

TRACE METALS SPECIATION IN COASTAL AND IN OPEN SEAWATERS OF THE ROSS SEA.

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Physical, chemical and biological processes occurring in the Ross Sea influence the water masses' composition including the distribution and speciation of trace elements. Although studies are carried out to assess the distribution of trace metals, little information is available about their speciation, as the bioavailability and the environmental effects of metals depends on the chemical forms they assume. The cadmium, copper and zinc speciation in the western sector of the Ross Sea was studied by assessing the complexation by organic ligands, The inorganic species were calculated by using the MINEQL+ program. The results are considered by taking into account processes and the seasonal evolution of metal speciation in coastal areas.

Studies emphasized that the concentration of dissolved metals in the Ross Sea can be related to processes occurring in coastal areas and the age of the water masses. Indeed, the distribution of metals along the water column in coastal areas changes during the summer in relation to the phytoplankton bloom and results have emphasized that changes were much more evident for the metal speciation. The inorganic form of cadmium in the photic layer represents more than 95% of the dissolved metal at the beginning of the summer, while it decreases to 20-50% at the end of season. The ionic copper concentration (the bio-available) in the photic layer decreases by 4 orders of magnitude.

In seawater samples collected in the western sector of the Ross Sea, along one transect from the permanent polynia to the Cape Adere area, the cadmium is complexed by one class of ligands and the organo-complexes represent 60% of the total in the surface waters, it is about 25% in deep waters and it represents about 50% in the bottom waters; It reaches the highest concentration in shore waters. We can hypothesize that organic ligands are originated from the summer phytoplankton bloom and from recycling of organic matter at the sediment level. More than 90% of the zinc is present in the organic form and it reaches the highest value in the surface layer. Therefore its distribution seems related to biological activity and with the partial decomposition in intermediate-deep waters. Conversely from the results obtained in coastal waters, copper is complexed by only one class of ligand. This may be due to the saturation of low concentration ligands by copper in open seawaters. More than 90% of copper is in the organic form along the water column and the ligand distribution is independent according to the presence of different water masses, therefore these compounds are constituted by a refractory class of ligands.