

## O25.1

### **Trace elements contamination and trophic transfer in Terra Nova Bay (Ross Sea, Antarctica): a baseline for monitoring environmental contamination and processes in the Ross Sea MPA**

Geraldina Signa<sup>1,2</sup>, Edoardo Calizza<sup>3,2</sup>, Maria Letizia Costantini<sup>3,2</sup>, Cecilia Tramati<sup>1,2</sup>, Simona Sporta Caputi<sup>3,2</sup>, Giulio Careddu<sup>3,2</sup>, Antonio Mazzola<sup>1,2</sup>, Loreto Rossi<sup>3,2</sup>, Salvatrice Vizzini<sup>1,2</sup>

<sup>1</sup>University of Palermo, Italy. <sup>2</sup>CoNISMa, Italy. <sup>3</sup>Sapienza University of Rome, Italy

#### **Abstract**

High contamination of trace elements (TEs) in coastal ecosystems and their transfer along food chains are pressing problems affecting even remote areas, like the Antarctic region. Here, we analysed Cd, Pb and Hg concentrations and carbon and nitrogen stable isotopes in organic matter sources and consumers from the Ross Sea i) to provide reference data prior to the recent institution of the Ross Sea Marine Protected Area and ii) to assess how food web features influence TE transfer along the food chain. Moreover, we made a special focus on top predators, by performing multi-tissues analysis of chick carcasses and eggs of Adélie and Emperor penguins, which are acknowledged bioindicators of environmental contamination.

Higher TE levels than those found in past studies were overall recorded in both abiotic and biotic samples, indicating increasing contamination in the Antarctic marine system in the last decades. Moreover, the higher TE levels found in penguin chick carcasses than in eggs suggested high toxicity risks also for scavengers. Regressions between  $\log[\text{TE}]$  and  $\delta^{13}\text{C}$  showed that the sympagic pathway drove Cd and Hg accumulation in secondary consumers, while a coupled benthic/pelagic pathway drove Pb transfer to all consumers. Regressions between  $\log[\text{TE}]$  and  $\delta^{15}\text{N}$  revealed that only Hg biomagnified along the food web, while the other TEs biodiluted, consistently with previous findings in temperate food webs.

Concluding, the present findings revealed a high baseline for TE contamination and represent useful reference data for the future monitoring of the Ross Sea MPA. On the other hand, they provide important insights about the role of basal sources in the transfer of non-essential TEs to the Antarctic biota, in the light of the forecasted trophic changes potentially resulting from variations in productivity and sea-ice dynamics due to climate change.

#### **Keywords**

Metal, stable isotopes, food web, penguin