calculations show the importance of the dynamics for many different glaciers.
The current overall Arctic data indicates that the Arctic (Canada, Svalbard, Russian Arctic) with about 1/3 of all ice in worlds GIC have an increasing negative mass balance. The net mass balance is: $B_n = -38 \pm 7$ $km^3\ yr^{-1}$ or $b_n = -0.15 \pm 0.03$ m yr^{-1} which is in SLE = 0.11 ± 0.02 mm yr^{-1}. Thus they contribute less than 15 % of the ice input to global sea level but has a large potential to higher contribution.

Exploration for new CO_2 storage opportunities

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This paper presents an outline of a new subsurface exploration program initiated by Statoil within the field of CO_2 storage. Geological storage of CO_2 for the purpose of climate mitigation is only tenable if carefully selected sites, that meet strict requirements, are identified, risked and developed. A business driver (i.e. economic incentive) is also required to sustain a prolonged effort in CCS (carbon capture and storage).
Secure and reliable storage of the captured CO_2 is a key prerequisite in every CCS value chain development. Several storage options have been evaluated (deep ocean, salt caverns, etc.), but generally regarded as the most promising, due to both capacity and safety, is injection of CO_2 as a dense phase into subsurface geological reservoirs. This is a proven technology, pioneered by Statoil at Snøhvit, In Salah (Algeria), and Sleipner, where storage of CO_2 has occurred for more than a decade.
Existing CO_2-storage projects aim to reduce CO_2 content in natural gas to meet sale specifications. As a result, these developments are coupled with sites for natural gas development. In the future however, more focus will probably be placed on storage of CO_2 from industrial sources, such as power plants. In this latter scenario it will be necessary to capture and store large volumes of CO_2 safely and with high regularity. For public acceptance, both forms of CCS must induce no significant impact to the environment, either locally or globally.
The Statoil initiative, called the *CO_2 Storage Mapping Programme* (COSMaP), aims to explore, mature and develop future CO_2 storage sites. In the initial phase of COSMaP, our focus will be to establish a common methodology, aligned with international expertise within CCS, that describes the necessary activities involved, and the criteria used to characterise and verify CO_2 storage and capacity estimation. In parallel, all hazards and risks (for example top seal integrity, fault leakage and induced fracturing during injection) involved with CO_2 storage are to be described, assessed and handled satisfactory to assure public and regulatory acceptance.
Exploration for CO_2 storage shares several standard activities with oil & gas exploration. However, some important differences are obvious, and basins that lack oil & gas opportunities, may prove to be valuable for CO_2 storage. By utilising the subsurface knowledge situated in an E&P company, we claim that swift maturation towards industrial-scale CO_2 storage is possible.

Clastic dykes from the Upper Jurassic of Svalbard, Norway

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Two clastic dykes have been identified in the Agardhfjellet Fm. at Janusfjellet, Central Spitsbergen. The dykes originate near sandy horizons in the Oppdalssåta Mbr. (Kimmeridgian), and can be followed more than 60 m vertically until they terminate near the top of the Slottsmøya Mbr. (Tithonian). The dykes are 20-30 cm thick, and consist of sand and larger quartz pebbles with fragments (xenoliths) of black shale from the side rock. The large vertical extent reflects sand injection under high pressure. The stratigraphic level at the upper termination coincides with that of numerous methane seeps in the area, close to the Jurassic-Cretaceous boundary. We speculate that the two phenomena both reflect a phase of considerable fluid or gas expulsion, and that the injectites may represent part of the plumbing systems for the seeps. Calcite veins within the dykes have isotopic signatures interpreted as hydrothermal, similar to late-phase sparites in the seeps. Several near-contemporary events may have contributed to the formation of injectites and seeps, such as the global warm pulse at the Jurassic-Cretaceous boundary causing release of gas hydrates, production of thermogenic methane through steepening of the geothermal gradient during preliminary phases of the High Arctic LIP, seismic activity or even the Mjølnir impact.

Carbon isotope chemostratigraphy of the Upper Jurassic of Svalbard, Norway

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We present bulk $\delta^{13}C_{org}$ curves for the Volgian (Tithonian-Berriasian, Upper Jurassic to lowermost Cretaceous) of Svalbard, Norway. The two sections span the Slottsmøya Member (Agardhfjellet Fm.) at Janusfjellet and Knorringfjellet in the Sassenfjorden area. The results indicate that organic carbon isotope chemostratigraphy can be used as a tool for high-resolution, local chronostratigraphic correlation in this area, resolving problems of possible overthrusts and highly diachronous lithological boundaries. Moreover, the curve can be compared with published data from the Russian Platform, recording a negative $\delta^{13}C$ trend through the Lower Volgian followed by a positive trend through the lower part of the Middle Volgian and finally a high plateau in the upper Middle Volgian into the Upper Volgian. The minimum near the Lower-Middle Volgian boundary is sharply defined and may provide a useful chemostratigraphic marker for correlation between the Barents Sea and the Russian Platform. Correlation with the Tethys is more problematic. Inorganic carbon and oxygen isotopes from carbonates mainly reflect diagenetic processes.

Cenozoic reduction in cell size and abundance of marine calcifying phytoplankton driven by a decline in atmospheric CO_2

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Calcifying phytoplankton play a fundamental role in marine ecosystems and global biogeochemical cycles. Their cell size and abundance modulate the efficiency of the biological carbon and carbonate "pumps", which represent important feedbacks in the Earth System. Hypotheses for explaining long-term changes in plankton size and community structure observed in the sedimentary record involve both environmental and intrinsic drivers. However, the many biotic and abiotic processes that influence planktonic ecosystems are inherently coupled on multiple scales, and their relative importance over geological time scales is unknown. Furthermore, culture experiments have yielded conflicting results regarding the short-term response of calcifying phytoplankton to changes in seawater carbonate chemistry. Here we show that the Cenozoic decline in atmospheric carbon dioxide levels (pCO_2) caused a reduction in both size and abundance in calcifying phytoplankton. We analysed large fossil data sets on cell size in two coccolithophore lineages, as well as estimated calcareous nannoplankton abundance, against geochemical proxy records on global change over much of the Cenozoic (~45-5 million years ago). We found that relative to other targeted climate proxies, reconstructed pCO_2 had the strongest influence on size changes in both lineages. Furthermore, we found evidence for calcareous nannoplankton abundance being driven by changes in atmospheric CO_2 concentration. Our results demonstrate that long-term variation in CO_2 availability and concomitant shifts in ocean carbonate chemistry have been important drivers of planktonic ecosystems beyond their association with ocean temperature and structure. This supports the hypothesis that large-celled coccolithophores lacking a carbon concentrating mechanism were disadvantaged in a low-pCO_2 world. Decreasing abundance of calcifying phytoplankton may have represented a negative feedback during global cooling by reducing carbon drawdown and burial fluxes, potentially contributing to the stabilisation of atmospheric CO_2 concentrations over the past 24 million years.

Valley-fill stratigraphy and evidence for prehistoric quick-clay landslides from onshore, high-resolution shear-wave seismic, Trondheim harbour area, central Norway

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Detailed, 2D stratigraphic information is often difficult to obtain near the shoreline of fjords using marine-seismic methods due to the presence of coarse sediments at the sea bed. Also, detailed, stratigraphic information at greater depths may be difficult to obtain from the terrestrial part of fjord valleys. This is in contrast to the deeper parts of fjords or fjord lakes where detailed 2D(3D) seismic information is easily achieved from survey vessels. A new, non-invasive shear-wave seismic system developed at LIAG, Germany, gives new possibilities for the investigation of fjord-valley fills even in urban areas. The focus of this presentation is on the stratigraphic interpretation of shear-wave seismic data that were successfully collected from the onshore harbour area in Trondheim, central Norway. The infilled harbour area is located on the submerged part of a delta plain, and land reclamation is still going on. Historic and older submarine landslides are known to have taken place along the shoreline and ground information is of high interest. Following the last deglaciation the region has been