



Evidence of initial degradation of *Limacina helicina* shells above the chemical lysocline in the Ross Sea (Antarctica)

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The observation of badly preserved shells of the pteropod *Limacina helicina* in deep (880 m) sediment traps moored in the polynya of Terra Nova Bay was the first goad that led us to investigate the chemical and physical processes affecting the aragonitic shells of these organisms upon their death in this area. This subpolar-polar pteropod is considered an overall indicator of ecosystem health which in the Ross Sea accounts for the majority of the annual carbon export. For this purpose we determined the chemical saturation state of CaCO_3 in seawater from Total Inorganic Carbon (TCO_2) and Total Alkalinity (TA) data. The results showed that the saturation level for aragonite was located at about 1000 m depth, hence below the trap level. A few lines of evidence concur to suggest aragonite dissolution above the chemical lysocline in the investigated area: i) fluxes of *Limacina helicina* shells near the bottom were very low, despite the

large abundance of these pteropods in the upper 200 m of the water column, ii) the shells collected near the bottom showed a state of advanced chemical degradation, on the contrary of the shells collected by the shallow trap, which appeared integral and well preserved and iii) carbonate fluxes observed in the bottom trap corresponded to only 1% of fluxes measured in the shallow one.

Results are presented for several oceanographic cruises performed in the Ross Sea in the austral summer from 1999 to 2006.