

# **PS Stratigraphic Evidences of Presence of the Jurassic and Lowermost Cretaceous Deposits in the Laptev Sea Shelf and Hydrocarbon Potential of its Lower Cretaceous Oilfields\***

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## **Abstract**

During the last decade, the age of the sedimentary cover of the Laptev Sea shelf and its possible hydrocarbon potential has been a matter of controversy. Especially important are age and structure of the suspected Jurassic and lowermost Cretaceous rocks, which are characterized by presence of the both oil-source rocks and oil reservoirs in the Arctic shelves. Late Jurassic and Neocomian deposits are still unknown in the Laptev Sea shelf but they are well studied in many sections from the nearby outcrops from the Taimyr Peninsula at the west to the Lena river lower reaches in the east and New Siberian Islands in the north. Oxfordian and Kimmeridgian rocks are usually characterized by small thickness and numerous gaps. Overlying Volgian and Ryazanian are most widespread; they are represented by coarsening upwards succession of mudstones to siltstones with sandstone at the eastern part of the studied area, with average thickness from ~50 m at the west to ~300-400 m at the east and more than 1 km in the New Siberian Islands. Marine Valanginian and Hauterivian deposits are differ from underlying succession by significantly higher content of coarse-grained rocks. In spite of presence of many gaps and unconformities in the Kimmeridgian and Oxfordian and absence of the Lower Volgian in most studied sections, Upper Volgian to Lower Valanginian part of the succession is stratigraphically continuous throughout in the Laptev Sea region in terms of ammonite and *Buchia* zones and includes the same faunal elements. It should be noted that rock succession through the Jurassic-Cretaceous boundary which starts in the Volgian from mudstones, sometimes with high TOC contents and overlying by sandstone bodies of the Valanginian age is clearly corresponding to such succession in the major oil fields in West Siberia, where Volgian to Ryazanian mudstones of the Bazhenovo Formation are overlying by Achimovka sandstones which is includes many oil-bearing reserves. Its stratigraphical correlatives in other Boreal areas (Kimmeridgian Clay Fm of the North Sea, Hekkingen Fm of Barents Sea etc) are also belongs to major oil-source formations. These stratigraphical data suggests high probability of presence of Upper Jurassic and lowermost Cretaceous marine deposits in the Laptev Sea sedimentary cover, including chronostratigraphical and sedimentological analogues of the oil-source and oil-bearing formations of Western Siberia. In our opinion, most favorable area for deposition and maturation of such hydrocarbon-source rocks could be suggested in the western part of palaeobasin in 100-150 km offshore from the Nordvik Bay and Taimyr Peninsula and in the Ust'-Lena trough. This study has been supported by RFBR grant 12-05-00380 and Earth Science Division of RAS Program no.1.

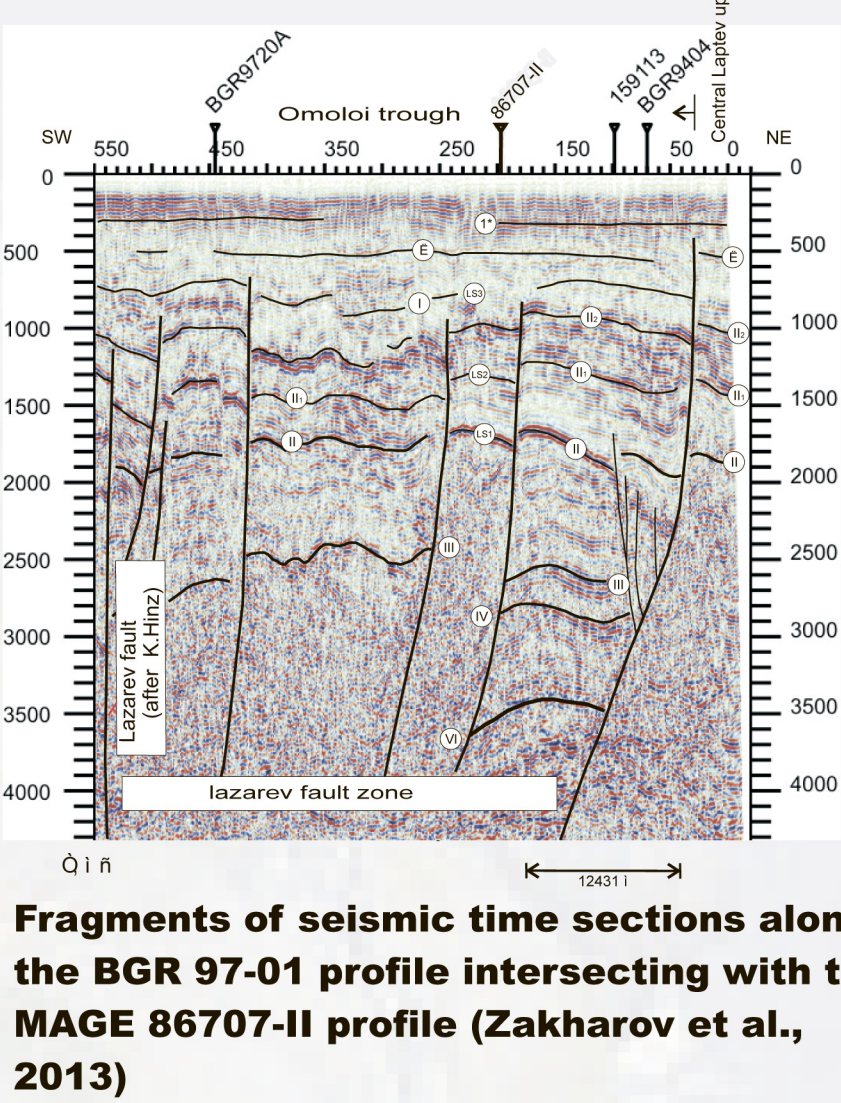
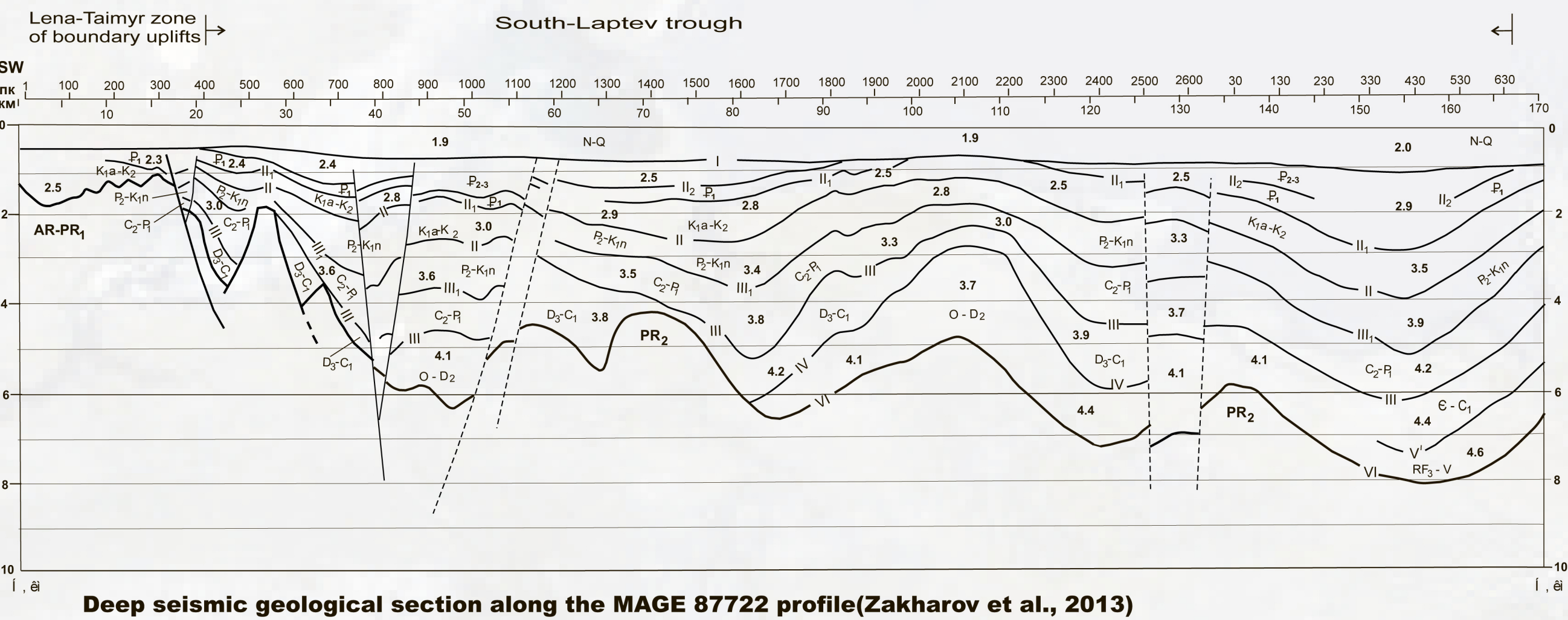


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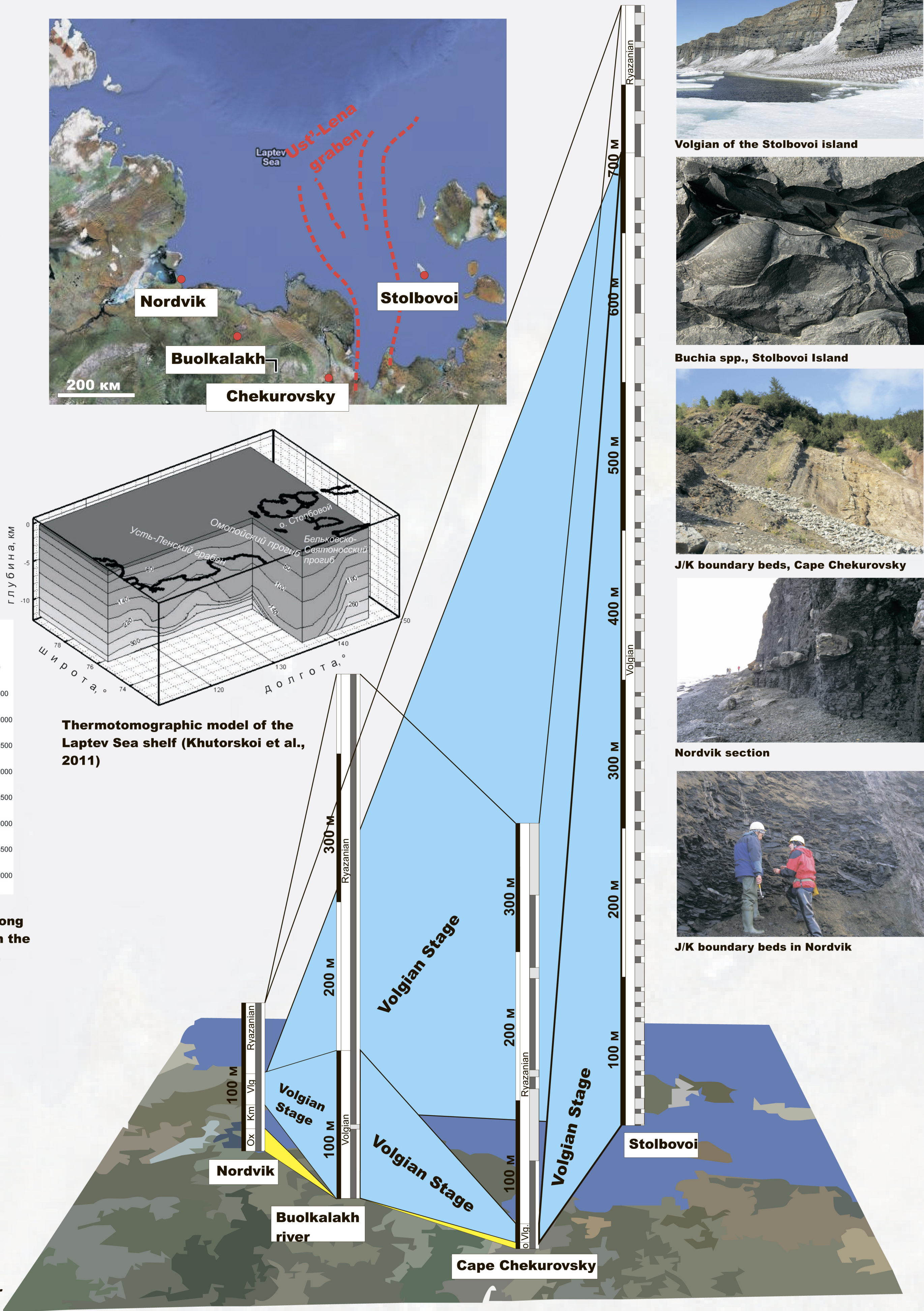
Late Jurassic and Neocomian deposits are unknown from the drill cores of the Laptev Sea shelf but they are well-studied in many sections from the nearby outcrops from the Taimyr Peninsula at the west to the Lena river lower reaches in the east and New Siberian Islands in the north (Zakharov and Rogov, 2012). Oxfordian and Kimmeridgian rocks are usually characterized by small thickness, variable lithologies and presence of many gaps. Overlying Volgian (representing, as a rule, by uppermost Middle and Upper substages) and Ryazanian are most widespread deposits in the studied region, they are represented by coarsening upwards succession of mudstones to siltstones with sandstone at the eastern part of the studied area, with average thickness from ~50 m at the west to ~300-400 m at the east and more than 1 km in the New Siberian Islands; in the latter region they have turbidite characters and consists from relatively monotonous intercalation of sandstones, siltstones and mudstones (cf. Kuz'michev et al., 2009). Marine Valanginian and ?Hauterivian deposits are differ by significantly higher content of coarse-grained rocks (sands and sandstones with uncommon siltstones to conglomerate members).

In spite of presence of many gaps and unconformities in the Kimmeridgian and Oxfordian and absence of the Lower Volgian in most studied sections, Upper Volgian to Lower Valanginian part of the succession is stratigraphically full throughout in the Laptev Sea region in terms of ammonite and Buchia zones and includes the same faunal elements. It should be noted that rock succession through the Jurassic-Cretaceous boundary which starts in the Volgian from mudstones, sometimes with high TOC contents and overlying by sandstone bodies of the Valanginian age is clearly corresponding to such succession in the major oil fields in West Siberia, where Volgian to Ryazanian mudstones of the Bazhenovo Fm are overlying by Achimovka sandstones, which is includes many oil-bearing reserves. Its stratigraphical correlatives in other Boreal areas (Kimmeridgian Clay Fm of the North Sea, Hekkigen Fm of Barents Sea etc) are also belongs to major oil-source formations.



These stratigraphical data suggests high probability of presence of Upper Jurassic and lowermost Cretaceous marine deposits in the Laptev Sea sedimentary cover, including chronostratigraphical and sedimentological analogues of the oil-source and oil-bearing formations of Western Siberia. In our opinion, most favorable area for deposition and maturation of such oil-source rocks could be suggested in the western part of palaeobasin in 100-150 km offshore from the Nordvik Bay and Taimyr Peninsula. Ust'-Lena trough could be among most promising region for hydrocarbon prospecting. Such conclusions are well-corresponding to geophysical data (Zakharov et al., 2013)

**References**  
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