

2022
Geologic Repositories Rock
Sample Digitization
Webinar Series
Alaska Geologic Materials Center



Geologic Repositories Rock Sample Digitization Webinar Series

The Spring 2022 **Geologic Repositories Rock Sample Digitization** webinar series is co-hosted by the *Alaska Geologic Materials Center* (GMC) and the *Alaska Geological Society* (AGS). Additional support is provided by the USGS National Geological and Geophysical Data Preservation Program (NGGDPP), Alaska Oil and Gas Association (AOGA), Alaska Miners Association (AMA), and American Association of State Geologists (AASG).

Presenters include technology providers, academia, and government bureaus with expertise and actual experiences in creating non-destructive analytical databases for rock sample archives.

Each presentation looks to extend the geologic community's use of repository collections through digitization of rock samples, including examples of cooperation and support across public, academic, and resource industry partnerships. The presentations also look to draw support from the geological community for the acquisition of technological capability and the opportunity to build modern regional integrated analytical rock sample datasets for the nation.

Geologic Repositories Rock Sample Digitization Webinar Series: Original Schedule

Date	Presenter	Organization	Title
2/23	Jacob Proctor	Ingrain - A Halliburton Service	Addressing reservoir challenges in the North Slope and non-destructive dual energy CT
3/9	Kurt Johnson	Alaska GMC	Promise and challenge of digital rocks
3/16	Katrina Cox	Core Laboratories	RAPIDZoom™ core and thin sections: Digitalization of Umiat and Square Lake energy core
3/23	Matthew Andrew	Carl Zeiss X-ray Microscopy, Inc.	Bringing petrography into the digital age: automating acquisition, analysis & quantification of thin sections using the Axioscan 7, advanced algorithms and machine learning
3/30	Dale Blue Caroline Mignot	Halliburton	Diskos 2.0: The National Digital Resource for exploration and production in Norway
4/13	Georgina Gordon Carsten Laukamp	Geological Survey of South Australia CSIRO Mineral Resources	Virtual Core Libraries: Implementation and the impacts of making this resource readily accessible. Insights from the Geological Survey of South Australia and AuScop's National Virtual Core Library
4/20	Marie-Christine Ferland	Photon etc.	Modular multi-sensor core scanning platform for geological applications
4/27	Philip Lypaczewski	College of the North Atlantic	Hyperspectral imaging as a public geoscience tool - Early results of a drill core digitization program in Newfoundland and Labrador, Canada
5/4	Gary Thompson Douglas Morrison	College of the North Atlantic Centre for Excellence in Mining	The Mining Innovation Commercialization Accelerator (MICA) and the role of Canadian colleges in advancing geosciences
5/18	Jacob Proctor	Ingrain - A Halliburton Service	Data acquisition campaign for Alaska reservoirs
5/25	Guy Oliver David McKnight	Geolog Americas Inc. Hitachi Vantara	A digital-cuttings drill-down, with examples from the Geolog Americas Nanushuk-Torok Regional Cuttings Consortium
6/1	Katrina Cox Patrick Huff	Core Laboratories	Non-Invasive Technologies for Reservoir Optimization (NITRO) on the Umiat Core Advanced Cuttings Collection and Reservoir Expression in Cuttings
6/8	Rainer Bärs Phil Harris	Spectral Imaging Ltd. TerraCore	A geological tool for digital transformation: The Sisurock Hyperspectral Scanner

Geologic Repositories Rock Sample Digitization Webinar Series: Published Chapters

This publication includes three chapters organized by the following topics:

Chapter A: Non-destructive scanning instruments

Chapter B: Public Agencies

Chapter C: Third-Party Support Services

Unless otherwise noted, each chapter includes presenter biographies, presentation abstracts, and presentation recordings.

Modular multi-sensor core scanning platform for geological applications

Talk Date: April 20, 2022

Abstract: Photon etc. has developed, the nCore, a new and modular and automated photonics multi-sensor for core scanning and ore sorting. This talk will explore the platform, its modularity, and sensors.

Speaker: Marie-Christine Ferland, Photon etc. Inc | mcferland@photonetc.com

Marie-Christine holds a Bachelor's Degree in Physics and an MBA in Business Management from University Laval. Marie-Christine is the Business Development Director and the acting Sales & Marketing director for Photon etc. She is responsible to oversee planning on execution of the company's strategic plan. She also manages all business and university partnerships. Prior to that, she worked 9 years at National Optics Institute (INO) from 2008 to 2017. She held 3 positions there: from market analysts to business development and commercialization manager. She acquired extensive experience with commercialization of optics and photonics innovation. Later on she was an Account Director at Leddartech, a lidar company for the automotive industry. She gained substantial experience in commercializing and selling optics innovation. While working at INO she helped many startups find the right market for their technology, helped them quantify the market, and started their business. She has participated in a lot of strategic planning for optics technology enterprises and has extensive experience in optics innovation.



Link to Video: <https://doi.org/10.14509/30878>

A geological tool for digital transformation: The Sisurock Hyperspectral Scanner

Talk Date: June 8, 2022

Abstract: The Specim Sisurock is an integrated, turnkey hyperspectral-imaging scanner specifically designed to scan drill core trays rapidly. It can currently house up to three different hyperspectral cameras of different geologically relevant wavelength ranges, including a thermal LWIR imager. The scanner is fast, and scan rates of up to 200-core boxes/shift are reported. These systems enable geological digitization of mineralogy, textures, and their distributions and associations through the spectral imaging.

Speaker: Rainer Bärs, Specim Ltd | rainer.bars@SPECIM.FI and Phil Harris, TerraCore | pharris@terracoregeo.com

Rainer has a background in applied geophysics and computer science and has specialized in hyperspectral methods. He holds a Lic. Sc. (Tech) in applied geophysics and computer science. Rainer currently works as a Senior Application Engineer at Specim, where he has been for over 20 years. His work focuses on developing and supporting geological applications and instruments. Much of his focus is on demo- and pilot measurements and data analysis for potential customers, demonstrating and enabling the use of hyperspectral imaging to solve these problems.

Phil is a geologist who has been keenly involved applications of infrared spectral techniques across the discipline. His focus has been on the development of systems and solutions enabling spectral techniques for geological applications. Phil is currently the President of TerraCore providing hyperspectral core imaging services and solutions for the mining and minerals industry.

Link to Video: <https://doi.org/10.14509/30878>

Bringing petrography into the digital age: automating acquisition, analysis & quantification of thin sections using the Axioscan7, advanced algorithms and machine learning

Talk Date: March 23, 2022

Abstract: One of the biggest challenges in the characterization of flow and transport in porous media is that of scale – real rocks are typically heterogeneous at a wide array of length-scales from the pore scale upwards. To deal with this high level of heterogeneity new techniques need to be developed to properly assess the broad petrographic, petrological and petrophysical properties of subsurface samples, retaining pore-scale insights without losing sight of macroscopic sample structure. Optical petrography is a unique and powerful technique that, has the potential to provide these insight, however, has proved challenging to automate. In this talk we will outline recent developments in the automation of petrographic and petrophysical analyses from large scale digitized light microscopy datasets.

First, we will show how complete petrographic data can be analyzed across multiple polarization orientations. This data can then be fed into a machine-learning based pixel classification algorithm allowing for modal mineralogy and mineralogy distribution to be assessed across the entire extended thin section. We will then show how a highly optimized phase solution can be performed on multi-orientation birefringent channels to determine extinction angles to an angular resolution of around 0.5°. This allows for individual mineral grains / crystals to be identified, even if the sample is mono-mineralogic and adjacent grains correspond to a single mineral phase. This is applied to a range of primary and metamorphosed quartz dominated sandstones or meta-quartzites. We show how the weak primary fabrics (exhibited in both grain and extinction angle orientation) are common across a range of sandstones, but the onset of metamorphism induces a much more pronounced preferential orientation. Automated petrographic analyses are rapid (with sample analysis in the 10s of minutes timescale), this should allow for pore and grain scale data to be accessible much more cheaply at a much larger length-scale than previously possible.

Bringing petrography into the digital age: automating acquisition, analysis & quantification of thin sections using the Axioscan7, advanced algorithms and machine learning

Talk Date: March 23, 2022

Speaker: Dr. Matthew Andrew, Carl Zeiss X-ray Microscopy |
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Dr. Matthew Andrew is the Director of Advanced Development and Design at Carl Zeiss Microscopy. His research interests focus on flow and transport processes in porous media, including multiscale digital core analysis, in situ analysis of multiphase flow, unconventional pore and mineral systems and ways to automate big-data analyses using modern data science, particularly using automated optical petrography. His work also includes the development and implementation of new machine learning techniques to improve imaging speed, enhance resolution and enable unique workflows across the ZEISS microscopy portfolio and the development of customized image processing and analysis workflows in collaboration with academic and industrial partners.

Before working at Carl Zeiss Microscopy, Matthew worked at Imperial College developing the first reservoir condition in situ flooding rig, enabling for fluid flow to be directly visualized for the first time at representative subsurface conditions.



Link to Video: <https://doi.org/10.14509/30878>