mercially viable option. Increased exploration and development activity in the region can work like a *vitamin injection* to the local job marked and to the academia if organized in the right way. Here the local politician has a responsibility in order to influence on the terms and demands for the activity.

In terms of additional jobs to the region there will be a need for a plant, analog to "Nyhamna" along the Finnmark coast in order to dry and prepare the gas for longer transport. Cooperation between academia and the industry of a completely different scale than today is of great importance for further development of the region. If the increase in exploration activity we now observe is a glimpse of the future the building of competence, innovation and technology that follows the activity in the south has to be the motivation for the growth and innovation clusters up North. While the largest part of the facility functions of oil and gas in the South still is in Stavanger, activities in Bergen have developed into a cluster which has a much higher content of innovation and technology. The "Subsea Valley" between Kongsberg and Fornebu is pure innovation and on its way to new markets. When the stream of oil and gas gradually drops in importance, these activities will survive and generate new innovation. This should be a target model for the politicians up north. If successful, the North of Norway will be leading the way into new technology in the Arctic on issues like coastal preparedness, cold climate issues and handling ice, darkness and tremendous distances without infrastructure. In this, cities like Tromsø and Narvik, with a long tradition for technology and innovations should play a key role.

Cyclicity and petroleum prospects of Cretaceus in the Barents Kara Sea Region

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Actuality of investigation of the Cretaceous terrigeneous complex structure in the Barents Kara sea region deals with presence of unique gas condensate fields in the Aptian-Cenomanian deposits of the Kara sea, multiple oil shows in the Valanginian-Barremian deposits in the Norwegian part of the Barents sea and rare gas shows in the Aptian deposits in the Eastern Barents sea. The main property of the Cretaceous complex in this area is cyclicity which controls petroleum prospects.

Study of the Cretaceous complex structure is based on an interpretation of well log data from the Barents sea, the Kara sea and the Yamal peninsula, as well as interpretation of regional 2D-seismic data, which were held jointly with MAGE and SMNG (fig. 1). Based on 2D-seismic interpretation several regional reflectors are identified in the Cretaceous section of the South Barents trough. These reflectors correspond with intra Cretaceous unconformities which limit the seismic-stratigraphic complexes formed in different sedimentation conditions: Neocomian and Lower-Upper Cretaceous complexes. Neocomian complex has clinoform structure and is subdivided into Berriasian, Valanginian and Hauterivian-Barremian subcomplexes. Berriassian and Valanginian clinoforms have low angles and subparallel internal structure and were formed in an inner shelf environment. Hauterivian-Barremian subcomplex is characterized by inserted small clinoforms with steep angles and deposited on the outer shelf at a lower depth of the basin. An overlying Cretaceous deposits are characterized by subparallel stratification and is subdivided into Aptian-Albian and Upper Cretaceous subcomplexes. Aptian-Albian subcomplexes is characterized by lens-shaped and discontinuous internal reflections of varying amplitudes corresponding to interbedding of sandy, silty and clayey deposits formed in the coastal-marine and coastal-continental conditions. Upper Cretaceous subcomplex have subparallel low-amplitude internal reflections and is formed in the shallow-marine, coastal-marine and coastal-continental environments. The upper part of subcomplex is truncated due to Cenozoic uplift and glacial erosion.

As a result of well log data interpretation cyclicity of the Cretaceous section and seven sedimentary cycles are detected: Berriassian, Valanginian, Hauterivian-Barremian, Aptian, Albian, Cenomanian-Santonian and Campanian-Maastrichtian cycles. The unconformities are accepted as boundaries of cycles and register rapid changes of depositional conditions. Each cyclothem in the succession corresponds to the cycle of sedimentation and consists of sandy and clayey layer. The clayey layer is formed during transgression, highstand in sea-level and at the beginning of regression. Sandy layer is deposited during regression and lowstand in sea-level. Thus, the presence of cyclothem caused alternation of reservoir sandy layers and clayey seals in the Cretaceous section.

In the Cretaceous of South Kara trough and Yamal peninsula seven cycles of sedimentation are identified based on seismic and well log interpretation: Valanginian, Hauterivian-Barremian, Aptian, Albian, Cenomanian, Turonian-Santonian, Campanian – Paleogenic. Thus, there are common sedimentary cyclothems in the Lower Cretaceous section of South Barents trough and South Kara trough and we can conclude that these troughs developed during Early Cretaceous together as a single depositional basin.

Based on analysis of cyclicity we can conclude that there were periodic changes of transgressions and regressions during Cretaceous period amid global regression. The black shales of the Upper Jurassic are the maximum flooding surface in the regional scale. After Late Jurassic

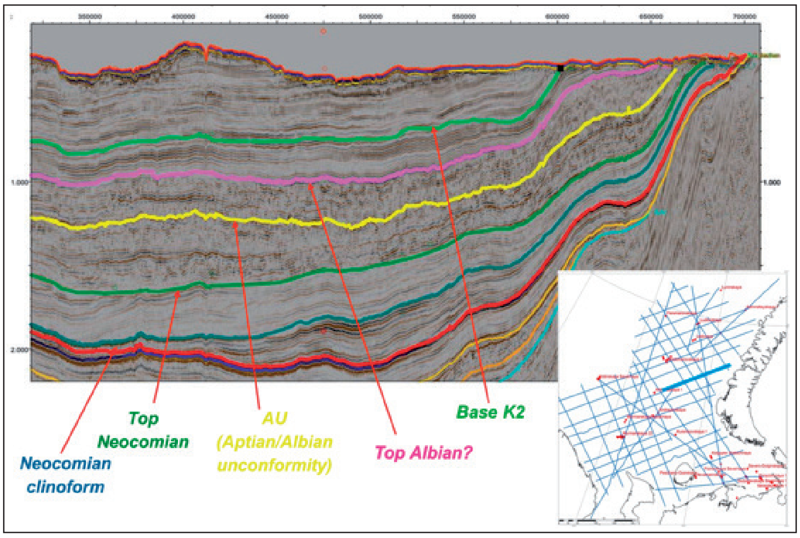

Figure 1. Cretaceous seismostratigraphic complexes of the Barents sea.

regressive Cretaceous period begins and Neocomian clinoforms deposit. The maximum of regression occurs in the middle of the Aptian, after that late Aptian – Albian transgression starts and is changed by regression.

Permian Reservoirs in the Timan-Pechora Province

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Permian formations in Timan-Pechora Province (TPP) are characterized by a wide lateral and vertical variation of facies. The underlying Carboniferous and overlaying Triassic formations are more homogeneous in this basin. Depositional environment in the Early Permian age was at deep marine conditions, in the Late Permian it was continental coal accumulation. Carbonate sedimentation in the major part of the TPP was completed by the end of Artinskian period, but in some areas it continued until the mid Kungurian age. Throughout the Early Permian age there was a clear lateral orientation of the facial distribution: from the West to the East, towards the Ural Paleo-ocean, a deepening of the regional sedimentation basin is observed. Throughout this time period a gradual climate cooling has happened with changing paleo environment conditions.

In the Asselian time, the shallow marine deposition occurred in the warm humid tropical climate. Active growth of organogenic structures was taking place in the shallow marine environment extending almost like a continuous carpet in TPP. A characteristic feature of Asselian reef-building was orthogonal positioning of reef structure chains. Asselian reefs are characterized by high porosity, up to 20%. However, the best reservoir properties are associated with inter-reef deposits in grain stones with porosity exceeding 30% at South Khylchuyuskoye field. Sakmarian tight carbonate deposits represent local cap rocks. Sakmarian carbonate sediments have been accumulated at colder climate conditions than Asselian ones. Buildups either continued to build upon Asselian structures or were displaced down-slope. These buildups have very poor reservoir properties, very tight. Only the inter-reef grain stones in Sakmarian have good properties (Varandey and Toravey fields).

In Artinskian time the regional deepening to the East gained a greater gradient. In the West of the province the Asselian - Sakmarian carbonate banks were formed, some of them becoming islands, at extreme coastal tidal shallow marine conditions (Kolvinskoe mega ridge). In the East of the province a relatively deep marine conditions were dominating formation of siliceous-carbonate deposits (Varandey-Adzvinskaya area). This tendency resulted in the West of TPP with Artinskian rocks having very poor reservoir properties, some times being called "faulse cap rocks", while in the East having porosities in the 11-13 % range. Kungurian clay deposits are the regional cap rock for the Low Permian formations in the TPP. The main feature of the Low Permian carbonate complex is a lacking of vertical and lateral seals that could lock reef buildups. Hydrocarbon reservoirs were formed with different facies having pressure communication laterally and vertically.

Field case examples from TPP will be given in the presentation.