

Spring 2006 Newsletter

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images, and sound will be delivered to scientists, managers, the public, and a data archive via seafloor fibre-optic cables laid from two separate landfall sites. These cables will deliver power for instruments, lights, and robots, transmit commands from project scientists, as well as deliver information back on the state of our oceans.

The VENUS Project includes two interactive laboratories, one currently installed and operational in Saanich Inlet and a second in the Strait of Georgia to be installed later in 2006.



The VENUS digital stills camera captures the image of a squat lobster, plumose anemone, along with sea squirts and sponges. These animals are common in the benthic community of Saanich Inlet.

Project Overview

VENUS is a research facility that will support coastal oceanography and provide data for long term studies in British Columbia waters. The VENUS network of instruments is dedicated to observing oceanographic processes in our marine environment.

The VENUS Data Archive will support data mining and communication among users. Measurements,

Keeping Current

Saanich Inlet Update

Following on from the successful installation of the Saanich Inlet Array in early February, the Project Team returned to Saanich Inlet on 21 February 06 to fine-tune recovery and deployment procedures. After recovering and redeploying the VIP (VENUS Instrument Platform), the camera system and hydrophone array were deployed on the bottom of the inlet. At present, all of the initial instrument packages for Saanich Inlet have been deployed and are functioning. The data is streaming from the Shore Station into the Data Management and Archive System and is being plotted automatically every five minutes to provide researchers with a starting point for data queries. The Team is now working on recovery, calibration and inspection protocols for our first maintenance cruise in August 06.

ZAP Data Coming Soon

The VENUS team is currently working on the tools to retrieve and format multi-dimensional time series data for web display. An ASL Environmental Sciences ZAP (Zooplankton Acoustic Profiler) rests in Saanich Inlet on the VENUS Instrument Platform (latitude: 48 deg 39.0792' N, longitude: 123 deg 29.1613' W) at a depth of approximately 98 m. This upward-looking ZAP measures acoustic backscatter intensity for a range of 100 m and collects one sample every second. Because the sampling rate is so high, a large amount of data is accumulated quickly and therefore, data are stored in XML (Extensible Markup Language) file formats and parsed using the XML Toolbox functions in MATLAB. ZAP profile images will display averaged data (30 second averaging) for the last 24 hours and will be updated daily. The figures shown to the right are examples of ZAP images users will be able to view on the website next month. The ZAP records relative acoustic backscatter intensity in counts, but the scale has been adjusted to display relative backscatter in dB (decibels) which is a logarithmic representation of sound pressure. In the images, you can clearly see zooplankton migrating each day. This is represented by the rising and descending pattern of elevated intensity values (green). The surface, fish and concentrated zooplankton are marked by their strong intensity values (red). The instrument platform also holds a Teledyne RDI ADCP (Acoustic Doppler Current Profiler) that pings every 60 seconds. Since the ZAP has a higher sampling frequency it records the acoustic transmissions from the ADCP. The ADCP pings are represented by striations visible in the background of each image.

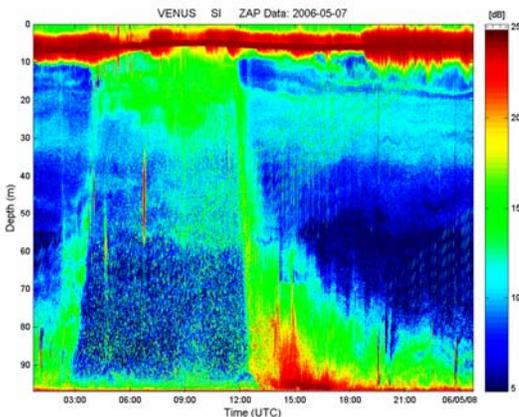


Figure 1 ZAP profile data for May 7, 2006 from Saanich Inlet.

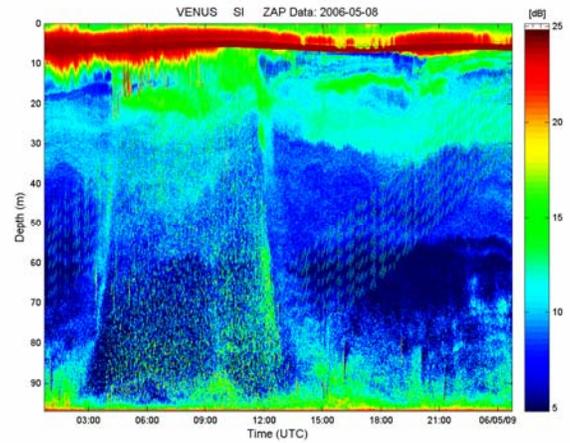


Figure 2 ZAP profile data for May 8, 2006 from Saanich Inlet.

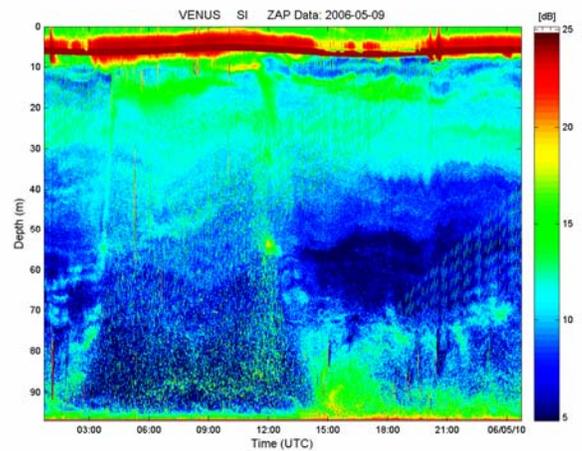


Figure 3 ZAP profile data for May 9, 2006 from Saanich Inlet.

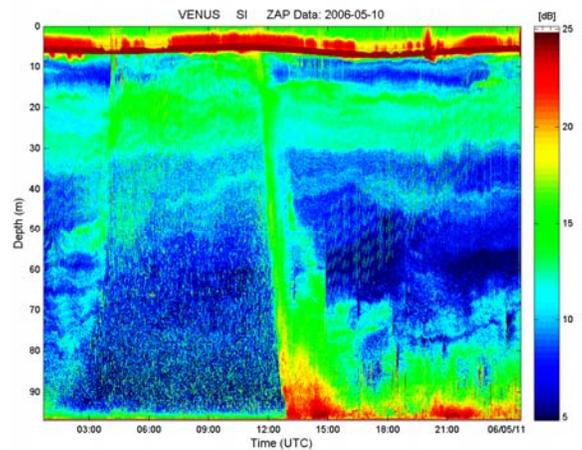


Figure 4 ZAP profile data for May 10, 2006 from Saanich Inlet.

VENUS Observatory Allows Study of Fish Activity: defining the role of fish in nutrient and carbon recycling

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The ocean floor is a major sink for photosynthetically fixed carbon and biogeochemically important elements (such as N, P, Fe, and Si). Ultimately, the fate of material reaching the seafloor is controlled by the balance between burial and recycling processes. Mechanisms that recycle carbon, nutrients and other material from the sediment include bacteria and infauna activity, chemical diffusion, and physical resuspension. The role of fish in marine settings has received little attention despite recognition of their importance in coral reef and lake settings.

While survey and installation work was conducted with ROPOS for VENUS, we took some time to examine the activities of abundant flatfish at the node site. Saanich is a perfect place for “controlled” work because we can compare results with the unpopulated anoxic zone. As oxygen increases, flatfish appear on the bottom and reach densities up to 30 fish in 10m². Other fish put on seasonal appearances and dense schools of herring, pollack and dogfish can cause notable seafloor disruption. Turbidity levels near the bottom and the degree of bottom disturbance were positively correlated with benthic fish abundance along a gradient of dissolved oxygen from 0 to 3 ml L⁻¹ at 180 to 60 m depth. Our measurements indicate that fish can rework about 44% of the seafloor each day seeking food or refuge. Acoustic and visual data indicate that fish activity causes 2 to 5 resuspension events m⁻² hr⁻¹.

This activity means that compounds buried in the surface sediments are resuspended and are available for chemical and biological reworking. By careful sampling just above flatfish before and as they created sediment clouds, we observed increases in ammonia, phosphorus and silica concentrations of 166%, 53% and 3%, respectively, while oxygen levels dropped. Calculations suggest that fish

resuspension in Saanich may reduce organic carbon sequestration by 230 mg C m⁻² day⁻¹ (66% of the annual vertical flux). Simulations of sediment resuspension in the lab suggest that fish activity enhances nutrient and organic matter recycling by at least two fold in comparison to undisturbed sediments. Currently, we are using the VENUS camera for on-line observations of fish activity at the bottom of Saanich Inlet, coupled with on-line acoustic observation of sediment clouds using a horizontally-looking 200 kHz acoustic profiler for long term monitoring of near-bottom fish behaviour.

To date, these processes are missing from geochemical estimates based on pore-water profiles and benthic chamber measurements. The intensive reworking and resuspension of marine sediments by fish has implications for carbon burial models, contaminant redistribution, denitrification rates, and spore resuspension, among others. The ongoing decimation of ground fish populations by commercial fisheries is likely to affect global geochemical cycles in unforeseen ways.

Pictures and videos can be found on Gitai Yahel's web site: <http://web.uvic.ca/~yahel/gyhp.htm>

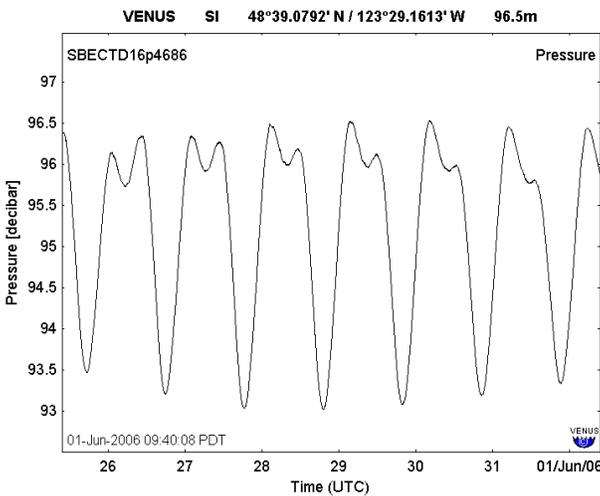
New Website to be Released on June 22, 2006

The new VENUS website will be available on June 22, 2006 at www.venus.uvic.ca! We are excited about being able to offer live data in multi-formats from Saanich Inlet and provide Project information and updates. You will find automatically generated plots from the last 24 hours, last week, last month in different resolutions and formats. You will also find video and still images collected from both the Saanich Inlet array and site exploration cruises. Hydrophone samples are included in mp3 format. MATLAB, the database, and the website have been integrated to enable registered users to search by time period, instrument, and sensor. The end result of the search screen is a downloadable data product.

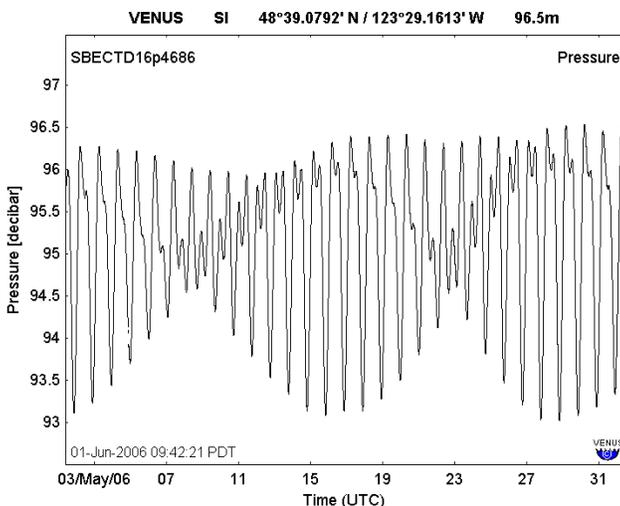
We hope you will check out Phase 1 of the new VENUS website. As part of our mandate to reach out to the community we welcome your suggestions and comments. Please let us know what you think through the website email address: venus@uvic.ca.

VENUS Data Products

The VENUS Observatory has collected over 3 months of data from the instruments deployed in Saanich Inlet. Along with the near-real time scalar data plots that display data for the last 24 hours (updated every 5 minutes), longer time period data plots are now available on the website. Website users can view time series data for the last week (7 days), the last month (31 days) and the last year that are updated daily. We are generating longer time series data plots from all our scalar instrument sensors in Saanich Inlet: oxygen, temperature, dissolved gas pressure, internal temperature (for the gas tension device), light transmission, conductivity, pressure, and salinity. The figures shown below represent the last week and last month of pressure data collected by a Sea-bird 16plus CTD (measures conductivity, temperature and depth).

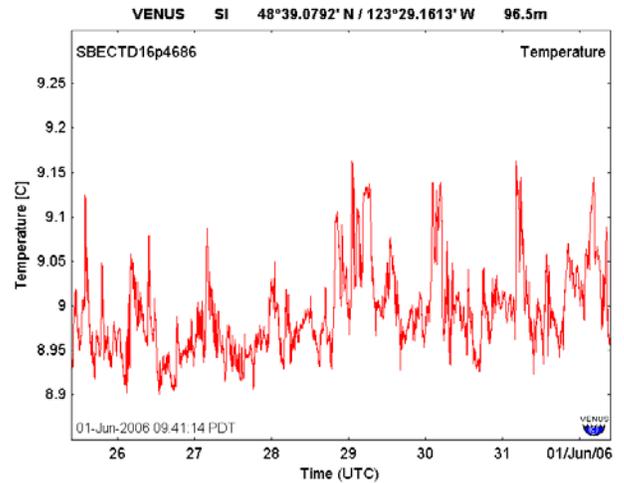


The last week of pressure data from the Seabird 16plus CTD.

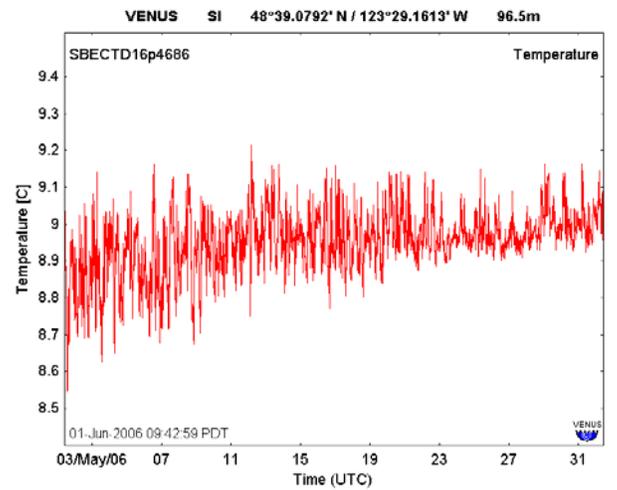


The last month of pressure data from the Seabird 16plus CTD.

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The last week of temperature data from the Seabird 16plus CTD



The last month of temperature data from the Seabird 16plus CTD.

NEPTUNE Canada, our sister project, can be found at www.neptunecanada.ca.



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