

Trias North newsletter

News from the research project
Reconstructing the Triassic northern Barents shelf:
basin infill patterns controlled by gentle sags and faults

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Triassic North fieldwork on Sørkapp Land

Five geologists participated in the Triassic North fieldwork last July: Snorre Olaussen (UNIS; expedition leader), Urszula Czarniecka (PAS), Espen Simonstad (NPD), Andreas Bjørnstad (NPD) and Kasper Høj Blinkenberg (UCPH, UNIS).

The team set out from Longyearbyen by helicopter and landed on the central part of the western coast of Sørkapp Land – the southernmost part of Spitsbergen, Svalbard. The main aim was geological exploration of one of the Hilmarfjellet heights named Karentoppen (697 m).

The Middle Triassic deposits, especially sandy facies of the Bravaisberget Formation are very well exposed in this area. The fieldwork was mainly focused on the facies observations and sedimen-

tological logging. New samples of sandstones for further petrographic and geochemical analyses were also collected.

Weather was a quite big challenge those days, and because of a dense fog the team had to change their plans several times and wait for better conditions. Despite the difficulties, detailed investigations conducted in the field will result in conclusions about sedimentary environments, distribution and properties of the Middle Triassic local sandy facies, that will lead to better understanding a distribution and geological evolution of the Triassic succession in a source to sink framework.

Urszula Czarniecka



Edgeøya field work 2015:

A natural laboratory to insight on Triassic rocks

Nine geologists affiliated to the Trias north project boated to Edgeøya August 17, 2015 to perform field work for two weeks. This was my second time there associated to my PhD work. The mission was to sample reservoir Triassic rocks, coal and organic rich source rocks to unravel the thermal history based on diagenetic fingerprints and other evidence, such as trapped fluids at the time of mineral precipitation.

Conducting field work on Svalbard is not an easy task – it was challenging, but rewarding. There were days pretty cold, windy, rainy, and foggy. However, there were also days lovely, sunny, and with very good visibility.

We started with long distance walking on moist soggy ground accompanied by difficult river crossing, walking barefoot in the cold water. After this I was totally exhausted and felt strong pain in my right leg. I could barely move it when I woke up the next morning. However, I was eager and curious to be in the field, so the pain could not stop me. Just see below how happy I was.

I don't like foggy days with limited visibility. It is scary and dangerous for two reasons: 1) You may encounter polar bear all of a sudden. 2) You may walk in the wrong direction and get in steep mountain terrain even though you are tracing your walk with GPS.

Moreover, the sedimentary mountains have loose stones that can fall due to the person walking above you. Climbing here was taking one step forward and two backwards as the rocks moved.

Even though there were so many risks, any bad feelings vanished when observing exposed outcrops of the Triassic rocks in a real 3D setting, touching the rocks and appreciating the marvelous sedimentary structures revealing the hydrodynamics of the



paleo-water system back roughly 250 million years in time. It was an immeasurably thrilling experience to be there.

I also had an excellent opportunity to meet people with different backgrounds and ample experiences associated to the Arctic geology. I worked in collaboration with postdoc Tore Grane

Klausen from University of Bergen to link diagenesis with sedimentology. This has given me a lot of opportunities to learn about and thoroughly admire the hydrodynamic secrets printed in the rocks. These beautiful sedimentary structures tell a story about the situation in which the sediments were deposited, such as the flow power.

The field work also enabled me to consolidate concepts discussed in the course Sedimentology and Facies Analysis that I took at University of Bergen earlier this year. I could enhance my competencies in the field of sedimentology such as sediment logging, identification of regional markers, looking for coal traces in the sedimentary strata, etc.

In addition, the trip enabled me to understand more abstract concepts, which are generally not easy to understand and may be difficult to visualize. It was remarkable to see sedimentary structures that are lovely expressions of the processes in the past. An example: Look at the beautiful heterolithic tidal sandstone intervals that belong to the basal part of De Geerdalen Formation at Edgeøya, locality Øhmanfjellet, shown above. It is characterized by the



Tidal heterolithic deposits in the bottom part of the De Geerdalen Formation characterized by wavy and lenticular bedding, Edgeøya, Øhmanfjellet

The author as scale standing against the cemented sandstone, Edgeøya, Øhmanfjellet.

presence of tide-generated sedimentary structures: wavy and lenticular bedding.

Let me round up this report by sharing some details behind the process of approaching the deposits of the paleo-river system at Edgeøya, Svartpynten:

On August 22nd a group headed to this fluvial channel deposit to perform logging and sampling. Unfortunately, at the landing point we encountered a polar bear. This king of the Arctic can run surprisingly fast in all kinds of terrain. It was a thrilling experience to spot the bear and watch him walking steadily along the beach, then finally towards the cliff, once in while watching us. We followed the principle “try to walk away” and boated off with the Zodiac.

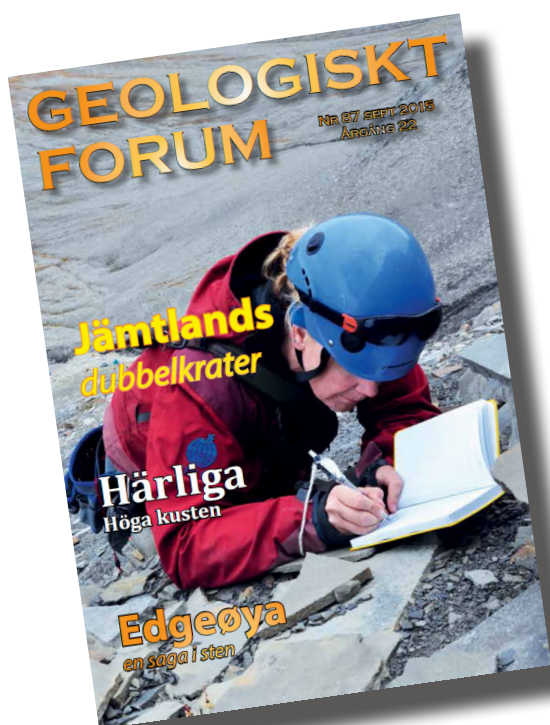
However, as we were very desperate to observe, log and sample this fluvial channel deposit, we went back to the same place on August 25th. This time the bear was not to be seen, but the weather was windy, cold, and foggy at times. Still we managed to approach the beautifully exposed fluvial channel deposit and performed our logging and sampling (pictures below).

To sum up, the mission was concluded with success even though we were disappointed by missing the opportunity to go closer and examine the growth faults of Edgeøya, Kvalpynten, due to bad weather condition.

Beyene Girma Haile



Left picture: Kei Ogata, the author and Mark Mulrooney at the top of the paleo-fluvial channel deposit, ready to do sampling. Right picture: An overview of the fluvial channel (roughly 30 m thick). All the pictures taken by **Tore Grane Klausen** (UiB).



More on Edgeøya

Trias postdoc Ingrid Anell had a five page story about her studies at Edgeøya in the Swedish-language periodical *Geologiskt forum* last month.

«My colleague and I are looking for the coastline – dotting the i, so to say. We are looking for evidence that the land we are standing on just now also was land once in earlier times ...»

The story is available for Trias members in our project room.

Enjoyable data sharing workshop

In early June a load of Trias people both from academia and the industry joined at the Soria Moria conference center in the forests outside Oslo. More than 20 talks were given at this event, and most presentations are available for Trias members at our project room.

- Alvar **Braathen**: Trias North summary – status and outlook
- Jan Inge **Faleide**: Recent advances in understanding the tectonic setting of the Triassic Barents Shelf
- Tore **Klausen**: Clinoform study; progress in quantifications
- Ingrid **Anell**: Quantifiable clinoforms and missing clinoforms: how studies down-under can help our understanding of the Triassic of the Barents Shelf
- Per Terje **Osmundsen**: Growth basins of Edgeøya – sedimentary architecture and facies relationships
- Kei **Ogata**: Characteristics of listric and planar growth fault systems of southern Edgeøya
- Harmon **Maher**: South Edgeøya shale detachment geometry and mechanics
- Simon **Buckley**: 3D photogrammetric modelling of Kvalpynten: background and overview of LIME functionality
- Isabelle **Lecomte**: Seismic modelling – Edgeøya and other illustration cases
- Veronica **Piazza**: Late Smithian (Early Triassic) ammonoid biostratigraphy of Spitsbergen
- Wolfram **Kürschner**: Triassic and Jurassic palynostratigraphy and environmental history
Triassic palynostratigraphy and environmental history: how to correlate the Early Carnian in the Arctic with the Tethys realm
- Tore **Klausen**: Recent advances in understanding the Triassic sedimentary systems of the Barents Shelf
- Ingrid **Anell**: Shifting stress regimes and deep structural control on Triassic sedimentation
- Roy **Gabrielsen**: Fault initiation, fault growth and fault linkage – musings from analogue experiments
- Kei **Ogata**: First test results on analogue modelling of shallow vs. deep rooted faults with syn-sedimentary infill: the Kvålpynten case
- Urszula **Czarniecka**: Petrography and whole-rock geochemistry of siliciclastic deposits of the Middle Triassic on Sørkapp Land, S Spitsbergen
- Mai Britt **Mørk**: Provenance and diagenesis of the Triassic succession (not available in the project room)
- Beyene Girma **Haile**: Burial Diagenesis in Triassic Sandstones: key to understand reservoir quality evolution
- Krzysztof P **Krajewski**: Geochemical anomalies at the Middle/Upper Triassic boundary in Svalbard
- Atle **Mørk**: The geology of Svalbard as a key to the Barents Sea
- Snorre **Olaussen**: Middle Triassic of South Spitsbergen – the Karentoppen case
- Christian Haug **Eide**: Source-to-sink aspects of the Triassic Barents Sea
- Jan Inge **Faleide**: Seismic attributes and facies of the Triassic Barents Shelf



Presenting our staff

We continue our presentation of people working at the Trias project. This time we welcome of new PhD student at UiO.

HONORE

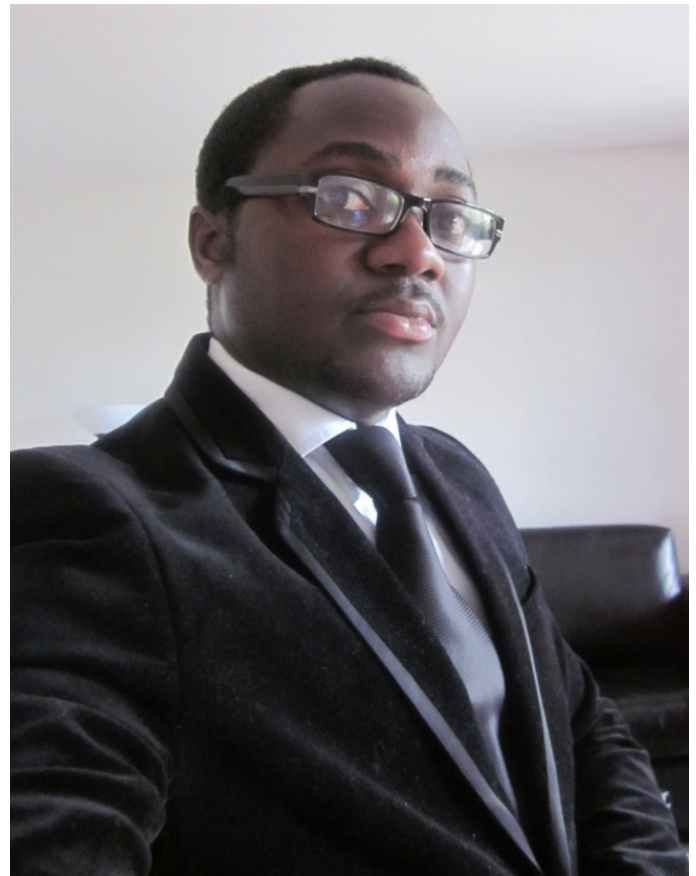
My name is **Honore Yenwongfai**. I am a Trias North PhD candidate in Geophysics at the Department of Geosciences in the University of Oslo (UiO), and I am also currently a Sr. Reservoir Geologist with Statoil ASA.

I have a Bachelors Honours Degree in Geology and a Diploma in Chemistry from the University of Buea, Cameroon in 2008. During my time there, I carried out field mapping of volcanic lava flows and pyroclastics around Mount Cameroon, and their relationship to landslide occurrences in the area.

I then came to Norway under the Quota scheme fellowship program in 2009 and did an M.Sc in Petroleum Geology and Petroleum Geophysics in the Department of Geosciences at UiO. My thesis focused on compaction, uplift assessment, and AVO (Amplitude Versus Offset) synthetic modeling within the Goliat Field, SW Barents Sea.

After my M.Sc in 2011, I joined Statoil ASA as a reservoir geologist on the Snorre Field within the Petroleum Technology group.

My PhD research focuses on quantitative seismic interpretation with particular focus on prestack seismic elastic inversion, AVO/AVA, and seismic modeling techniques. The goal is to establish a link between the seismic attributes, lithofacies, depositional environments and the distribution of potential Triassic reservoir rocks in the northern Barents Shelf area. Fluid prediction in areas with overconsolidated



rocks such as the uplifted Barents Shelf area creates additional challenges. This is a major challenge for hydrocarbon exploration in this area. Lithology and fluid discrimination using an integrated approach (geology, petrophysics, rock physics and geophysics) will be the key contribution of this study, with respect to the distribution of potential Triassic reservoirs in the northern Barents Shelf.



Upcoming Trias events:

- October 16th: Workshop in Oslo on diagenesis and provenance
- October–November: Project visits to our industry partners.

The Trias North project is hosted by University of Oslo and funded by the Research Council of Norway, Tullow Oil, Statoil, Lundin Norway, Edison Oil and RWE Dea. Research partners are University of Bergen, University Centre in Svalbard, Norwegian University of Science and Technology, NORSAR, Uni Research, University of Utrecht, University of Parma, Polish Academy of Sciences, and University of Nebraska at Omaha, and we are cooperating with Geological Survey of Norway, Geological Survey of Canada and others.

Please spread this newsletter within your institution and to other Trias fans.