(M_2) frequencies, a convergence of low-mode, onshore-directed energy flux is approximately balanced by a divergence of high-wavenumber energy flux, directed offshore in the bottom 300 m. This conversion occurs in a region where the continental slope is near-critical with respect to the M_2 tidal characteristic.

We suggest that the elevated mixing ($K_\rho > 10^{-3}\mathrm{m}^2\mathrm{s}^{-1}$) observed offshore of the supercritical continental slope results from the reflection of a remotely-generated, low-mode, M_2 internal tide. Vertical shear associated with the offshore-directed flux is sufficient to generate turbulent instabilities. Moored velocity profilers indicate most of the near-bottom shear to be within this beam and at M_2 frequencies. Based on the observed rate of turbulent kinetic energy dissipation, this flux should be dissipated in ∼10-30 km. Numerical simulations are consistent with this hypothesis and hence suggest a source for intense mixing along continental slopes throughout the world's oceans.

URL: http://kai.apl.washington.edu/twist

OS32P-10 1605h

Internal Tides on the Shelf off Southeast Florida

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Historical and recent data reveal a very energetic regime on the shelf off the southeast Florida. The recent exploratory measurements conducted as a part of the South Florida Ocean Measurement Center (SFOMC) during 1999-2001 provide a new insight on the hydrological processes in this area. In addition to what has been known as spin off eddies, large-amplitude tidal velocity fluctuations with amplitudes exceeding 0.5 m/s are observed. The time scale of the tidal velocity oscillations is about 10 hrs. This time period apparently doesn't coincide either with the inertial period (27 Hrs) or with the semidiurnal M2 (12.42 hrs) or S2 (12 hrs) tidal constituents. In addition, these internal oscillations appear to be modulated seasonally and over time scales of 10 days or so. Further analysis has reveled that these internal velocity oscillations are of baroclinic nature. The hypothesis we are discussing in this paper is that these oscillations are actually the near-resonant internal seiches in the channel between Florida and Bahamas that are generated by the interaction of the barotropic tidal waves with the Miami Terrace.

OS32P-11 1620h

The Shoaling of Internal Solitary Waves

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Internal solitary waves typically form during a nonlinear transformation of the internal tide. This paper analyses the behaviour of oceanic internal solitary waves as they pass over variable topography. First order non-linear theory can predict an explosive growth as shallow water is approached. In contrast a partially second order theory predicts a capping of the wave amplitude in shallow water, thus limiting the shoaling process.

These predictions are compared to observations from the Shelf Edge Study at the UK shelf, which tend to validate the second order theory. Both model and observations suggest that large amplitude waves will become subject to shear or convective instability, and the impact of this is discussed.

OS32P-12 1635h

Propagation of Internal Soliton Packets Through Interthermocline Lens on Shelf

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Effect of internal waves propagated through interthermocline lens is investigated both by field observations and numerical modeling. Observations of lens (intrusion of warm saline waters) were carried out on shelf of the Sea of Japan during summer season. Internal waves of tidal origin propagated shoreward and met in their path the lens at site of observation of 40 m depth. The parameters of the intrusion changed greatly within the following limits: width 0.5m - 7 m, and the temperature difference across the inversion 0.2 -1.0 degree C. The intrusion was oscillating synchronously with the entire column with a period of internal waves with heights up to 8 m. A kinematic effect of the internal waves on the lens was noticed, which manifested itself in alternating compression and expansion of the intrusion in the areas where internal wave crests and troughs were propagated. Results of numerical modeling of the process made on the basis of solving full Navier-Stokes and diffusion equations are also presented. The research work described in this publication was made possible in part by a grant of Award No. RP2-2255 of the U.S. Civilian Research and Development Foundation (CRDF).

OS32Q HC: 323 A Wednesday 1330h

Western Pacific Marginal Seas VI

Presiding: **I Yasuda,** University of Tokyo**; Y Fukamachi,** Hokkaido University

OS32Q-01 1330h INVITED

What We Have Learned About the Okhotsk From 22 Years of Remote Sensing Data

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For the period 1979-2000, SAR, AVHRR and passive microwave data are used to examine the properties of the Okhotsk Sea ice cover and in particular its polynyas. The importance of the polynyas is that they contribute to the Okhotsk and North Pacific intermediate water. These polynyas are generated by two processes: tidal resonance and cold northeast winds. The tidal resonance generates the open ocean polynya over Kashevarov Bank, which is accompanied by a warm water upwelling. The northeast winds generate the coastal polynyas along the northern shelves. There are three major coastal polynyas, the northwest shelf (NWS), the northern shelf (NS) and Shelikhov Gulf (SG), where in the Gulf, both tides and winds contribute to the ice production. For the 1979-2000 winters, the polynya production rates of ice and salt are calculated using the Cavalieri thin ice algorithm from a combination of the SMMR (Scanning Multichannel Microwave Radiometer) and SSM/I (Special Sensor Microwave /Imager) data with meteorological data. SAR and AVHRR imagery are used to examine the small-scale polynya features, which are also compared with the lower resolution passive microwave images. Throughout the 22-year period, the total ice and salt production varies by more than a factor of two, with a maximum in 1979 and 1985, and a minimum in 1997. The total production is inversely correlated with the Arctic Oscillation, and shows a large decrease between 1987 and 1989, simultaneous with a similar increase in the AO index. Although the NWS is the dominant polynya, its productivity is approximately constant and uncorrelated with the AO. At the same time, the NS and particularly the SG time series have a much larger variability and a stronger correlation with the AO. The reason for this improved correlation is that their geographic location makes them more sensitive to changes in the Aleutian low. Finally, the Kashevarov polynya upwelling is investigated using AVHRR data.

OS32Q-02 1350h

Processes of increase and decrease of sea ice area in the Sea of Okhotsk

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We examined the local change of sea ice concentration and estimated the local increase or decrease of areal volume of sea ice. Analyses were carried out for seven winters (December-April) from 1991/92 to 1997/98 using ice velocity and concentration data derived from satellite microwave sensor SSM/I data. First, we mapped sea-ice divergence and convergence calculated from the daily ice velocity field. With an offshore wind, high divergence was observed along the coastline, but a broad convergence area is observed with an inshore wind. Next, we examined the local change of ice volume by considering the change in ice concentration and the change due to ice movement. We found that a large amount of sea ice is produced in the coastal area. Distribution of the area agrees well with that of the well-known coastal polynya area. Our estimation shows that $9.0 \times 10^5 km^2 yr^{-1}$ of sea ice is generated in the northern coastal area, and $5.7 \times 10^5 km^2 yr^{-1}$ is the Sakhalin coastal area. In contrast, $6.8 \times 10^5 km^2 yr^{-1}$ of sea ice disappears north of Sakhalin Island. We think that this decrease of ice area is mainly caused by mechanical processes such as rafting or ridging of ice floe, not by ice melting. These processes play important roles in the Okhotsk sea ice growth.

OS32Q-03 1405h

Interannual Variability of the Okhotsk Sea ice and its Relation to Atmospheric Circulation

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NCEP (NCAR) reanalysis and Russian aircraft ice surveys along with SSM/I sea-ice data during 1958 to 1998 are used to examine the main reasons of ice variations in the Okhotsk Sea. Stable and strong winter monsoon, bringing cold temperatures, causes the intensive ice growth in the northwestern Okhotsk Sea and Shelikhov Bay. Further, this ice drifts generally south southeastward due to prevailing winds and the strong East Sakhalin Current. In contrast in the eastern Okhotsk Sea, the low pressure dominates in the atmosphere. Our analysis shows that the appearance of ice in this region largely depends on the cyclonic circulation in the North Pacific. Cyclones usually transport relatively warm air to the eastern Okhotsk Sea, which sometimes cause ice melting or at least prohibit ice formation. There are two scenarios of this warm advection. First, the intensive southern cyclones from the Japan and Yellow Seas bring warm air to the west Kamchatka coast and over the Tinro Basin. These events are characterized by strong south winds have duration of 1-3 days and occur 5-10 times in January-March. When cyclone moves to the North Pacific, ice rapidly advances again due to strong northwestern winds. Second, when the Aleutian low shifts westward to the Kamchatka Peninsula, northeastern winds transport the warm air to the northern Okhotsk Sea shelves from the North Pacific. These events have a longer duration of about 5-20 days, although occur not every year. Bidecadal oscillation of ice cover is also prominent in the Okhotsk Sea to be resulted from the Aleutian low. Applying Cavalieri and Martin (1994) model, we have estimated that the total average ice production in coastal polynyas have decreased by about 40 km3/yr during the last two decades.

OS32Q-04 1420h

Thermohaline balance of the surface layer on the seasonal sea ice extent in the Sea of Okhotsk

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By using a coupled ice-ocean model, the seasonal extent of sea ice cover in the Sea of Okhotsk is examined. During the 1990fs winter the model results show that the sea ice at the ice edge is advected southward along Sakhalin Island with the mean velocity of 0.3m/s into the ocean water with temperatures above freezing. As a result, even in mid-winter, a large amount of the ice melting occurs around the edge, which decreases the temperature of the surface mixed water. The mean total volume ratio of ice melting to ice production is estimated at 0.7. The negative latent heat flux from the ice melting is nearly comparable to the total atmospheric heat flux at the ice edge. Furthermore, the melt water supply to the surface layer is estimated at 3 times the Amur River inflow. Thus, it is suggested that the ice melting around the extending ice edge is a significant factor for the thermohaline balance between the sea ice and the surface mixed layer and plays an important role in the maintenance of the large seasonal sea ice extent in the Sea of Okhotsk.

OS32Q-05 1435h

Interannual to interdecadal variations of upper water temperature in the Japan Sea (East Sea) and Okhotsk Sea

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For the Japan Sea (East Sea) and southern part of the Okhotsk Sea, upper water temperatures are gridded by using an optimal interpolation method on a monthly 0.5×0.5 grid. This is the first gridded datasets which allow us to analyze year-to-year variability of those seas as far as authors know. The resultant gridded temperatures are analyzed in order to identify major interannual-to-interdecadal variations by using EOF techniques in each sea.

The mode common for the Japan Sea and Okhotsk Sea is the quasi-decadal variability of the water temperature. For the Okhotsk Sea the spatial pattern of this mode is rather uniform, but in the pattern for the Japan Sea has a complex structure involving phase lags between the southwestern and northeastern part with large amplitudes trapped by the polar front. These quasi-decadal variations are highly correlated with the Sea-Level Pressure (SLP) variability in the northern part of the Siberian high. The correlation map for the SLP resemble the spatial pattern of the Arctic Oscillation but with weights in northern part of the Eurasia continent. The phase relation indicates that the cold anomalies in the Okhotsk Sea and northeastern part of the Japan Sea are accompanied by the strong Siberian high. Thus, it is concluded that the strength changes of the Asian winter monsoon related with the quasi-decadal component of the Arctic Oscillation caused significant changes to the Okhotsk Sea and Japan Sea via the changing of atmospheric cooling.

In addition to the quasi-decadal variability commonly found in both seas, a 2-3 year variation in the Okhotsk Sea associated with the Aleutian low variability is identified. For the Japan Sea, bidecadal temperature changes are likely remotely forced by the bidecadal changes of the Aleutian low strength, and 5-6 year variability in the southwestern part of the Japan Seas is likely to be locally forced by the wind anomalies along over and around the Japan Sea.

OS32Q-06 1510h

Eddy Kinetic Energy in the Western Gulf of Alaska and Bering Sea: Comparative Estimates From TOPEX Altimeter Data and Coupled Ice Ocean Model Simulations

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Mesoscale eddies have been shown to influence shelf/slope exchange of biota and water mass properties at many locations in the world ocean. The Naval Postgraduate School (NPS) regional coupled ice ocean model is currently being used to identify oceanic mass and property exchanges, including nutrient pathways between the Gulf of Alaska and Bering Sea, and to investigate how the regional mesoscale eddy field influences those pathways. The model domain is configured at $1/12^\circ$ (9km) and 45-level grid and it extends from 30°N in the North Pacific, across the Bering Sea and the Arctic Ocean, into the North Atlantic, to 45°N. As a preliminary step in this investigation, eight years (1993-2000) of TOPEX altimeter measurements (10 day orbital repeat period, 2.83° longitude orbital ground track separation, 6.2 km along-track measurement spacing) of sea surface height anomalies (SSHA) are used to validate the numerical model output from a several-year integration starting in 1979. Altimeter measurements in the Bering Sea show that a representative diameter for shelf break eddies is 50 km. The NPS model grid spacing is approaching a scale that is sufficiently fine to resolve these features. Annual mean and seasonal mean eddy kinetic energy estimates for the western Gulf of Alaska and Bering Sea basin, derived from TOPEX altimeter measurements of SSHA and from NPS coupled ice ocean model SSHA, are used for direct comparison.

OS32Q-07 1525h

Towards an Improved Model Representation of Oceanic and Sea Ice Conditions in the Bering and Chukchi Seas.

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Results from a regional coupled ice-ocean model of the pan-Arctic region are presented with emphasis on water and ice, mass and property exchanges between the North Pacific and the Arctic Ocean. Model output for the period of 1979-1981 is analyzed. The ongoing integration will extend through the 2000s. The model grid is configured at 9-km and 45-level and it includes the Arctic Ocean, Bering Sea and the North Pacific to 30°N, the Canadian Archipelago, Nordic Sea and the North Atlantic to 45°N. In order to balance the net northward water transport through Bering Strait, an artificial channel across Canada is opened to allow return flow from the North Atlantic to the North Pacific. This approach yields realistic predictions of the transport through Bering Strait and it provides an alternative to prescribing a fixed transport there, which has been commonly used in regional models of the pan-Arctic. In addition, this approach allows a better representation of the circulation and dynamics in both the Bering and Chukchi seas. Shelf-basin exchanges in those highly productive marginal seas are influenced by the water mass and property export from the Bering Sea into the Chukchi Sea. Preliminary results including numerical dye tracers suggest that submarine canyons along the Bering shelf slope appear to be preferred pathways for Pacific Water entering the Bering shelves from the deep basin. A similar picture emerges along the Chukchi slope, where the Barrow and Herald canyons guide the outflow of Pacific Water into the deep Beaufort Sea. A comparison of velocity fields and transport estimates at various locations from observations and from our previous Arctic Ocean model with the closed Bering Strait is presented to demonstrate improvements due to the opening of Bering Strait and increased model resolution.

URL: http://www.oc.nps.navy.mil/~pips3

OS32Q-08 1540h

Climate Control of New Production on the Shelf of the Southeast Bering Sea

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Over the past 20 years new primary production (NPP) on the outer shelf of the Bering Sea can be predicted from the North Pacific Index (NPI) climate indicator for March of a given year, a relationship found for other regions of the Alaska coast. We used the 1979-1999 time series of physical, chemical and biological data collected by cruises of the Oshoro Maru in the Bering Sea to examine the surface ocean and to estimate new production. Depth averaged euphotic zone temperatures indicate periods of warm (1979-83), cold (1984-92) and warm (1993-2000). New production (NPP) for each year was calculated from Nitrate+Nitrite concentrations using a seasonal difference technique in combination with estimated diffusive resupply supplied by a model. The result is an average daily value for each year of the spring- early summer production period which varies from 0.6 to 1.2 gC m^{-2} d^{-1} for 1979-2000 (average =1.85).

Over these decades chlorophyll showed a general decline and the assimilation ratio increased, especially in the most recent decade. The NPI for March was a successful predictor of annual NPP and chlorophyll biomass when data were segregated by warm and cold periods. In warm years productivity of seabirds in this region was highly correlated to NPP.

OS32Q-09 1555h

Temporal and spatial variability in lipid fluxes over the southeastern Bering Sea shelf, 1997-2000

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The lipid composition of sinking particulate matter at two sites over the southeastern Bering Sea shelf was investigated using sediment traps deployed between 1997-2000. The traps were moored at M2 ($56^\circ53'$, $164^\circ02'$W) at 35 meters and M3 ($56^\circ04'$, $166^\circ20'$W) at 70 meters. Lipid fluxes varied spatially, the flux into the middle shelf trap (M2) being greater than the flux into the deeper outer shelf (M3) trap. Temporal variations in fluxes were also noted, with maximum fluxes at both sites usually occurring during spring and fall blooms and minimum fluxes in winter. The fatty acid composition of lipids at M2 during bloom pulses consisted of the diatom biomarkers 16:1 (n-7), the polyunsaturates 16:4 (n-1), 20:5 (n-3), with a lesser concentration of saturated fatty acids such as 14:0 and 16:0. Polyunsaturated fatty acids believed to be flagellate biomarkers, 18:2 (n-6), 18:3 (n-6), 20:4 (n-6) and 22:5 (n-3) and 22:6 (n-3), were present in samples also. Lipid fluxes from the M2 fall bloom reflected diatom and flagellate inputs, in addition to the euphausid biomakers, 14:0, 16:0, 18:0, 18:1 (n-7) and 18:1 (n-9), and calanoid copepod lipids 20:1 (n-9) and 22:1 (n-11). Numerous zooplankton fecal pellets were found in fall samples. The odd-chain and branched-chain fatty acids 15:0 and 17:0, bacterial indicators, were also present. Fluxes at M3 were lower and generally contained fewer phytoplankton and a larger ratio of intact fecal pellets. The same fatty acids were found during bloom periods as at M2, although 20:1 (n-9) and 22:1 (n-11) were concentrations were significantly higher at M3. Fatty alcohols phytol, 16:0, 18:0, 20:1 and 22:1 were dominant. Cholesterol was the main sterol, especially in samples containing flagellates. Other sterols found were 24-methylcholesta-5,22E-dien-3â-ol and cholesta-5,22E-dien-3â-ol

OS32Q-10 1610h

Mean Summertime Circulation Along Australia's Southern Shelves

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The author has just completed a study of the ocean circulation along Australia's southern shelves. To this end, studies were made of a) idealised models of wind forced upwelling and downwelling over the continental slope b) the nature of flow past straits c) tidal circulation within the Gulfs and Bass Strait d) the nature of the Flinders Current: a northern boundary current e) mean wintertime circulation along Australia's southern shelves and the "Mean Summertime Circulation along Australia's Southern Shelves: a numerical study", the focus of this talk.

In particular, the Princeton Ocean Model is adapted to provide a high resolution numerical model of the circulation along Australia's southern shelves as forced by summertime meteorology. The model extends from near Cape Leeuwin in the west to the west coast of Tasmania and the open boundaries are relaxed towards transports obtained from a global circulation model. The primary focus of the study is the slope and shelf circulation within the Great Australian Bight and off the gulfs region of South Australia where upwelling is known to occur.

The dynamics of the circulation is determined to involve several factors including the negative wind stress curl, geostrophic adjustment to the remnants of the wintertime density field and baroclinic instability, the latter leading to the generation of 160km scale eddies over the shelf slope. Paradoxically, winds while upwelling favourable near the coast, drive currents which converge over the shelf break leading to downwelling of 100m or more, and an eastward current which flows in the opposite direction to both the nearshore currents and Flinders current (a northern boundary current) farther offshore. Hydrographic and current meter data is cited to support such a sceanario.

URL: http://www.maths.unsw.edu.au/~jffm

OS32R HC: 319 B Wednesday 1330h

CDOM in the Coastal Ocean: Transformation Processes and Their Effects on Optical Properties III

Presiding: **D G Zika,** University of Miami**; D D Clark,** Chapman University

OS32R-01 1330h

The Role of Seagrasses as a Source of CDOM to Tropical Coastal Waters

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To examine CDOM sources to tropical oligotrophic coastal waters, we conducted a time series study using a moored AC-9, CTD and current meter placed at a site (7-8 m water depth) on the shallow water Bahama Banks. An examination of the data in this 30 hr time series indicated that there were large changes in CDOM absorbance over the tidal cycle, with high dissolved CDOM absorbance being associated with the high salinity waters that originate from the shallow banks. Combining these results with current measurements indicated that there was a net flux of CDOM off the shallow banks to the deeper waters of Exuma Sound. The CDOM spectral slope also varied with the tidal cycle implying that there were differences in the type of CDOM (as well as its absolute amount) being exchanged between deep waters and the shallow banks. Both CDOM absorbance and total DOC showed a positive relationship with salinity, which is opposite of that seen in most coastal systems, in which high DOC and CDOM concentrations are generally associated with low salinity waters of terrestrial origin.

We believe that seagrasses and seagrass sediments represent the most likely sources of this CDOM. Seagrasses are important primary producers in oligotrophic tropical coastal waters and generate a significant amount of the particulate organic matter that settles into the sediments. They also promote the deposition of allocthonous organic matter to seagrass sediments as a result of the leaf canopy altering (dampening) water motion and tidal currents. Consistent with these suggestions, DOC and CDOM levels were significantly higher in the sediment pore waters of vegetated areas versus adjacent bare (ooid) sands. Therefore, we believe that processes associated with seagrass biogeochemistry and decomposition likely represent the predominant mechanisms by which CDOM is input to such oligotrophic tropical coastal waters that experience little or no terrestrial freshwater input.

OS32R-02 1345h

Inputs to and Removals From the Colored Dissolved Organic Matter Pool by the Pelagic Larvacean, *Oikopleura dioica*.

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Oikopleura dioica is a pelagic tunicate that feeds by pumping water through an extruded gelatinous house containing food-concentrating filters with a mesh size of 0.2 μm. *O. dioica* is a common neretic species and has the potential to affect DOM pools by both removing larger colloidal material and by inputting excreted dissolved material. Chromophoric dissolved organic material (CDOM) is a variable but significant component within the total dissolved organic matter (DOM) pool that influences the optical characteristics of the water column. Little is known about *in situ* biological production of CDOM in coastal environments. Laboratory experiments were conducted at the University of Oviedo, Spain to examine the hypothesis that *O. dioica* could influence CDOM pools in coastal environments.

Laboratory experiments were conducted with cultured *Oikopleura dioica* to examine the excretion of chromophoric dissolved organic material and the ingestion of fluorescently labeled fatty acids and dextrans ranging from 400 daltons to 70 kdaltons. Results from these experiments indicate that *O. dioica* does excrete fluorescent protein-material and fluorescent humic-material. Additionally, preliminary results indicate that *O. dioica* is capable of ingesting material as small as 800daltons. Results from these experiments will be discussed in terms of how *O. dioica* can affect the DOM pool and specifically the CDOM pool.

URL: http://www.es.umb.edu/jur/cdom_connection_o_dioica.html

OS32R-03 1400h

A Novel Radioisotopic Technique to Measure Biological Uptake of Dissolved Humic Compounds

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Terrestrially derived colored dissolved organic material (CDOM, eg. humic and fulvic acids) can be an important source of dissolved organic carbon in coastal marine systems. The bioavailability of these compounds has been difficult to measure directly however. A novel technique has been developed to provide radiolabeled humic material for uptake studies. ^{125}Iodine is attached to extracted humic and fulvic material by an iodination reaction catalyzed by lactoperioxidase, with subsequent purification by size-exclusion and ion exchange chromatography. The isotopic signal of the resulting ^{125}I-labeled Suwannee River humic acid exhibited aggregation properties over a range of salinities consistent with that of humic acid. Uptake rates of ^{125}I-labeled humic and fulvic acids by marine bacteria and phytoplankton were quantified under a variety of environmental conditions including 1) prior to and after a significant rainfall event, 2) an onshore offshore transect into the eastern Gulf of Mexico and 3) in phytoplankton culture experiments. Uptake rates of natural populations ranged from 0.0 to 1.4 μg humic acid L^{-1} hr^{-1} and were greatest in the bacterial fractions in all experiments. Uptake by phytoplankton in natural populations did occur however and culture experiments demonstrate that the ability to take up humic compounds is species specific in phytoplankton.

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Seasonal Variability in the Diurnal Cycling of a Short-lived Photoproduct of CDOM: Spring-Summer Comparison of Carbon Monoxide Time-Series Data at BATS

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In the upper ocean, carbon monoxide (CO) is formed photochemically from CDOM. Its sinks are microbial consumption (major) and gas exchange (variable but minor). Concurrently, mixing redistributes CO within the mixed layer on diurnal and faster scales.

We examine two high-precision, high-resolution time series datasets of near-surface [CO] at BATS in periods of similar insolation and day length but strongly contrasting meteorology (wind speed, E-P), and oceanography (temperature, mixed layer depth and upper thermocline structure, microbial activity; also optics, including [CDOM] and likely CDOM quality).

These differences would a priori be expected to result in very different diurnal cycle patterns (amplitude and shape); paradoxically, this was not observed. Instead, the interplay of production, consumption, outgassing, and mixing somehow usually results in strongly compensatory effects, so that CO near-surface diurnal concentration time-series are quite similar within and between seasons. This "CO cycle buffering" will be explored using constraints from the concurrent process studies. Brief periods with markedly different cycle patterns will be discussed in this light as well.

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Photo-production of Ammonium from Chromophoric Dissolved Organic Matter (CDOM) in Coastal Waters.

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The role of Chromophoric Dissolved Organic Matter (CDOM) photo-mineralisation processes and the production of inorganic nutrients, have received much increased interest recently. Photo-production of ammonium in aquatic environments is one such process and linear production kinetics have been observed over several hours associated with CDOM-fading. We report here results from a number of irradiation experiments carried out using authentic, filtered river, estuarine and marine water samples. The ammonium production results showed three distinct phases; initially a lag period, followed by production and finally a consumption phase. The lag phase was completed in under 1 hour with maximum concentrations reached in approximately 2 hours, followed by abiotic uptake of ammonium to return concentrations to original levels within 6-24 hours. Estimated production rates were approximately 100 nmoles per litre per hour and showed no relationship to CDOM or salinity, in contrast to previous work. Based on the production rates of ammonium estimated from this work and assuming a mixed layer depth of 50 metres and annual mean global irradiance at 40 degrees latitude, we estimate the potential net photo-release of ammonium to be in the order of 40 Tg per year.

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The Influence of Copper Speciation on the Photobleaching of CDOM in the Cape Fear Estuary

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