LATE MESOZOIC - CENOZOIC TECTONO-MAGMATIC HISTORY OF THE BARENTS SEA SHELF AND SLOPE AS A CLUE TO PALEODYNAMIC RECONSTRUCTIONS IN THE ARCTIC OCEAN

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Objectives:

- To constrain current perceptions of formation of the world's youngest oceanic basins through studying Alpine tectonic and magmatic events in the adjacent continental margin and continent-ocean transition zones.
- To gain insight into recent (Plio-Pleistocene) history of the Barents region in terms of glaciations, related isostatic movements, sea level changes, depositional and erosional processes.

Rationale:

The Arctic shelf bordering the Eurasian deep seafloor between Yermak Plateau and the Laptev Sea is unique among passive continental margins in the presence of island archipelagoes lying almost immediately adjacent to the shelf edge and suggesting its significant neotectonic uplift and accompanying erosion. The existence of these bedrock elevations offers a rare opportunity for direct geological investigation of tectono-stratigraphic units and igneous assemblages formed prior to, coevally with, and subsequently to Eurasian Basin opening. Combined with relatively dense offshore seismic evidence and drilling data, this provides a sound base for recognizing in the Barents Sea basin the manifestations of those pre-, syn- and post-rift structural and magmatic events that led to breakup and subsequent separation of the Laurasia supercontinent.

While the entire period of tectonic uplift of the Barents Sea shelf can broadly be defined as latest Mesozoic-Cenozoic by the absence of sequences of respective stratigraphic range in the uppermost part of basin sedimentary fill, neither the exact timing of this process within Alpine stage, nor its cause (elevation of continental margin *versus* contemporaneous subsidence of the oceanic core) are understood. Narrowing time interval(s) of main uplift impulse(s) and quantifying their amplitudes in relation to latest Cenozoic glacial-influenced erosional/sedimentation processes, associated isostatic rebounds and changes of temperature regimes will not only have fundamental scientific importance but will also appear critical for evaluating the impact of those events on petroleum systems.

Anticipated outcome:

- A better understanding of rifting/spreading history of the Arctic Ocean in relation to Late Mesozoic – Cenozoic geodynamic evolution of the Barents Sea continental margin.
- Insight into causes and mechanism of Tertiary tectonic uplift and its influence on hydrocarbon potential of the Barents Sea sedimentary basin.

Proposed research activities:

Utilizing the existing knowledge:

- Synthesizing available information on extensional magmatism in the study area and its geodynamic setting within the Arctic LIP (composition, age and isotope geochemistry of rift-related igneous rocks and their distribution in plate tectonics context);
- Integrated analysis of seismic and potential field data with bedrock geology and borehole evidence to constrain crustal structure and Tertiary basin configuration/paleoenvironments and model vertical movements (and associated erosional/depositional processes);
- Revising glacial history concepts and glacioisostatic models.

New data acquisition:

Based on the outcome of examination and integration of available data,

- plan and accomplish on-shore expedition activities on Svalbard and Franz Josef Land (possibly also on Novaya Zemlya) and marine cruises in the Barents Sea using R/V "Akademik Nikolai Strakhov" (GIN RAS) and R/V "Dalnye Zelentsy"(MMBI) to shoot thoroughly selected seismic lines, collect bottom and bedrock specimens, obtain multibeam/sidescan sonar documentation, etc.;
- perform additional analytical work on earlier and newly collected samples, including paleomagnetic investigations coupled with petrological studies, isotope geochemistry and age determinations of exposed (or drilled) intrusive and volcanic basaltic rocks;
- subject to completion of processing of new field data and additional laboratory work, summarize the results as a comprehensive model of Late Mesozoic - Cenozoic tectono-magmatic evolution of the Barents Sea continental margin and adjacent deep seabed of the Eurasian Basin.

National and international cooperation:

- Karpinsky All-Russia Geological research Institute (VSEGEI), Polar Marine Geological Research Expedition (PMGRE), Marine Arctic Geological Expedition (MAGE), SEVMORGEO Enterprise
- University of Oslo, University of Bergen, University of Tromse, Rogaland Research
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Links to other projects:

- POGE (Polar Oceans Gateways Evolution) IPY initiative.

Timeframe:

Indoor activities start in 2005.