CTD profiles from R/V Wecoma multiple cruises in the Northeast Pacific coastal waters off states of Washington and Oregon from 2004 to 2006 (RISE project)

Website: https://www.bco-dmo.org/dataset/3250
Version: 23 August 2010
Version Date: 2010-08-23

Project
» River Influences on Shelf Ecosystems (RISE)

Contributors	Affiliation	Role
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Dataset Description

Final processed CTD data for the Wecoma cruises associated with the RISE Project.

NODC_EDDF_Form_RISE04W1
NODC_EDDF_Form_RISE05W2
NODC_EDDF_Form_RISE05W3
NODC_EDDF_Form_RISE06W4

Methods & Sampling

The data were collected using the Wecoma's SBE911+ system with dual Temperature and Conductivity sensors, a SeaTech fluorometer sensor, a Biospherical Instruments/LICOR PAR (Irradiance) sensor, a Chelsea/Seatech/Wetlab CStar Transmissometer, and a Sea Bird SBE043 dissolved oxygen sensor.

Data Processing Description

The data were initially processed using SeaBird Electronics' processing with SeaBird's standard, recommended parameters, following post-processing procedures developed at NOAA's Pacific Marine Environmental Laboratory in the Eco-FOCI (Fisheries and Oceanography coordinated Investigations). Each cast was visually inspected for reasonableness and for spikes. The criterion used for rejection of a data point is that for 1-m bin data, sigma-t inversions > 0.02 are unacceptable. Temperature or conductivity values causing such inversions are removed and the result data gaps are linearly interpolated. On most casts, data were extrapolated to the surface from the first data point at 2-3m depth. Missing cast numbers are for casts taken solely to collect water for deck experiments.

Water samples, taken approximately every third station, were analyzed for salinity using an autosal aboard the Wecoma. The results were compared to data measured by the CTD sensor to determine the calibration correction for the salinity values. The resulting corrections were applied to all the profile data. After the salinity calibration was applied, potential temperature, densities expressed as sigma-t and sigma-theta, and dynamic heights were calculated.

BCO-DMO Processing/Edits
- Original ".txt" file imported into spreadsheet
- RISE master cruise id added to dataset for compatibility with other RISE datasets
- Supplied cruise parameter retained as CruiseId_CTD
- Additional parameters added for overall standardization between RISE CTD datasets
- These parameters have "nd" (no data) entered for values
- Parameter names modified to conform to BCO-DMO convention
- Some renamed to BCO-DMO standard (date, time, lat, lon)
- Spaces removed or replaced with underscores
- Duplicate parameter names individualized
- Parameter units removed from names
- Single Date/Time parameter split into two parameters (date and time)
- date reformatted to YYYYMMDD
- time reformatted to HHMMSS
- Longitude converted signed for West longitude (negative) by subtracting 360.0 from supplied value
- Data values padded with decimal places as appropriate
- Error values changed to BCO-DMO standard of "nd"
- "9999" changed to "nd"
- "-1.00E+10" changed to "nd"

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Data Files

File
CTD_Profiles.csv (Comma Separated Values (.csv), 11.39 MB) MD5:063f2854dcdc42c482c5148a06ab1b89 Primary data file for dataset ID 3250

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Parameters

Parameter	Description	Units
Cruise	RISE Project Cruise Id	text
CruiseID_CTD	RISE CTD Data Specific Cruise Id	text
station	Cast	integer
type	Station Type	text
date	Date (GMT)	YYYYMMDD

time	Time (GMT)	HHMMSS
lon	longitude (West is negative)	Decimal degrees
lat	latitude (South is negative)	Decimal degrees
depth_bot	Bottom Depth	meters
PRESSURE	Pressure	decibars
TEMPERATURE	Temperature (Primary)	degrees celsius
TEMPERATURE2	Secondary Temperature	degrees celsius
fluorometer_raw	rFv = raw Fluorometer volts	volts
Chlorophyll_A	Chlorophyll-A = Sea Tech/Wetlabs FLF Fluorometer measuremen	ugrams/l
Transmissometry	Transmission (light) Percent per meter	percentage
OXYGEN_ml	O= Dissolved Oxygen concentration from SeaBird SBE43 oxygen sensor; uncorrected by sampling.	ml/l
OXYGEN_umol	O= Dissolved Oxygen concentration from SeaBird SBE43 oxygen sensor; uncorrected by sampling.	umol/kg
PAR_v	PAR; Photosynthetically Active Radiation (a measure of light intensity) volts.	volts
PAR	PAR = Irradiance; Photosynthetically Activated Radiation (a measure of light intensity)	uEin m-2 s-1
SALINITY1	Salinity (Primary) (corrected)	PSU
SALINITY2	Secondary Salinity (corrected)	PSU
TEMP_POTENTIAL	Potential Temperature (PT) calculated from T and pressure	degrees celsius
SIGMA_T	density; sigma-t calculated from salinity; T1; Sal1 and pressure)	kg m-3

SIGMA_THETA	density; sigma-t calculated from salinity; T1; Sal1 and pressure)	kg m-3
DYNAMIC_METERS	Dynamic Height (Dyn-m)	Dyn-m
Attenuation	(Beam) Attenuation (light)	m-1

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Instruments

Dataset-specific Instrument Name	CTD Seabird 911
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	SeaBird Electronics SBE911plus with dual temperature and conductivity sensors
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Dataset-specific Description	Biospherical LI-COR Instruments 4-pi (spherical) light intensity sensor (PAR)
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	Sea Tech Fluorometer
Generic Instrument Name	Sea Tech Fluorometer
Dataset-specific Description	Sea Tech/Wetlabs FLF fluorometer (chlorophyll)
Generic Instrument Description	The Sea Tech chlorophyll-a fluorometer has internally selectable settings to adjust for different ranges of chlorophyll concentration, and is designed to measure chlorophyll-a fluorescence in situ. The instrument is stable with time and temperature and uses specially selected optical filters enabling accurate measurements of chlorophyll a. It can be deployed in moored or profiling mode. This instrument designation is used when specific make and model are not known. The Sea Tech Fluorometer was manufactured by Sea Tech, Inc. (Corvalis, OR, USA).

Dataset-specific Instrument Name	CTD Seabird SBE 43
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	SBE43 oxygen sensor (Dissolved Oxygen)
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Wet Labs CSTAR Transmissometer
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly intgrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

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Deployments

W0407A

Website	https://www.bco-dmo.org/deployment/58008
Platform	R/V Wecoma
Report	http://bcodata.whoi.edu/RISE/CruiseReports/RISE-1_Wecoma_CruiseReport.pdf
Start Date	2004-07-08
End Date	2004-07-28

Description	W0407A, RISE-1, RISE1W, RISE04W1 This cruise is the first of four cruises in the RISE program aboard the R/V Wecoma, which was charged with the task of conducting hydrographic surveys. The R/V Pt. Sur conducted studies of the Columbia R. plume frontal structure, mixing processes and zooplankton dynamics concurrently with this cruise on the R/V Wecoma. Cruise Objectives The purpose of this cruise was to make physical, chemical and biological measurements within the plume of the Columbia River and over the shelves north and south of the river mouth, with the objective of determining the effect of the river plume on regional productivity. Historical observations have shown that in spite of weaker upwelling winds the Washington shelf is more highly productive than much of the Oregon shelf. Comparative measurements of biological rates, chemical constituents including iron and other micro nutrients and plankton growth and grazing as well as community distributions were made in the three regions. These data complement data from three moored arrays deployed in the study area, data from a second ship, the R/V Pt. Sur, that focused on mixing rates and large scale physical, nitrate, fluorescence surveys as well as frontal processes, and data from remote sensing and model studies. RISE-1 Figures: Cruise Track Stations and Moorings Wind Events **Methods & Sampling** Link to NODC Data Form 24-13 for Wecoma cruise number W0407A CTD Data Submission File: we0407_ctd_conrept.txt Date: 01/12/2009 Instrument configuration file: E:RISE_confilesw0407ctd026.CON Configuration report for SBE 911plus/917plus CTD ---------- ---------- Frequency channels suppressed : 0 Voltage words suppressed : 0 Computer interface : IEEE-488 (GPIB) Scans to average : 1 Surface PAR voltage added : No NMEA position data added : Yes Scan time added : No 1) Frequency 0, Temperature Serial number : 2327 Calibrated on : 29-Aug-03 G : 4.35194563e-003 H : 6.42961546e-004 I : 2.33581860e-005 J : 2.26867454e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 2) Frequency 1, Conductivity Serial number : 1896 Calibrated on : 29-Aug-03 G : -4.10066585e+000 H : 5.24256945e-001 I : -1.31072264e-003 J : 9.66826034e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 3) Frequency 2, Pressure, Digiquartz with TC Serial number : 9P6012-0256 Calibrated on : 25-Oct-03 C1 : -4.705724e+004 C2 : -4.431410e-002 C3 : 8.991870e-003 D1 : 4.427900e-002 D2 : 0.000000e+000 T1 : 3.014264e+001 T2 : -2.990150e-004 T3 : 3.699150e-006 T4 : 5.702540e-009 T5 : 0.000000e+000 Slope : 0.99990000 Offset : -1.61590 AD590M : 1.140000e-002 AD590B : 0.000000e+000 4) Frequency 3, Temperature, 2 Serial number : 2329 Calibrated on : 29-Aug-03 G : 4.34007498e-003 H : 6.41621142e-004 I : 2.33745142e-005 J : 2.27955379e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 5) Frequency 4, Conductivity, 2 Serial number : 1898 Calibrated on : 29-Aug-03 G : -1.05910191e+001 H : 1.51842313e+000 I : 2.55231578e-005 J : 1.05602711e-004 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 6) A/D voltage 0, Fluorometer, Seatech/Wetlabs FLF Serial number : 101S Calibrated on : Mar 04 Menzies Scale factor : 2.108000e+001 Offset : -0.386 7) A/D voltage 1, Transmissometer, Chelsea/Seatech/Wetlab CStar Serial number : CTS-590DR Calibrated on : 05/01/02 M : 21.3440 B : -1.1950 Path length : 0.250 8) A/D voltage 2, Oxygen, SBE 43 Serial number : 0387 Calibrated on : 04/12/03 Equation : Owens-Millard Coefficients for Owens-Millard: Soc : 5.0730e-001 Boc : 0.0000 Offset : -0.4917 Tcor : -0.0005 Pcor : 1.35e-004 Tau : 0.0 Coefficients for Murphy-Larson: Soc : 0.00000e+000 Offset : 0.00000e+000 A : 0.00000e+000 B : 0.00000e+000 C : 0.00000e+000 E : 0.00000e+000 Tau : 0.00000e+000 9) A/D voltage 3, Free 10) A/D voltage 4, Altimeter Serial number : Datasonics Calibrated on : Scale factor : 15.000 Offset : 0.000 11) A/D voltage 5, Free 12) A/D voltage 6, PAR/Irradiance, Biospherical/Licor Serial number : 4246 Calibrated on : 12 Oct 2004 M : 1.00000000 B : 0.00000000 Calibration constant : 9615384600.00000000 Multiplier : 1.00000000 Offset : 0.00000000 13) A/D voltage 7, Fluorometer, Wetlab Wetstar Serial number : wscd861p Calibrated on : Vblank : 0.000 Scale factor : 1.000 **Processing Description** http://bcodata.whoi.edu/RISE/NODCForms/NODC_DataDocForm_RISE1Wb.pdf">Link to NODC Data Form 24-13 for Wecoma cruise number W0407A CTD Data Submission

W0505C

Website	https://www.bco-dmo.org/deployment/58010
Platform	R/V Wecoma
Report	http://bcodata.whoi.edu/RISE/CruiseReports/RISE-2_Wecoma_CruiseReport.pdf
Start Date	2005-05-29
End Date	2005-06-21
Description	W0505C, RISE-2, RISE2W, RISE05W2 This cruise is the second of four cruises in the RISE program aboard the R/V Wecoma, which was charged with the task of conducting hydrographic surveys. Cruise information and original data are available from the NSF R2R data catalog. The R/V Pt. Sur, concurrently with this cruise on the R/V Wecoma, conducted studies of the Columbia R. plume frontal structure, mixing processes and a Triaxis survey of the shelf **Methods & Sampling** Link to NODC Data Form 24-13 for Wecoma cruise number W0505C CTD Data Submission File: we5050c_ctd_conrept.txt Date: 01/12/2009 Instrument configuration file: E:RISE_confilesw0505cctd026.CON Configuration report for SBE 911plus/917plus CTD ---------- ---------- Frequency channels suppressed : 0 Voltage words suppressed : 0 Computer interface : IEEE-488 (GPIB) Scans to average : 1 Surface PAR voltage added : No NMEA position data added : Yes Scan time added : No 1) Frequency 0, Temperature Serial Number : 1369 Calibrated on : 12-Aug-04 G : 4.83568175e-003 H : 6.76854957e-004 I : 2.62975080e-005 J : 2.08309715e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 2) Frequency 1, Conductivity Serial number : 1896 Calibrated on : 05-Nov-04 G : -4.09852341e+000 H : 5.23660723e-001 I : -1.16452100e-003 J : 8.71950865e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 3) Frequency 2, Pressure, Digiquartz with TC Serial number : 9P6012-0256 Calibrated on : 25-Oct-03 C1 : -4.705724e+004 C2 : -4.431410e-002 C3 : 8.991870e-003 D1 : 4.427900e-002 D2 : 0.000000e+000 T1 : 3.014264e+001 T2 : -2.990150e-004 T3 : 3.699150e-006 T4 : 5.702540e-009 T5 : 0.000000e+000 Slope : 0.99990000 Offset : -1.61590 AD590M : 1.140000e-002 AD590B : 0.000000e+000 4) Frequency 3, Temperature, 2 Serial number : 1367 Calibrated on : 28-Oct-04 G : 4.86069398e-003 H : 6.76215543e-004 I : 2.71400813e-005 J : 2.17770720e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 5) Frequency 4, Conductivity, 2 Serial number : 1054 Calibrated on : 28-Oct-04 G : -4.09061598e+000 H : 5.91805506e-001 I : -9.16823701e-005 J : 4.00387868e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 6) A/D voltage 0, Fluorometer, Seatech/Wetlabs FLF Serial number : 101S Calibrated on : 12/19/01 Scale factor : 2.108000e+001 Offset : -0.386 7) A/D voltage 1, Transmissometer, Chelsea/Seatech/Wetlab CStar Serial number : CTS-590DR Calibrated on : 30-nov-2004 M : 21.2040 B : -1.1662 Path length : 0.250 8) A/D voltage 2, Oxygen, SBE 43 Serial number : 0463 Calibrated on : 09-Nov-04 Equation : Owens-Millard Coefficients for Owens-Millard: Soc : 3.6130e-001 Boc : 0.0000 Offset : -0.4754 Tcor : 0.0004 Pcor : 1.35e-004 Tau : 0.0 Coefficients for Murphy-Larson: Soc : 0.00000e+000 Offset : 0.00000e+000 A : 0.00000e+000 B : 0.00000e+000 C : 0.00000e+000 E : 0.00000e+000 Tau : 0.00000e+000 9) A/D voltage 3, Free 10) A/D voltage 4, Altimeter Serial number : Datasonics Calibrated on : Scale factor : 15.000 Offset : 0.000 11) A/D voltage 5, PAR/Irradiance, Biospherical/Licor Serial number : 4329 Calibrated on : 28 Oct 04 M : 1.00000000 B : 0.00000000 Calibration constant : 4444444444.44444470 Multiplier : 1.00000000 Offset : 0.00000000 12) A/D voltage 6, Free 13) A/D voltage 7, User Polynomial Serial number : MBARI-ISUS Calibrated on : Sensor name : A0 : 0.00000000 A1 : 0.00000000 A2 : 0.00000000 A3 : 0.00000000 **Processing Description** http://bcodata.whoi.edu/RISE/NODCForms/NODC_DataDocForm_RISE2Wb.pdf">Link to NODC Data Form 24-13 for Wecoma cruise number W0505C CTD Data Submission

W0508

Website	https://www.bco-dmo.org/deployment/58012
Platform	R/V Wecoma
Report	http://bcodata.whoi.edu/RISE/CruiseReports/RISE-3_CruiseReport_Daily.pdf
Start Date	2005-08-04
End Date	2005-08-26
Description	W0508, RISE-3, RISE3W, RISE05W3 This cruise is the third of four cruises in the RISE program aboard the R/V Wecoma, which was charged with the task of conducting hydrographic surveys. The R/V Pt. Sur, concurrently with this cruise on the R/V Wecoma, conducted studies of the Columbia R. plume frontal structure, mixing processes and a Triaxis survey of the shelf Stations and Moorings **Methods & Sampling** Link to NODC Data Form 24-13 for Wecoma cruise number W0508 CTD Data Submission File: we0508_ctd_conrept.txt Date: 01/12/2009 Instrument configuration file: E:RISE_confilesw0508ctd150.CON Configuration report for SBE 911plus/917plus CTD ---------- ---------- Frequency channels suppressed : 0 Voltage words suppressed : 0 Computer interface : IEEE-488 (GPIB) Scans to average : 1 Surface PAR voltage added : No NMEA position data added : Yes Scan time added : No 1) Frequency 0, Temperature Serial number : 1369 Calibrated on : 12-Aug-04 G : 4.83568175e-003 H : 6.76854957e-004 I : 2.62975080e-005 J : 2.08309715e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 2) Frequency 1, Conductivity Serial number : 1896 Calibrated on : 05-Nov-04 G : -4.09852341e+000 H : 5.23660723e-001 I : -1.16452100e-003 J : 8.71950865e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 3) Frequency 2, Pressure, Digiquartz with TC Serial number : 9P6012-0256 Calibrated on : 25-Oct-03 C1 : -4.705724e+004 C2 : -4.431410e-002 C3 : 8.991870e-003 D1 : 4.427900e-002 D2 : 0.000000e+000 T1 : 3.014264e+001 T2 : -2.990150e-004 T3 : 3.699150e-006 T4 : 5.702540e-009 T5 : 0.000000e+000 Slope : 0.99990000 Offset : -1.61590 AD590M : 1.140000e-002 AD590B : 0.000000e+000 4) Frequency 3, Temperature, 2 Serial number : 1367 Calibrated on : 28-Oct-04 G : 4.86069398e-003 H : 6.76215543e-004 I : 2.71400813e-005 J : 2.17770720e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 5) Frequency 4, Conductivity, 2 Serial number : 1054 Calibrated on : 28-Oct-04 G : -4.09061598e+000 H : 5.91805506e-001 I : -9.16823701e-005 J : 4.00387868e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 6) A/D voltage 0, Fluorometer, Seatech/Wetlabs FLF Serial number : 101S Calibrated on : 12/19/01 Scale factor : 2.108000e+001 Offset : -0.386 7) A/D voltage 1, Transmissometer, Chelsea/Seatech/Wetlab CStar Serial number : CTS-590DR Calibrated on : 30-nov-2004 M : 21.2040 B : -1.1662 Path length : 0.250 8) A/D voltage 2, Oxygen, SBE 43 Serial number : 0463 Calibrated on : 09-Nov-04 Equation : Owens-Millard Coefficients for Owens-Millard: Soc : 3.6130e-001 Boc : 0.0000 Offset : -0.4754 Tcor : 0.0004 Pcor : 1.35e-004 Tau : 0.0 Coefficients for Murphy-Larson: Soc : 0.00000e+000 Offset : 0.00000e+000 A : 0.00000e+000 B : 0.00000e+000 C : 0.00000e+000 E : 0.00000e+000 Tau : 0.00000e+000 9) A/D voltage 3, Free 10) A/D voltage 4, Altimeter Serial number : Datasonics Calibrated on : Scale factor : 15.000 Offset : 0.000 11) A/D voltage 5, PAR/Irradiance, Biospherical/Licor Serial number : 4246 Calibrated on : 02/11/05 M : 1.00000000 B : 0.00000000 Calibration constant : 91700000000.00000000 Multiplier : 1.00000000 Offset : 0.00000000 12) A/D voltage 6, User Polynomial Serial number : 018 Calibrated on : Sensor name : A0 : -14.11600000 A1 : 31.84200000 A2 : 0.00000000 A3 : 0.00000000 13) A/D voltage 7, User Polynomial, 2 Serial number : MBARI-ISUS Calibrated on : Sensor name : A0 : -1.28998968 A1 : 12.89989680 A2 : 0.00000000 A3 : 0.00000000 **Processing Description** http://bcodata.whoi.edu/RISE/NODCForms/NODC_DataDocForm_RISE3Wb.pdf">Link to NODC Data Form 24-13 for Wecoma cruise number W0508 CTD Data Submission

W0605B

Website	https://www.bco-dmo.org/deployment/58015
Platform	R/V Wecoma
Report	http://bcodata.whoi.edu/RISE/CruiseReports/RISE-4_Wecoma_CruiseReport_F_TDP.pdf
Start Date	2006-05-21
End Date	2006-06-13
Description	W0605B, RISE-4, RISE4W, RISE06W4 This cruise is the fourth of four cruises in the RISE program aboard the R/V Wecoma, which was charged with the task of conducting hydrographic surveys. Cruise information and original data are available from the NSF R2R data catalog. The R/V Pt. Sur, concurrently with this cruise on the R/V Wecoma, conducted studies of the Columbia R. plume frontal structure, mixing processes and a Triaxis survey of the shelf **Methods & Sampling** Link to NODC Data Form 24-13 for Wecoma cruise number W0605B CTD Data Submission File: we0605b_ctd_conrept.txt Date: 01/12/2009 Instrument configuration file: E:RISE_confilesw0605bctd020.CON Configuration report for SBE 911plus/917plus CTD ---------- Frequency channels suppressed : 0 Voltage words suppressed : 0 Computer interface : IEEE-488 (GPIB) Scans to average : 1 Surface PAR voltage added : No NMEA position data added : Yes Scan time added : No 1) Frequency 0, Temperature Serial number : 1008 Calibrated on : 09-Aug-05 G : 4.80459038e-003 H : 6.74782932e-004 I : 2.70807138e-005 J : 2.20710539e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 2) Frequency 1, Conductivity Serial number : 1568 Calibrated on : 13-Sep-05 G : -4.00440405e+000 H : 5.18956990e-001 I : -1.63314992e-004 J : 3.20297282e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 3) Frequency 2, Pressure, Digiquartz with TC Serial number : 9P6012-0256 Calibrated on : 17-Mar-06 C1 : -4.705724e+004 C2 : -4.431410e-002 C3 : 8.991870e-003 D1 : 4.427900e-002 D2 : 0.000000e+000 T1 : 3.014264e+001 T2 : -2.990150e-004 T3 : 3.699150e-006 T4 : 5.702540e-009 T5 : 0.000000e+000 Slope : 0.99995000 Offset : -1.59690 AD590M : 1.140000e-002 AD590B : -8.242000e+000 4) Frequency 3, Temperature, 2 Serial number : 1384 Calibrated on : 09-Aug-05 G : 4.86999793e-003 H : 6.80583250e-004 I : 2.70846981e-005 J : 2.14889646e-006 F0 : 1000.000 Slope : 1.00000000 Offset : 0.0000 5) Frequency 4, Conductivity, 2 Serial number : 1041 Calibrated on : 16-Sep-05 G : -4.10442646e+000 H : 5.61313222e-001 I : -1.13800827e-005 J : 3.22951690e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.00000 6) A/D voltage 0, Fluorometer, Wetlab ECO-AFL/FL Serial number : flrtd-425 Calibrated on : 10-Nov-2005 Vblank : 0.0540 Scale factor : 1.30000000e+001 7) A/D voltage 1, Transmissometer, Chelsea/Seatech/Wetlab CStar Serial number : CTS-590DR Calibrated on : 30-nov-2004 M : 21.2040 B : -1.1662 Path length : 0.250 8) A/D voltage 2, Oxygen, SBE 43 Serial number : 0463 Calibrated on : 14-Mar-06 Equation : Owens-Millard Coefficients for Owens-Millard: Soc : 3.4140e-001 Boc : 0.0000 Offset : -0.4794 Tcor : 0.0017 Pcor : 1.35e-004 Tau : 0.0 Coefficients for Murphy-Larson: Soc : 0.00000e+000 Offset : 0.00000e+000 A : 0.00000e+000 B : 0.00000e+000 C : 0.00000e+000 E : 0.00000e+000 Tau : 0.00000e+000 9) A/D voltage 3, Free 10) A/D voltage 4, Altimeter Serial number : Datasonics Calibrated on : Scale factor : 15.000 Offset : 0.000 11) A/D voltage 5, PAR/Irradiance, Biospherical/Licor Serial number : 4246 Calibrated on : 02/11/05 M : 1.00000000 B : 0.00000000 Calibration constant : 9174311920.00000000 Multiplier : 1.00000000 Offset : 0.00000000 12) A/D voltage 6, Free 13) A/D voltage 7, Free **Processing Description** http://bcodata.whoi.edu/RISE/NODCForms/NODC_DataDocForm_RISE4Wb.pdf">Link to NODC Data Form 24-13 for Wecoma cruise number W0605B CTD Data Submission

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Project Information

River Influences on Shelf Ecosystems (RISE)

Website: http://www.ocean.washington.edu/rise

Coverage: Northeast Pacific, coastal waters off states of Washington and Oregon

River Influences on Shelf Ecosystems (RISE) - A Study of the Columbia River Plume
A Multi-Institutional Collaborative Project Sponsored by the National Science Foundation

In 2004 an interdisciplinary study "River Influences on Shelf Ecosystems" (RISE) was initiated to determine the extent to which alongshore gradients in ecosystem productivity might be related to the existence of the massive freshwater plume from the Columbia River. RISE was designed to test three hypotheses: - During upwelling the growth rate of phytoplankton within the Columbia plume exceeds that in nearby areas outside the plume being fueled by the same upwelling nitrate.
- The plume enhances cross-margin transport of plankton and nutrients.
- Plume-specific nutrients (Fe and Si) alter and enhance productivity on adjacent shelves.

Within those constraints, RISE provides the first comprehensive interdisciplinary study of the rates and dynamics governing the mixing of river and coastal waters in an eastern boundary system, as well as the effects of the plume formed by the mixing processes on rates, standing stocks and community structure of plankton in the local ecosystem. The RISE project, includes 4 field and two different numerical model applications. We collected simultaneous measurements of water chemistry, phytoplankton growth and grazing rates, zooplankton populations, water currents, and turbulent mixing. These are being combined with data from satellites, radar, and moorings, as well as detailed numerical simulations, to develop a deeper understanding of this important ecosystem.

The overall RISE sampling strategy was to compare mixing rates, nutrient supply, and phytoplankton production, grazing and community structure within the plume and outside the plume; i.e. on the shelf to the north of the river mouth, presumed more productive, and on the shelf to the south of the river mouth, presumed less productive, as well as in the important "plume lift off" area (the region where the plume loses contact with the bottom) near the river mouth and the plume "near field". The backbone for this project consists of data collected during four cruises that took place in the seasonally high-flow period (May-June) in each of three years (2004-06) and in a low-flow period in the second year (August, 2005). The sampling was spread over three years to attempt to include interannual differences in processes related to wind and river flow variability. The 21-day length of the cruises ensured that a variety of circulation and growth regimes, including upwelling and relaxation/downwelling and neap/spring tides, were observed.

The field studies used two vessels operating simultaneously. The R/V Wecoma obtained primarily biological and chemical rate data: a) at individual stations on cardinal lines north and south of the river mouth (off Grays Harbor, WA and Cape Meares, OR) and near the river mouth; b) at selected process study stations; and c) at fixed stations near the river mouth during strong neap and spring tides (time series). A towed sensor package was used to obtain micronutrient samples near the sea surface on cardinal lines and other selected transects. Underway measurements included macronutrients (N, P, Si), dissolved trace metals (Fe, Mn), supplemented with discrete samples from the underway system (microscopy, FlowCAM and particulate trace metals). At CTD stations vertical profiles (0-200 m where possible; and 500 m at selected stations) of T, S, vertical shear and currents, dissolved O2, in vivo fluorescence, PAR, chlorophyll a, dissolved macronutrients (NO3, NH4, urea, PO4, SiO4), dissolved trace metals, and heterotrophic and autotrophic plankton composition were obtained. Surface drifters were used to follow the mixing of individual plumes and to provide information on surface currents.

On the R/V Pt. Sur, synoptic mesoscale and fine-scale features were sampled with underway measurements of near-surface T, S, velocity, particle size and concentration, PAR, transmissivity and fluorescence and nitrate+nitrite. The Pt. Sur's Triaxus tow fish provided high-resolution sections of T, S, zooplankton (Laser-OPC), PAR and transmissivity, fluorescence, particle size and concentration (LISST-FLOC25X), UV absorption and nitrate (Satlantic ISUS) and radiance/irradiance (7 channels) through the upper water column to 50 m. Rapidly-executed transects of turbulence and fine-structure were also carried out using the Chameleon profiler; these provide full-depth profiles of T, S, optics (880 nm backscatter and fluorescence), turbulence dissipation rates and turbulent fluxes every 1-3 minutes. During selected periods, transects were repeated hourly to capture the high-frequency evolution in the plume's nearfield and river estuary. Acoustics (surface-deployed 1200 kHz ADCP and 120 kHz echosounder) were used to image fine-scale features of the velocity and backscatter fields, resolving fronts, nonlinear internal waves, and turbulent billows.

The temporal context for observed variability was provided by an array of moored sensors deployed in the plume near field as well as on the shelf north and south of the plume (complemented by the pre-existing long-

term estuarine and plume stations of the CORIE/SATURN network. To better resolve regional differences, moorings were moved farther north and south to the cardinal sampling lines after the first year of the program. Surface currents were mapped hourly from shore using HF radar with two simultaneously operating arrays, one with a 40 km range and a 2 km range resolution, the other with a 150 km range and a 6 km range resolution. Satellite ocean color, sea surface temperature, turbidity and synthetic aperture radar (SAR) were also obtained when available.

Two modeling systems were developed or enhanced during RISE. The system developed specifically for RISE employed a structured grid model (ROMS) and was used in hindcast mode (MacCready et al., 2008). The CORIE/SATURN modeling system (Baptista, 2006)- based on two unstructured-grid models (SELFE, Zhang and Baptista, 2008; and ELCIRC, Zhang et al., 2004)- was used in both near real-time prognostic mode and multi-year hindcast mode. Both modeling systems incorporated the estuary in the simulation domain (although at different resolutions) and used realistic river, ocean and atmospheric forcing conditions, tidal forcing, and Columbia River estuary forcing. Wind/heat flux model forcing for ROMS was derived from the 4 km MM5 regional wind/heat flux model. SELFE and LCIRC were also forced by MM5. Conditions on open boundaries were provided by ~9 km resolution models from the Navy Research Laboratory (NRL) (NCOM); ROMS used the smaller domain NCOM-CCS NRL model, SELFE and ELCIRC used the larger domain Global-NCOM model. The biological model is a four-box ("NPZD") nitrogen-budget model that tracks nutrients, phytoplankton, zooplankton, and detritus in every cell of the ROMS grid. The rich RISE biological dataset allowed model validation against not just stocks (chlorophyll, microzooplankton, nutrients) but rates (phytoplankton growth and grazing) directly, a level of validation that is seldom possible. These rate observations also allowed the setting of key model parameters (e.g., zooplankton ingestion rate and mortality) empirically (Banas, et al., 2008).

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RISE Cruise Reports and Figures:

2004 RISE-1

RISE04W1=R/V Wecoma, W0407A, July 8-28, 2004
Cruise Report
Cruise Track
Stations and Moorings
Wind Events

RISE2004=R/V Point Sur, (tbd), July 8-28, 2004
Cruise Report

2005 RISE-2

RISE05W2=R/V Wecoma, W0505C, May 29-June 21, 2005
Cruise Report
Cruise Track
Stations and Moorings
Wind Events

RISE2005a=R/V Point Sur, (tbd), May 29-June 21, 2005
Cruise Report

2005 RISE-3

RISE05W3=R/V Wecoma, W0508, August 4-August 26, 2005
Daily Cruise Report
Lessard Cruise Report
Peterson/Shaw Zooplankton Report

Cruise Track
Stations and Moorings
Wind Events

RISE2005b=R/V Point Sur, (tbd), August 2-August 27, 2005
Cruise Report
Cruise Log

2006 RISE-4
RISE06W4=R/V Wecoma, W0605B, May 21-June 13, 2006
Cruise Report 1
Cruise Report 2
Cruise Track
Stations and Moorings
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RISE2006a=Leg 1, R/V Point Sur, (tbd), May 21-May 31, 2006
Cruise Report Leg 1
RISE2006b=Leg 2, R/V Point Sur, (tbd), June 2-June 12, 2006
Cruise Report Leg 2

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