pollution, eutrophication, and nutrient-altered coastal water. This left only crustal dust and fly ash (e.g. silicate) as remnant atmospheric aerosols. We continued our assessment of dust concentrations in the marine boundary layer by collecting aerosol particulate samples using continuous high-purity air intake of the OPC volatility measurement system. These samples were analyzed for total Fe (and other elements) using energy-dispersive X-ray fluorescence at the NOAA/PMEL laboratory.

Sulfuric acid (H2SO4) was used in the 2002 IOC cruise to sample the surface waters of the NW Pacific. This approach was chosen due to its increasing atmospheric concentrations and its role in the formation of sea-salt. This left only crustal dust and fly ash (e.g. silicate) as remnant atmospheric aerosols. We continued our assessment of dust concentrations in the marine boundary layer by collecting aerosol particulate samples using continuous high-purity air intake of the OPC volatility measurement system. These samples were analyzed for total Fe (and other elements) using energy-dispersive X-ray fluorescence at the NOAA/PMEL laboratory.

Sulfuric acid (H2SO4) was used in the 2002 IOC cruise to sample the surface waters of the NW Pacific. This approach was chosen due to its increasing atmospheric concentrations and its role in the formation of sea-salt. This left only crustal dust and fly ash (e.g. silicate) as remnant atmospheric aerosols. We continued our assessment of dust concentrations in the marine boundary layer by collecting aerosol particulate samples using continuous high-purity air intake of the OPC volatility measurement system. These samples were analyzed for total Fe (and other elements) using energy-dispersive X-ray fluorescence at the NOAA/PMEL laboratory.

Sulfuric acid (H2SO4) was used in the 2002 IOC cruise to sample the surface waters of the NW Pacific. This approach was chosen due to its increasing atmospheric concentrations and its role in the formation of sea-salt. This left only crustal dust and fly ash (e.g. silicate) as remnant atmospheric aerosols. We continued our assessment of dust concentrations in the marine boundary layer by collecting aerosol particulate samples using continuous high-purity air intake of the OPC volatility measurement system. These samples were analyzed for total Fe (and other elements) using energy-dispersive X-ray fluorescence at the NOAA/PMEL laboratory.
from competitive ligand equilibration cathodic stripping voltammetry analyses that were conducted both at sea on board samples and back at the laboratory on frozen samples. We will contrast the various regimes with respect to concentrations of organic ligands, conditional stability constants, inorganic Fe, and the 3 metalloids, with the highest total Se, Se(VI), and As(III) and methyl As were elevated in low percentage of the ligand below 1 kDa.

The metalloid elements have diverse behaviors in the ocean because of multiple sources (atmospheric, upwelling, rivers) and different chemical forms (speciation) affecting their chemistries and bioavailabilities. The atmosphere-ocean coupling of metalloids in the North Pacific has not received as much attention, although low productivity NHLC waters in the subarctic North Pacific and dust plumes from Asia (that may have enriched metalloid concentrations due to coal combustion) offer ample opportunities to study this coupling. We will present wet and dry deposition data collected along the IOC 2002 cruise track. The REE were selected along the IOC 2002 cruise track. The REE were dissolved Fe and Al concentrations that were used to interpret our data were determined at sea by FIA fluorescence.

The Effect of Air/Sea Exchange and Mixing on Organic Carbon Export Calculated from an Oxygen Mass Balance

The production of organic carbon, and its export from the euphotic zone to the deep ocean, is a major control on the CO2 evasion rates from the ocean substantially exceed estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex- sign model-derived rates of the physical processes that influence oxygen can be calculated from an upper ocean oxygen mass balance if the rates of physical processes that influence oxygen are constrained. We present an intensive one-year dataset of oxygen, nitrogen, argon and neon measurements collected from the Hawaii Ocean Time-series (HOT) from July 2000 to June 2001. Oxygen is supersaturated in the surface waters during the entire year due to a combination of biological and physical effects, such as heating and bubbled-mediated gas exchange. We use a one-dimensional dynamic mixed layer (PWF) model, driven by wind stress, to simulate the coupled biological and physical processes that control gas concentrations. The oxygen mass balances are used to constrain the rates of bubbled-mediated gas exchange by different bubble mechanisms and vertical mixing within the upper 50 m. The model-derived rates of the physical processes that control gas concentrations yield a net biological oxygen production of 1.2 ± 0.2 g C m−2 d−1. The one-dimensional model based on the present dataset can reproduce the oxygen measurements to within one standard deviation. One of the main questions that we hope to answer from this work is how the transport and deposition of continental dust in surface ocean waters impact the RRE content of seawater of the NW Pacific. We also hope to evaluate the relia- bility of RRE that are associated with this dust through a comparison of our data with experiments conducted by Landing and colleagues as well as dust deposition estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex-

The Effect of Air/Sea Exchange and Mixing on Organic Carbon Export Calculated from an Oxygen Mass Balance

The production of organic carbon, and its export from the euphotic zone to the deep ocean, is a major control on the CO2 evasion rates from the ocean substantially exceed estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex- sign model-derived rates of the physical processes that influence oxygen can be calculated from an upper ocean oxygen mass balance if the rates of physical processes that influence oxygen are constrained. We present an intensive one-year dataset of oxygen, nitrogen, argon and neon measurements collected from the Hawaii Ocean Time-series (HOT) from July 2000 to June 2001. Oxygen is supersaturated in the surface waters during the entire year due to a combination of biological and physical effects, such as heating and bubbled-mediated gas exchange. We use a one-dimensional dynamic mixed layer (PWF) model, driven by wind stress, to simulate the coupled biological and physical processes that control gas concentrations. The oxygen mass balances are used to constrain the rates of bubbled-mediated gas exchange by different bubble mechanisms and vertical mixing within the upper 50 m. The model-derived rates of the physical processes that control gas concentrations yield a net biological oxygen production of 1.2 ± 0.2 g C m−2 d−1. The one-dimensional model based on the present dataset can reproduce the oxygen measurements to within one standard deviation. One of the main questions that we hope to answer from this work is how the transport and deposition of continental dust in surface ocean waters impact the RRE content of seawater of the NW Pacific. We also hope to evaluate the reliabil- ity of RRE that are associated with this dust through a comparison of our data with experiments conducted by Landing and colleagues as well as dust deposition estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex-

The Effect of Air/Sea Exchange and Mixing on Organic Carbon Export Calculated from an Oxygen Mass Balance

The production of organic carbon, and its export from the euphotic zone to the deep ocean, is a major control on the CO2 evasion rates from the ocean substantially exceed estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex- sign model-derived rates of the physical processes that influence oxygen can be calculated from an upper ocean oxygen mass balance if the rates of physical processes that influence oxygen are constrained. We present an intensive one-year dataset of oxygen, nitrogen, argon and neon measurements collected from the Hawaii Ocean Time-series (HOT) from July 2000 to June 2001. Oxygen is supersaturated in the surface waters during the entire year due to a combination of biological and physical effects, such as heating and bubbled-mediated gas exchange. We use a one-dimensional dynamic mixed layer (PWF) model, driven by wind stress, to simulate the coupled biological and physical processes that control gas concentrations. The oxygen mass balances are used to constrain the rates of bubbled-mediated gas exchange by different bubble mechanisms and vertical mixing within the upper 50 m. The model-derived rates of the physical processes that control gas concentrations yield a net biological oxygen production of 1.2 ± 0.2 g C m−2 d−1. The one-dimensional model based on the present dataset can reproduce the oxygen measurements to within one standard deviation. One of the main questions that we hope to answer from this work is how the transport and deposition of continental dust in surface ocean waters impact the RRE content of seawater of the NW Pacific. We also hope to evaluate the reliabil- ity of RRE that are associated with this dust through a comparison of our data with experiments conducted by Landing and colleagues as well as dust deposition estimates made during this cruise based on surface water AI concentrations. Additionally, we hope to ex-
terrestrial impact. In the surface waters, hydrogen peroxide decreased with latitude from a little over 25 nM in the north (50°N) to more than 150 nM in the south (22°N). This latitudinal variation of hydrogen peroxide followed a trend similar to shipboard measurement of ultraviolet radiation. Dissolved concentrations of hydrogen peroxide were observed at several locations, with surface water concentrations increasing during the day and decreasing at night. The concentration of surface water peroxide increased to over 200 nM following rain events. Higher concentrations of hydrogen peroxide (>150 nM) were also observed near Asia. The profiles of hydrogen peroxide were obtained at 10 stations that exhibited surface maxima of 24 to 120 nM. The rate constant of dark decay varied from 0.08 d⁻¹ to 0.22 d⁻¹. Rate of photo-production decreased from 10 nM hr⁻¹ at noon to 0 at night. The concentration of hydrogen peroxide varied from 16 µM to 526 µM in rainwater. The data set permits a systematic analysis and modeling of factors regulating the dynamics of hydrogen peroxide in marine environment.

OS72D-13 1650h

CO2 supply from the North Sea and the Baltic Sea to the North Atlantic Ocean: evidence for the continental shelf pump

Helmuth Thomas¹ (31222369438; hthomas@nioz.nl); Yann Bozec¹ (+31-222-369439; bozec@nioz.nl); Alberto Berg¹ (Alberto.Bergo@ulg.ac.be); Hermann J Lehnardt³ (lehnardt@fmi.unibe.ch); Andreas Moll³ (moll@fmi.unibe.ch); Klaus Nagel² (klaus.nagel@uni-hamburg.de); Johannes Paetcke³ (paetcke@fmi.unibe.ch); Janusz Pempkowiak⁵ (pemp@iopan.gda.pl); Fred Wulff⁶ (Fred@systems.ecology.su.se); Michel Frankignoulle² (Michel.Frankignoulle@ulg.ac.be); Laure-Sophie Schiettecatte² (Laure-Sophie.Schiettecatte@ulg.ac.be)

1Royal Netherlands Institute for Sea Research (NIOZ), Department of Marine Chemistry and Geology, P.O. Box 59, Den Burg NL-1790 AB, Netherlands
2University of Liège Chemical Oceanography Unit, Institut de Physique (B5), Lige B-4000, Belgium
3Institut fuer Meereskunde Universitett Hamburg, Treptowstrasse 7, Hamburg D-22529, Germany
4Institut fr Oeetofsfrchh Waromunde, Seestr. 15, Roetock D-18119, Germany
5Institute of Oceanology Polish Academy of Sciences, Powsiawow Wawazay 55 PO 68, Sopot 81-712, Poland
6University of Stockholm Department of Systems Ecology, Department of Systems Ecology, Stockholm 10691, Sweden

Coastal and marginal seas are thought to act as a continental shelf pump transporting CO2 from the atmosphere to the open oceans. The CO2 uptake in coastal seas is triggered by high biological activity increasing the CO2 concentrations of their waters which finally are transported to the open ocean. The North Sea and Baltic Sea located in north-west Europe are connected via the Skagerrak where the Baltic Sea water first enters the North Sea. The North Sea then link to the North Atlantic Ocean. Carbon budgets for the Baltic Sea and the North Sea will be presented in order to provide evidence that in both seas the transfer of CO2, i.e. the continental shelf pump, acts in two different, but characteristic pattern. The Baltic Sea as a brackish water system collects river water and one might even call it as an estuarine system in a broader sense. Two major drainage areas provide the fresh water supply to the Baltic Sea. The Scandinavian shield supply CO2 poor waters and the north-east European continent CO2 rich waters. During the transport of Baltic Sea water to the North Sea the CO2 concentrations increase continuously. Riverine inputs in part control primary production in the Baltic Sea, however the major control mechanism is the winter nutrient concentrations. These are established by an interaction of production, remineralisation, export and riverine and atmospheric inputs on decadal time scale because of the residence time of the Baltic Sea water of approximately 25 years. The Baltic Sea thus acts as a continental shelf pump for atmospheric CO2 which injects CO2-rich water to the Atlantic Ocean (injection pump). In contrast the North Sea water is renewed once to twice per year most notably by water from the North Atlantic Ocean. The major control mechanism of the biological activity in the North Sea are thus the continuous (and - in comparison to the Baltic Sea - high) nutrient inputs for the North Atlantic Ocean. For the CO2-export from the North Sea to the Atlantic Ocean this means that the water is enriched by CO2 during its 6-12 month travel through the North Sea. Having in mind that almost no burial occurs in the North Sea, the North Sea acts as a continental shelf pump for atmospheric CO2 by increasing the CO2 concentrations in the Atlantic waters while they are bypassing through the North Sea (bypass-pump).