the Omani Basin. From these samples we have now identified and enumerated 272 species of invertebrate macrozooplankton and 229 species of fishes, and determined both numerical abundance and biomass distributions for all major groups. At stations off Somalia and in the Omani Basin, the overall numbers of species was 50% higher in May than August, but were the same at the JGOFS mooring in the central Arabian Sea. The most abundant crustacean macrozooplankton included the euphausiids Euphausia diomedeae, Gennadas brevirostris and Sergestes semissus. Important non-crustacean plankters were the pteropods Cymbulia peroni and Cavolinia longirostris, the salp Thalia rhomboides, and the hydromedusa Pantachogon haeckelii. Twnty-nine species of cephalopods were collected, with the greatest diversity off the Somali coast. The fish fauna was dominated by 5 species of Cyclothone, and the myctophids Lampanyctus macropterus, Benthosema pterotum and Diaphus arabicus. Two new species of fish were described from these collections, Monognathus berteli and Polyipnus limatulus, and at least two others await description. Distributions relative to the oxygen minimum zone varied for different groups. Cyclothone spp. and decapod shrimp remained within the suboxic layer at all times, while most myctophids and euphausiids made diel migrations into the surface waters at night. Diversity of the various groups relative to station and season, and in comparison with previous collections will be discussed further.

OS12I-08 1535h

Characteristics of the NE and SW Monsoon Blooms and its Relevance for the CO_2 Emission from the Arabian Sea

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Sediment traps are at present the only tools which can continuously intercept the export of carbon and associated elements from the surface ocean into the deep ocean. Although the accuracy of sediment trap measurements can be biased by hydrodynamic and biological effects, the results of sediment traps deployed at water depth >1200 m reveal an acceptable accuracy. During the field phase of JGOFS in the Arabian Sea, sediment trap experiments were carried out at 9 different sites. The deep ocean fluxes can be linked to upper ocean and meteorological processes obtained from satellite measurements and from the literature. This exercise reveals that the known monsoon driven flux pattern with enhanced fluxes during the SW and NE monsoons is restricted to the area north of 10^{o}N. There, the material transport into the deep-sea is mainly influenced by diatom blooms succeeding blooms of carbonate producing organisms. The succession seems to be caused by variations in the depth of the mixed layer and the euphotic zone, except during the SW monsoon where the velocity of the wind-induced upwelling generally controls the composition and the height of fluxes into the deep Arabian Sea. Thus, changes in the strength the of the monsoon driven physical forcing mechanisms are assumed to lead to variations in the chemical composition of sinking material.

On annual time scales, satellite derived primary production rates can be quantitatively related to deep ocean fluxes which suggests a mean annual export production ranging between 83 and 91 10^{12} g C a^{-1}. This meets estimates of annual mean CO_2 emission from the Arabian Sea and indicates that already small changes in the efficiency of the organic carbon pump due to, e.g., a varying composition of exported matter can affect the CO_2 emission, significantly.

OS12I-09 1550h

Extant planktic foraminifera from the Arabian Sea: A review

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The Arabian Sea is a unique and fascinating region to study the biogeochemical processes because, the seasonally reversing monsoon wind system operating over the region greatly influences the circulation pattern and hydrography resulting in seasonal variation in upwelling and productivity. It is also reflected in the planktic foraminiferal composition and their temporal distribution pattern in the Arabian Sea.

Foraminiferal studies in the Arabian Sea have established that these organisms strongly respond to the reversing monsoons resulting in distinct seasonal variation in productivity, shell flux and relative abundance of species composition. Studies from sediment traps deployed latitudinally across the central Arabian Sea have revealed that the productivity is about 2-3 times greater in the western Arabian Sea where the fauna is dominated by Globigerina bulloides and Globigerinita glutinata due to intense upwelling during the SW monsoon than the central and eastern Arabian Sea. For instance, G. bulloides production increased by a factor of three reaching a maximum flux rate of 9000/m -2/d-1 and also most of the other species such as Globigerinoides ruber, Globigerina tennellus, and Globorotalia menardii exhibit an increase in their productivity both during SW and NE monsoons. Besides, significant decrease in sea surface temperature ('4o C) has been recorded in the western Arabian Sea during SW monsoon. Foraminiferal fluxes in the central Arabian Sea display almost same seasonal patterns as in the western Arabian Sea, but overall the rate of productivity is lower by a factor of 2. Here the most abundant species encountered are G.bulloides and G. ruber. Interestingly, the highest abundance for seasonal species G. sacculifer, G. glutinata, G. aequilateralis and Pulleniatina obliquiloculata occur during NE monsoon rather than the SW monsoon. The increase in foraminiferal production during NE monsoon is more prominent than in the western or eastern Arabian Sea. Unlike the western and central Arabian Sea, lowest foraminiferal productivities are observed in the eastern Arabian sea. As in the central Arabian Sea, G bulloides and G. ruber dominate the assemblage during SW monsoon. Contrary to the significant increase in the production observed during NE monsoon in the western and central Arabian Sea, absolutely no increase was seen in the eastern Arabian Sea. Thus, there is a very conspicuous change in the distributional pattern of foraminifera which shows that there is a gradual decrease in the foraminiferal flux from the western to the eastern Arabian Sea.

In general it has been established that during the intermonsoons the foraminiferal production is minimal and the bulk of the annual foraminiferal flux in the Arabian Sea is largely contributed during the monsoons. Studies carried out till date have demonstrated that the foraminiferal population is largely governed by the interaction of biological and physical processes.

OS12I-10 1605h

What Causes the Sporadic Summer Bloom SE of Madagascar?

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A major summer bloom in the SW Indian Ocean near Madagascar was recently described with SeaWiFS imagery. It covers a high energy eddy field SE of Madagascar roughly 1500 by 3000 km. The bloom starts in January-February, reaches its peak in March and dissipates by the end of April. It is not observed every year: it was seen in Polder images in 1997, was absent in SeaWiFS images in 1998, peaked in intensity and eastward extent in 1999, was strong but not as wide in 2000 and was absent again in 2001. Entrainment of nutrient-rich deep water at the bottom of the surface mixed layer, spatially modulated by the mesoscale eddy field has been suggested as the probable cause. Our view with NCEP re-analysis winds and remotely sensed data from multiple satellite sensors is not consistent with this mechanism. The SE Madagascar bloom shows interesting deviations from typical blooms and its cause remains unexplained. Its sporadic nature suggests that it may be initiated by a combination of factors, such as seasonal changes, phase of large eddies and/or meanders of the retroflected East Madagascar current and secondary effects of tropical cyclones.

OS12J HC: 317 A Monday 1330h

Satellite-Measured Ocean Color Variability in the Ocean II

Presiding: **A Thomas,** University of Maine**; C McClain,** NASA GSFC

OS12J-01 1330h INVITED

Japanese Ocean Color Activities: OCTS to GLI

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National Space Development Agency of Japan (NASDA) launched on Advanced Earth Observing Satellite (ADEOS). One of the core sensors, Ocean Color and Temperature Scanner (OCTS), collected high resolution global data from November 1996 to June 1997. The mission broke through the 10 years of blank of satellite ocean color data from Coastal Zone Color Scanner (CZCS). The operation was terminated by stop of ADEOS; however following mission of SeaWiFS has been extended the time series for nearly 5 years with only two-months gap. NASDA will launch ADEOS-II on 2002, and Global Imager (GLI) will measure ocean color. Some examples of application of OCTS will be presented with plan of GLI.

OS12J-02 1345h

Seasonal and inter-annual variability in algal biomass and primary production in the Mediterranean sea derived from a four year-long seawifs data series

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The variability of chlorophyll concentration in the upper layer of the Mediterranean Basin has been described and analyzed using the weekly Level-3 products derived from four years of SeaWiFS observations. The data available during the investigation allowed us to perform the first study of seasonal and interannual variability of algal biomass in the different hydrologic regions of the Basin. SeaWiFS chlorophyll data are systematically overestimated for low concentrations. Hence new estimates of chlorophyll concentration were performed by developing a regional algorithm, and compared to those provided by the current algorithm of SeaWiFS Project (OC4V4). The most oligotrophic areas (i.e. Ionian sea, Levantine Basin) are generally stable, whereas the areas subject to seasonal blooms (i.e. Liguro-Provencal Basin, Gulf of Lions) show large interannual variations. Primary production was estimated on a pixel-by-pixel basis from surface biomass fields using a light-photosynthesis model adapted to the use of satellite data. Seasonal and interannual variations of primary production, which are mainly controlled by the variations in algal biomass, temperature and surface irradiation, were derived for the various regions of the Mediterranean Basin. Results were compared with in situ primary production data available in literature. The carbon fixation rates in each sub-region have been computed and compared with those previously derived in the Mediterranean Sea from CZCS data.

OS12J-03 1400h

Interannual Variability of SeaWiFS Chlorophyll in Continental Shelf and Slope Waters off the U.S. Northeast Coast

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SeaWiFS-derived chlorophyll from ocean margin waters off the Northeast U.S. were analyzed and compared to temperature and salinity measurements between fall 1997 and fall 2001. During the SeaWiFS era, the Gulf Stream position shifted northward as evidenced in AVHRR SST imagery as well as in temperature and salinity measurements collected by the merchant ship CMV Oleander on its weekly roundtrip between New Jersey and Bermuda. Recent studies point to a thermohaline forcing of the north-south position of the Gulf Stream: a displacement to the south happens when there is a greater than average supply of cold Labrador Sea waters flowing west along the Canadian shelf towards the mid-Atlantic Bight Slope waters; and vice versa when the Gulf Stream is displaced northward. Some of the interannual variability in the chlorophyll timeseries is correlated with the northward migration of the Gulf Stream, while some of the variability appears to have another forcing mechanism (e.g. wind-driven or non-physical). Curiously, the largest bloom in the Slope Sea during the four-year series took place in spring 2000 when the Gulf Stream was well north of its average path and temperatures were warmer than in other years. Mechanisms to account for this unanticipated finding are under investigation.

MON

OS12J-04 1415h

Empirical Approaches to Linking Ocean Circulation with Satellite Chlorophyll Observations

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We present results from an empirical modeling study aimed at linking ocean circulation to variability in chlorophyll estimates derived from SeaWiFS ocean color observations. In this approach, the supply of major nutrients is represented indirectly by climatological ocean circulation. Other limiting factors such as irradiance and the deposition of atmospheric iron are considered hidden variables of the system. Independent estimates of these latent variables are tested for consistency with model results. Characterization of the missing variables is relevant both for understanding the variability of observed chlorophyll and for calibrating and scaling prognostic ocean ecosystem models.

OS12J-05 1430h

Optical Fronts in Ocean Margin Waters: Quantifying Phytoplankton and Their Response to Environmental Change

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Ocean color satellites are useful tools for quantifying effects of global environmental and climatological variations on primary producers and aquatic ecosystems, as sensors provide daily images of phytoplankton chlorophyll *a* (chl *a*). Waters characterized by dissolved and particulate materials may be defined based on their specific absorption or spectral effects on remotely sensed water-leaving radiance. A frontal edge detection algorithm was applied to chl *a* and multiple bands of water-leaving radiance (L_{wn}) data from 1998 SeaWiFS (Sea-Viewing Wide Field-of-View Sensor) images within ocean margin waters off the southeastern continental United States (SEC). An optical front at 555nm delineated potentially high scattering waters, which occasionally coincided with waters of elevated chl *a*. A satellite sensor may interpret high levels of detritus as chlorophyll *a*, as detritus and phytoplankton may have similar backscattering effects at 555nm, which can skew empirical bio-optical algorithms used to estimate chl *a* remotely. Implications exist for global carbon and primary production models. Improvement of the remotely sensed biological signal through multi-radiance band analysis (412, 443, 490, 510, 555, 670nm) and frontal edge detection algorithms for SeaWiFS and MODIS (Moderate Resolution Imaging Spectroradiometer), coupled with in situ data, will help to establish more accurate spatial patterns of particulate and dissolved materials in optically complex waters. Fronts within radiance bands may represent optical signatures of dissolved and particulate materials (e.g., 412nm for colored dissolved organic material). AVHRR sea surface temperature patterns congruent with SeaWiFS chl *a* revealed physical processes that cause chl *a* distributions to vary in SEC waters. Determination of algal group distributions may be possible from phycobilipigment (490nm) and carotenoid (443nm) pigment-specific absorptions from SeaWiFS, which preliminarily revealed radiance fronts at 443nm better reproduced chl *a* fronts than those at 490nm (used in the OC2v.2 algorithm; OC4 analyses are underway). Multi-ocean color sensor (CZCS, OCTS, SeaWiFS, MODIS) analysis of chl *a* spatial variability (transient variations and long-term trends) can occur once ocean margin phytoplankton are correctly quantified.

OS12J-06 1445h

Optical Variability Linked to Physical Forcing in the Northern Gulf of Mexico Using Satellite, Shipboard, and CODAR Observations

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We describe the bio-optical variability in coastal and offshore waters in the northern Gulf of Mexico, from the Mississippi River eastward to Apalachicola, Florida, using satellite and shipboard measurements. Measurements include vertical profiles of temperature, salinity, beam attenuation and absorption coefficients, as well as surface measurements of total suspended sediment concentration and particle size distribution. We partition the absorption coefficient into dissolved and particulate components and the scattering coefficient into organic and inorganic components. In the coastal waters of Mississippi Sound, the horizontal and vertical optical patterns are highly variable and are tightly coupled to the physical forcing from winds, currents, and tides. Sediment resuspension events are observed in the optical profiles and are driven by surface forcing in some cases and by bottom currents in others. In the CODAR current fields, a tidal convergence front develops daily and persists for 6-8 hours near the barrier islands during ebb tide when winds are from the south. Offshore, we use SeaWIFS and MODIS satellite imagery to delineate the large-scale ocean color variability. Time series of chlorophyll concentration, absorption, and backscattering coefficients derived from the satellite imagery provide a broad context to interpret the surface optical variability. Intrusions of the Loop Current onto the shelf advect filaments of coastal water offshore and eastward toward the Florida panhandle. By coupling the forcing mechanisms and the distribution patterns of the bio-optical parameters through shipboard measurements and remote sensing, we gain a better understanding of the dominant physical processes in this area.

OS12J-07 1520h

Comparisons of Ocean Productivity Estimates Using SeaWiFS and MODIS chlorophyll products

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Two indexes of Ocean Net Primary Production (ONPP) are computed weekly as part of the standard MODIS data processing. These products are available from the Goddard archive. This talk will summarize the performance of these estimates with MODIS input data, and also using SeaWiFS chlorophyll and Reynolds SST. The semi-analytic (Carder) chlorophyll a and daytime MODIS SST are used in the standard processing to date. Comparisons of the standard products with regional and global ONPP estimates derived using the two additional MODIS chlorophyll products, and alternative PAR products (compared to the default PAR derived from the GSFC Data Assimilation Office shortwave radiation) show the sensitivity of global ONPP to choice of input data. Similarly, as MODIS vicarious calibration is refined to improve chlorophyll estimates, ONPP estimates reflect those changes. Ranges of ONPP derived from these various estimates are on the order of 30 percent, and provide an additional estimate of the uncertainty of individual estimator accuracy.

OS12J-08 1535h

MODIS Observations of Chlorophyll Fluorescence: Comparison with Ship Measurements off the Oregon Coast

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In terrestrial ecology, the fluorescence quantum yield (Φ_f) derived from remote sensing measurements has long been used to monitor physiological changes in plants resulting from water and nutrient stress. However, this application has not been extended to marine systems. With the launch of MODIS onboard EOS Terra, it is now possible to map and monitor the variability of Φ_f in oceanic surface waters. This physiological signal may provide us with insights regarding the variability in carbon and energy fluxes resulting from photosynthesis in pelagic systems and how this variability relates to changes in physical forcing. This is a critical step in understanding how temporal variability affects the structure of pelagic ecosystems. However, in order to achieve this goal, we must be able to identify a relationship between Φ_f and the mean in situ physiological status of photoautotrophic assemblages. As part of a GLOBEC Northeast Pacific cruise, sea surface temperature (SST), algal pigment concentrations (chlorophyll and carotenoids) and the relative index of the maximum quantum efficiency of photosystem II (Fv/Fm) were collected at night off Oregon. These fields were compared to 1 km resolution level 2 MODIS images of SST, chlorophyll, and Fluorescence Line Height per unit chlorophyll (FLH/chl), respectively, from August 1, 2000. After normalizing the MODIS chlorophyll map to match in situ values, the analysis of MODIS FLH/chl versus in situ Fv/Fm displays no significant relation. However, a significant negative correlation is found for waters with SST $> 14^{\circ}$C. This relation is consistent with the conceptual model of an inverse relationship between Φ_f and the quantum yield of photosynthesis (Φ_p). At SST $< 14^{\circ}$C (recently upwelled waters) a positive correlation was found between Φ_f and Φ_p which may be due to several factors, including changes in phytoplankton specific composition and light history. Some of these factors are assessed through the analysis of pigment composition and particulate absorption spectra.

URL: http://picasso.oregonstate.edu/ORSOO/modis.html

OS12J-09 1550h

Using MODIS channels to derive inherent optical properties of coastal waters after correcting chlorophyll fluorescence

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Current ocean-color algorithms use the ratio of water-leaving radiance (or remote-sensing reflectance) at 440 nm (or 490 nm) and 555 nm bands for the derivation of chlorophyll concentration or optical properties from water color. The algorithms do not work well, in general, for turbid coastal waters as the ratio is less and less sensitive to the increase of water constituents, and the 555 nm band may be contaminated by bottom reflectance. For derivations such as chlorophyll concentration of turbid coastal waters, the 555 nm band is better shifted to red region. Currently the available bands are at 667 nm and 680 nm for MODIS, which are normally, however, affected by chlorophyll fluorescence. In this study, a scheme is designed to quickly remove the fluorescence reflectance at 667 nm with the measured fluorescence at 680 nm. Then a multi-band analytical algorithm is applied to the corrected reflectance to derive inherent optical properties, with results validated by measurements from water samples. Typical error reduction from 30% to 10% for the total absorption coefficient at 440 nm is discussed.

OS12J-10 1605h

Primary Production Algorithm Round Robin 3 (PPARR3): Early Results

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The Primary Production Algorithm Round Robin 3 (PPARR3) aims to compare models or algorithms that estimate marine primary production from satellite measurements of ocean color (PP models). It is a continuation of previous PPARR exercises, which compared in situ carbon14 uptake rates with an estimate of primary production using satellite-accessible data. PPARR2 found that modeled primary production would be within a factor of two of the in situ rates if systematic offsets were corrected. PPARR3 aims to provide a forum to compare model output, improve parameterization, and help identify the source of biases. This community project presently counts with over twenty modeling groups who estimate primary production for input fields provided by the organizers. Our exercise will take place in three parts, as we compare (1) the output of the models among themselves throughout an annual cycle, (2) the structure of the models by following the steps of the calculation for

a subset of points, and (3) the model output to in situ measurements of carbon14 uptake. We present here the results of Part 1, in which the primary production fields for six months of 1998 allow us to evaluate the differences between models throughout the annual cycle and for different regions. Preliminary results indicate that although primary production fields are similar for different models, regardless of model complexity, point values or regional means can differ by a factor of two or more. Differences in primary production are greater for extreme values in temperature.

OS12J-11 1620h

Comparisons of Satellite and In Situ Chlorophyll-a Measurements in Coastal Upwelled Waters

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Off the southern coast of New Jersey, upwelled water evolves into an alongshore line of three recurrent upwelling centers that are co-located with historical regions of low dissolved oxygen (DO). The upwelling eddies have been clearly visible in AVHRR imagery over the last decade, and other than the annual seasonal warming cycle, represent the second most significant factor influencing sea surface temperatures. Associated with the upwelling are high concentrations of phytoplankton which are visible in ocean color remote sensing. The optical features of the upwelled waters are dominated by particulate organic carbon (POC) with C:N ratios of healthy phytoplankton. A robust relationship between POC and in-water optical parameters has allowed POC patterns to be defined in space and time. Using ocean color imagery, POC loads were estimated in response to the recurrent upwelling events. These maps are strongly dependent on the accuracy of the ocean color estimates of the inherent optical properties. Given this, the in situ database collected during the HyCODE/COMOP research effort, was used to validate currently available ocean color products for these optically complex coastal waters. The estimated in water respiration from the POC export is estimated to deplete bottom water oxygen concentrations by at least 10 percent. One major advantage of the upwellings is that they provide strong optical gradients, which have allowed us to cross-calibrate the international constellation of satellites against each other and in situ data. During summer 2001 we cross-calibrated SeaWIFS, MODIS, Oceansat, and FY1-C ocean color satellites. For the Chinese FY1-C ocean color satellite, launched in 1999 has no post launch calibration coefficients, a local overpass time of 9:00AM which dictates a low sun angle, and has bands which average a width of 0.6 microns in the visible spectrum. Through darkest pixel and sun angle corrections, we have been able to achieve estimates of surface chlorophyll-a values similar to SeaWIFS and Oceansat. By tapping the full constellation of international ocean color satellites, we were able to adaptively sample episodic features on the scales of hours, not days, which has never before been possible.

URL: http://marine.rutgers.edu/cool

OS12J-12 1635h

Comparisons of SeaWiFs derived Inherent Optical Properties to In Situ Coastal Measurements at LEO

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A large data base of in situ bio-optical measurements were collected at the LEO-15 (Long-term Ecosystem Observatory) off the southern coast of New Jersey (USA) as part of the HyCODE/COMOP experiment. The data was used to quantify the impact of coastal upwelling on nearshore bulk apparent and inherent optical properties. There was good qualitative agreement between the AOPs and IOPs in space and time. The measured IOPs were used as inputs to the Hydrolight radiative transfer model (RTE). Estimated spectral AOPs from the RTE were strongly correlated (generally R2 > 0.80) to measured AOPs. The RTE was then used to construct the spectral remote sensing reflectance. Spectral signatures of Hydrolight-derived in situ and SeaWiFs derived Rrs values compared favorably pooling all data. Generally, the R2 between the measured and modeled was above 0.7 using all available imagery; however just using the days with ideal satellite geometry and clear atmospheric conditions the R2 was greater than 0.92. However, within each spectral band the R2 Rrs values were compared directly, the results were far less encouraging. Direct comparison of SeaWiFs to modeled in situ Rrs as a function of wavelength was less encouraging. The R2 between measured and modeled varied with wavelengths and between days. Generally the correlations were greatest in the red and green wavelengths with poor correlations in the blue wavelengths. The R2 varied by on average by a factor of 4 across the spectral bands with values ranging from 0.9 in the red to 0.2 in the blue wavelengths on certain days. The relative impact of solar and satellite geometries and the corresponding impact on the correlation to the in situ data is discussed.

URL: http://marine.rutgers.edu/cool

OS12K HC: 316 C Monday 1330h

Coupled Biophysical Processes, Fisheries Resources, and Climate Variability in Coastal Ecosystems of the Northeast Pacific Ocean II

Presiding: **H P Batchelder,** College of Oceanic and Atmospheric Administration**; L Washburn,** ICESS/Dept. of Geography

OS12K-01 1330h

Effect of Ocean Conditions on the Cross-Shelf Distribution of Walleye Pollock (Theragra chalcogramma) and Capelin (Mallotus villosus).

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This study explores the role of oceanographic forcing on fish distributions with focus on the processes influencing the cross-shelf distribution of walleye pollock and capelin. We present results from process oriented field studies and retrospective analysis of sea surface temperature, water column properties, and summer trawl surveys.

Field observations were obtained during the first two years (2000 and 2001) of a multi-disciplinary experiment on the southern coast of Kodiak Island in the Gulf of Alaska. Fish distributions and school structure were monitored with acoustics. The acoustic survey was augmented with a comprehensive oceanographic program consisting of: five ocean moorings, satellite tracked drifters, and shipboard measurements.

The study site consisted of two submarine troughs (Barnabas and Chiniak) on the east side of Kodiak Island, Alaska. The Alaskan Stream, and the Alaska Coastal Current influence flow through the region. The geostrophic flow through the troughs is cyclonic. Mooring data and water column profiles collected reveal a sharp-shelf-break front in Chiniak and a mid-trough front in Barnabas.

Acoustic survey data identified three acoustic sign types: age-1 pollock, adult pollock and capelin. The spatial relationship of these sign types to real time current, water column structure, and temperature was examined. Pollock aggregated on the coastal side of the frontal systems in both troughs. The persistence of the fronts and the role of fronts in determining pollock distribution are examined using retrospective analysis of fish and oceanographic surveys for the years 1984 to present. The implications of these research findings to fisheries assessment and ecosystem management is discussed.

OS12K-02 1345h

Analysis of Hydrographic Data Collected by the Pollock Conservation Cooperative Research Center in the Bering Sea

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The Bering Sea is a semi-enclosed marginal sea of the North Pacific Ocean whose circulation is characterized by a cyclonic gyre driven by the inflow of the Alaskan Stream through deep passes in the Aleutian Islands. At present, the Southeastern Bering Sea shelf supports the Walleye Pollock fishery, the largest single species fishery in the world as well as the salmon run along the Alaska Peninsula, also the worlds largest. This study aims to show that the seasonal and interannual variability of water masses may aid in identifying regions of high catch and bycatch for the Bering Sea Pollock fishery. It makes use of records of salinity, temperature and depth collected on Pollock fishing vessels during normal fishing operations in the Southeast Bering Sea during the fishing seasons of 2000 and 2001. Regions were divided in terms of concentration of fishing activity and proximity to bathymetric features conducive to shelf-slope exchange. Levels of catch per unit effort were highest for the region defined by a shoaled bank located west of the Pribilof Islands. Consistently high bycatch of Chinook salmon is observed in the Bering and Pribilof Canyons. Higher temperatures associated with increased solar activity and decreased turbulent mixing led to greater Chinook bycatch in the spring of 2001 for areas to the Southeast of the Pribilof Islands.

OS12K-03 1400h

Using inner shelf oceanography to understand larval recruitment on the central Oregon coast.

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The mechanistic links between nearshore oceanographic processes and larval recruitment are poorly understood. Since 1998 we have been using a shallow (15-40 m deep) mooring array and associated intertidal sites to examine the relationships between inner shelf oceanography, larval transport, and the recruitment of intertidal invertebrates. Our talk summarizes the results of this ongoing study.

In 1998-99 moorings measuring temperature, salinity, currents, larval recruitment and larval flux were deployed in 15-40 meters of water off central Oregon. Recruitment rates of barnacles and mussels were measured concurrently at intertidal sites inshore of the moorings. All larval collectors was sampled weekly to biweekly. In each year we observed several major upwelling relaxations. During relaxations temperature and salinity changes were usually, but not always, accompanied by reversals in the otherwise predominantly equatorward near-shore flows. Maximum barnacle recruitment occurred during these relaxations, but only at sites experiencing current reversals. Maximum mussel recruitment did not coincide with these events. These observations led us to conclude 1. that barnacle and mussel larvae depend on different physical processes for onshore transport, and 2. that wind and density-driven current reversals are the primary mechanisms responsible for generating barnacle recruitment events along the central Oregon coast.

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