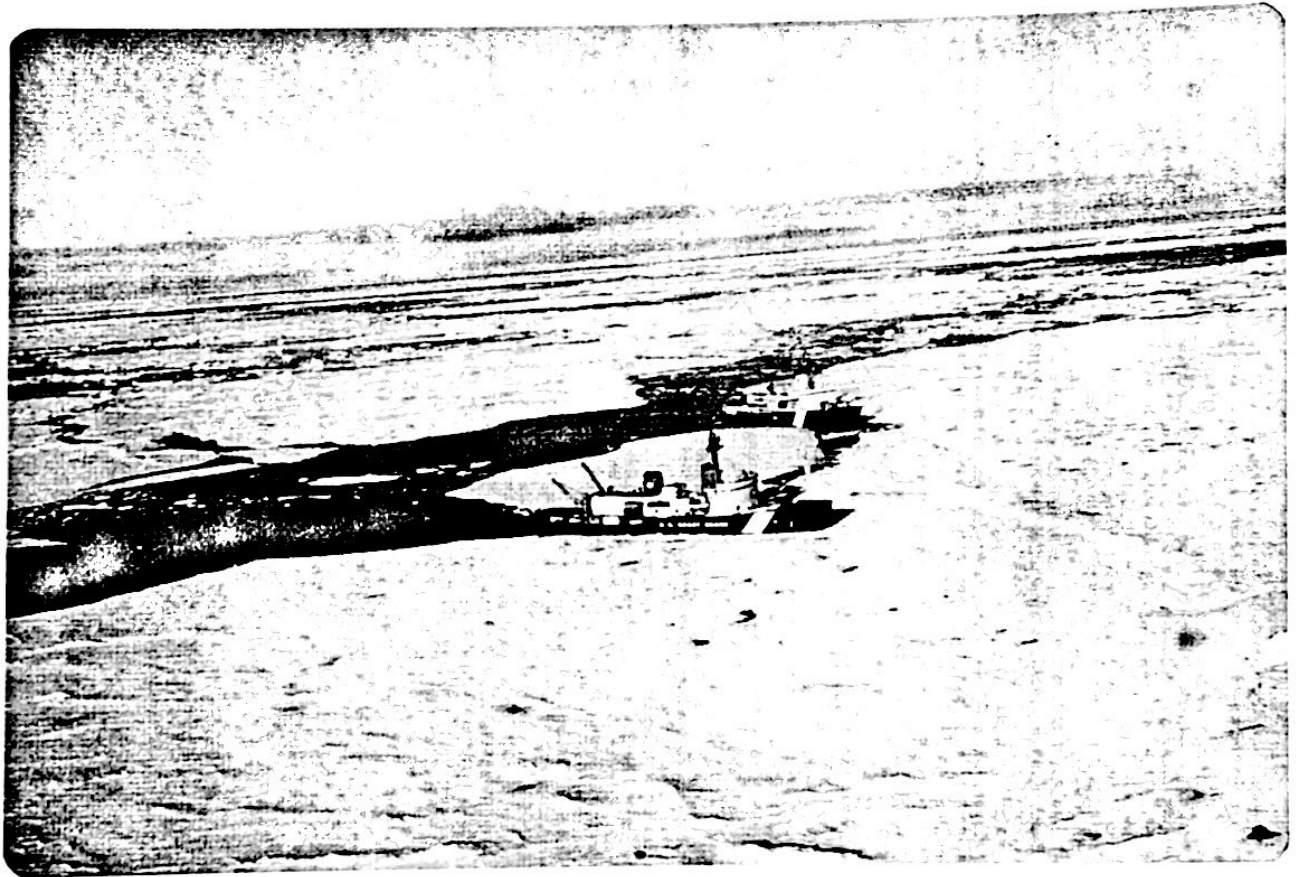


1996 OCEAN SCIENCES MEETING

San Diego, California

February 12-16



American Geophysical Union

American Society of Limnology and Oceanography

Published as a supplement to

Eos, Transactions, American Geophysical Union

Vol. 76, No. 3, January 16, 1996

Irradiance control of phytoplankton biomass and production in Terra Nova Bay (Western Ross Sea)

L. Lazzara, M. Innamorati, L. Massi, G. Mori and C. Nuccio

Dip.to Biologia Vegetale, University of Florence, Italy
e-mail: ecol@cesit1.unifi.it)

The temporal distribution of phytoplankton biomass has been followed in Terra Nova Bay (74° 42'S; 164° 12'E) during the summer of 1987/88, 1989/90 and 1994/95, together with surface and underwater spectral irradiance, CTD profiles and nutrients. Both cell density and chlorophyll *a* show the same trend in the three years, with a bloom at the end of December and the beginning of a new one in February. Scarce evidence exists in literature of such a late development of phytoplankton biomass, owing to the lack of observations for that period. The maximum of the bloom (12 mg/m³ of chl and 10⁷ cells/dm³) occurs when the irradiance reaches the maximum and enough energy has been collected to melt the pack-ice, to warm and stabilize the surface layers of the water column and to allow high primary production levels. A strong nutrients depletion in January is followed by a new availability, which can support the existence of a second late summer bloom. Even production measurements, at the beginning of February, have shown high ¹⁴C assimilation rates (up to 4.7 mg C/m³ h).

Photo-inhibition processes have always been observed in the surface layer (up to 20m). Stratified conditions frequently occur: low salinity surface layers associated to scarce biomass and a subsurface peak above or inside the pycnocline. In such conditions, samples from the surface layer, have revealed the presence of a compound with extremely high absorption in the UV-VIS boundary domain (peak around 375 nm), in the absorption spectra of the acetic extracts. For samples with increased absorption in this spectral region, the photosynthetic activity is not enhanced compared to deep samples, as revealed by the *in vivo* fluorescence excitation spectra of chlorophyll *a*. Therefore a photo-protective role can be hypothesized, for this substance.