

Press Release

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Searching for Cadmium in the Ocean

– Marine scientists investigate the distribution of important micro-nutrients in the Atlantic –

28.01.2010/Kiel. They are invisible and very difficult to measure but no life in the oceans would be possible without them. We are talking about trace metals such as cadmium, copper or iron, dissolved in seawater. Their precise origin and distribution in the world's ocean, in particular in the deep sea, are not well known. The international research program GEOTRACES aims to close this gap of knowledge. Under the leadership of Prof. Martin Frank from the Leibniz Institute of Marine Sciences in Kiel, Germany, the German research vessel METEOR will embark for one of the first expeditions of the project into the tropical Atlantic on February 4th.

The number is inconceivably small: only 300 trillionth of a gram (0,0000000003 g) of dissolved cadmium per litre are found on average in ocean surface waters. Fortunately, you may think because cadmium is deemed toxic. However, recent research has proven that many species of phytoplankton need cadmium for their metabolism. This plankton is the basis of the food chain in the oceans and stores huge amounts of carbon dioxide. Besides cadmium there are many other trace metals of similar importance: aluminium, manganese, copper, zinc, or iron. Where they come from and how they are distributed in the oceans is not well known. Globally standardized measurement procedures for such tiny amounts of substances were lacking until recently. "It's extremely difficult to make a reliable statement about changes in iron concentrations on the order of some billionth of a gram if you take the water samples with metal wires just a few metres away from 4500 tons of ship-steel", explains Professor Martin Frank, geologist at the Leibniz Institute of Marine Sciences (IFM-GEOMAR) in Kiel, Germany.

For seven years scientists from more than 30 nations have successfully been working together within the GEOTRACES programme to find solutions for this problem. Now they are ready for the first measurements. In February 2010 a kick off event will take place during the Ocean Sciences Meeting in Portland, Oregon (USA). At the same time Martin Frank will lead one of the first GEOTRACES expeditions with the German research vessel METEOR. It will leave the harbour of Las Palmas (Gran Canaria, Spain) with 24 scientists from Kiel, Bremen, Rostock, Cologne (all Germany), Barcelona (Spain) und Norfolk (Virginia, USA) on February 4th. During the 9000 km cruise along the West-African coast, across the Atlantic and back north along the Brazilian coast the scientists will measure trace metal concentrations up to a water depth of 5000 metres. It is planned to collect about 12,000 litres of water. "To avoid contamination we use purpose-built sample bottles made of plastic, which are fixed in a specially coated device. Instead of a steel wire we use a Kevlar-cable to lower this frame to the sampling depths", Professor Frank explains. Since RV METEOR is not equipped with such a cable, a mobile winch and cable owned by the U.S. GEOTRACES programme is used on this expedition. Two containers with clean room laboratories are included in the equipment, as well. There, the scientists will prepare the samples exactly according to the guidelines of the GEOTRACES programme in order to enable high precision measurements in the on shore home laboratories after the cruise. "This way we will get data that we can compare with the results of other measurement campaigns around the globe in the future", says Professor Frank. More than 50 expeditions are planned by the GEOTRACES programme in the coming years.

The results of all these expeditions will be used by scientists from many research directions. Biologists want to know how, where, when and in which quantities micro-nutrients are for example supplied into the oceans by dust. Oceanographers want to use the trace metals to track ocean currents. "Some of the trace metals do not only vary in their concentration but also in their isotopic composition, which provides precise information about the origins of the respective metals", says Professor Frank. Furthermore climate researchers use the isotope compositions for precise reconstructions of past climate conditions. And last not least a better understanding of the nutrient cycle in the oceans is fundamental to understanding consequences of environmental pollution. "This programme and our expedition are truly fundamental marine research, the results of which will be important for many different subjects", Professor Frank concludes.

Expedition at a glance:

METEOR expedition M81/1

Subject: Trace metals in the tropical Atlantic

Chief Scientist: Prof. Dr. Martin Frank (IFM-GEOMAR)

Start: February 4th, 2010, Las Palmas (Gran Canaria, Spain)

End: March 8th, 2010, Port of Spain (Trinidad and Tobago)

Links:

www.ifm-geomar.de/expeditionen current expeditions of the IFM-GEOMAR

www.geotraces.org the international GEOTRACES-programme

Figures:

At www.ifm-geomar.de/presse figures are available for download

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