The CoreWall Project

Core Visualization, Stratigraphic Correlation and Rich Media Distribution

Yu-Chung Chen[1], HyeJung Hur[1], Jason Leigh[1], Andrew Johnson[1], Luc Renambot[1], Emi Ito[2], Paul Morin[2], Sean Higgins[3], Josh Reed[4]
[1]Electronic Visualization Laboratory, University of Illinois at Chicago
[2]Limological Research Center, University of Minnesota
[3]Lamont-Doherty Earth Observatory, Columbia University
[4]Antarctica geological Drilling, University of Nebraska, Lincoln

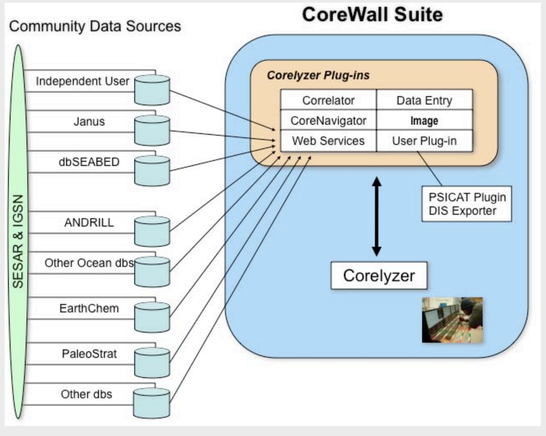
www.corewall.org

Introduction

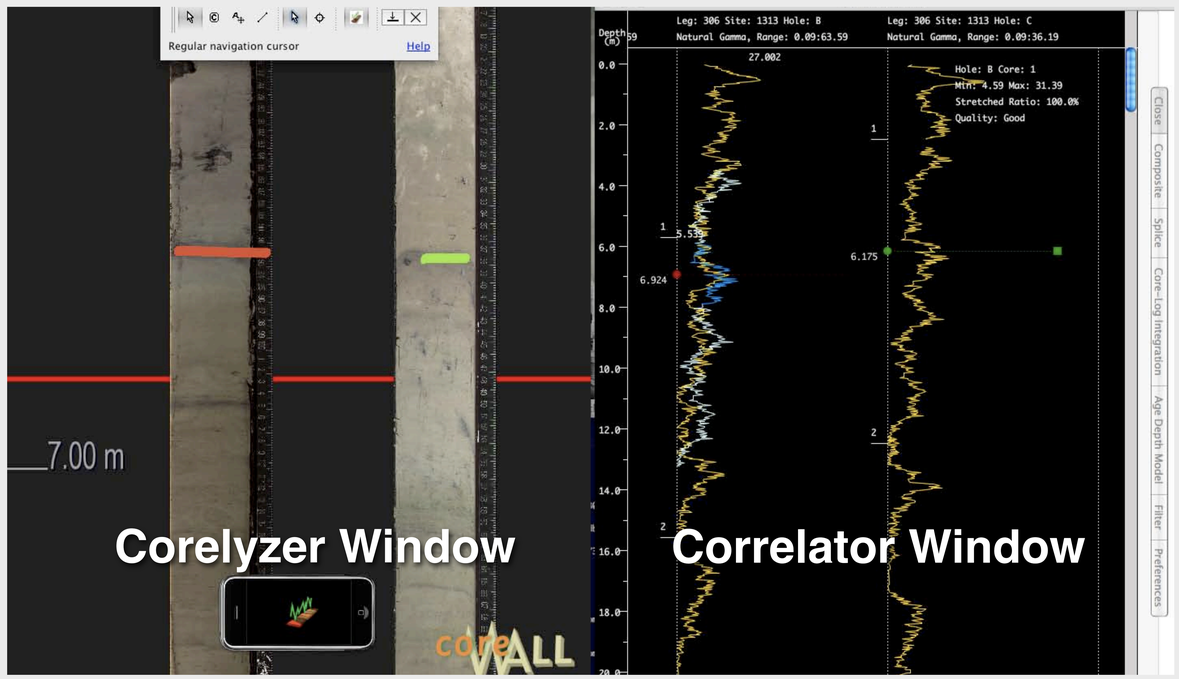
The CoreWall Suite is a National Science Foundation-supported collaborative development for a real-time core description (Corelyzer), stratigraphic correlation (Correlator), and data visualization (CoreNavigator) software to be used by the marine, terrestrial and Antarctic science communities. The overall goal of the CoreWall software development is to bring portable cross-platform tools to the broader drilling and coring communities to expand and enhance data visualization and enhance collaborative integration of multiple datasets.

CoreWall suite provides a set of tools for coring scientists to observe and analyze geological cores through high resolution imagery and physical sensor data. It helps scientists efficiently construct the overall mind map and generate more research ideas while the coring expedition is happening with high-resolution visualization and flexible interactivity. It has been used in various expeditions including individual lake core scientists in National Lacustrine Core Repository Laboratory in University of Minnesota, Earthscope's San Andreas Fault Observatory at Depth (SAFOD), and Antarctica Geological Drilling (ANDRILL).

CoreWall Architecture



Enhancements to Visual Stratigraphy Correlation

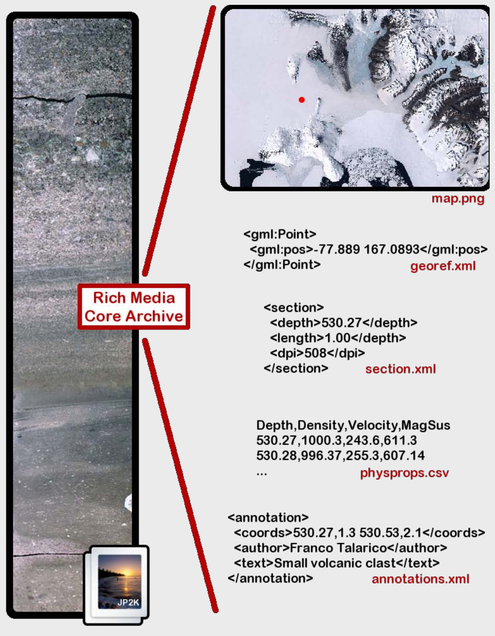


The function of visual stratigraphy correlation has been further enhanced to allow two pieces of software in the suite Correlator and Corelyzer to work side-by-side with both data logs and high-resolution imagery.

In 2008 Corelyzer began working with International Continental Scientific Drilling Project's (ICDP) Drilling Information System (DIS) and Paleotological Stratigraphic Interval Construction and Analysis Tool (PSICAT) to standardize on an interoperable data exchange format. The format is based on XML and allows DIS to expose the collected recovery data to client applications like Corelyzer and PSICAT. Corelyzer will be able to visualize the imagery downloaded from DIS server and export the user generated interpretation annotations back to DIS.

We will also be working on "Rich Media Core Archive" for core data distribution with management flexibility. The JPEG 2000 format provides both feature-preserving high compression ratio encoding and advanced features like multi-resolution and multi-tile imagery delivery. With the ability to embed XML data files, we can include not only geospatial metadata but also geometry features, data logs and interpretations into a self-contained JPEG 2000 core section archive file. We hope it will be useful to both scientists and educators in the classroom environment.

Rich Media Core Archive

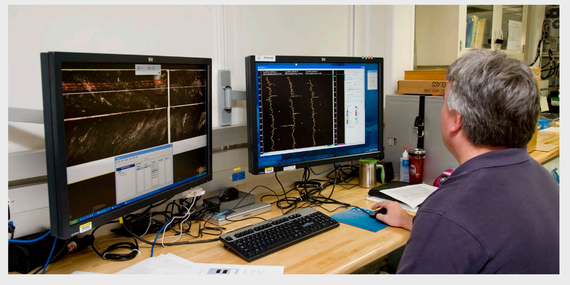


JOIDES Resolution Sea Trial

Software developed by the Corewall project has been successfully tested by an international crew of scientists studying equatorial Pacific Ocean climate history using sediment core samples extracted from the ocean's floor on the IODP's ship, Joides Resolution.

The Corelyzer software lets geoscientists view high-resolution core imagery as one continuous image. Users can then view, magnify, annotate, and juxtapose multiple cores. Optimal visualization of core imagery is facilitated by using two 30-inch LCDs arranged side-by-side. "The resulting session files can be saved, archived, and distributed among a global community of scientists via web services."

Correlator, another EVL-developed software tool, allows users to digitally correlate multiple cores. Core sections are run through an automatic multi-sensor track system to capture physical properties like magnetic susceptibility, overall density, velocity, and natural gamma-ray activity. The core is then split lengthwise for further analysis and imaged in high-resolution to capture all of its visible features. The split core and all the geophysical data (from the multi-sensor track as well as the log data) are curated and are used for additional specialty research.



Acknowledgements

This work was supported by the National Science Foundation under the agreement numbers OCE-0602117.

CoreWall (www.corewall.org)
ANDRILL: Antarctic Geological Drilling (www.andrill.org)
Electronic Visualization Laboratory, University of Illinois at Chicago (www.evl.uic.edu)
PSICAT: Paleontological Stratigraphic Interval Construction and Analysis Tool (www.psicat.org)
LacCore: U.S. National Lacustrine Core Repository at the University of Minnesota (www.laccore.org)
Drilling Information System, International Continental Scientific Drilling Program (www.icdp-online.org)