

# Rift systems of the East Siberian basin, Arctic region

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# Plan

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**1.** Geological and geophysical researches, factual material

**2.** Seismostratigraphy and age of the sedimentary cover

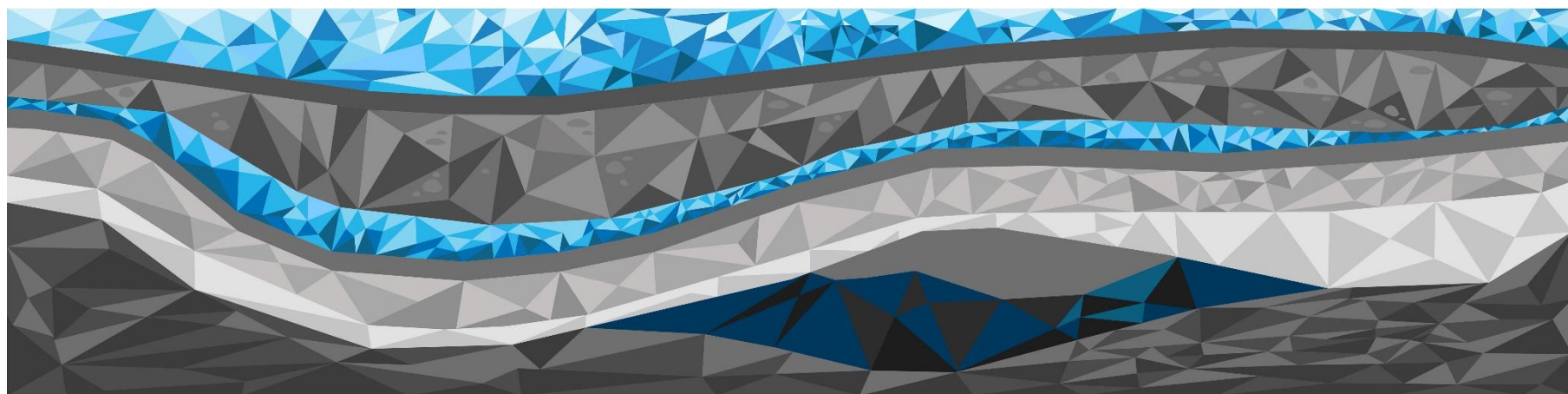
**3.** Rift systems of the East Siberian basin

**4.** Conclusions

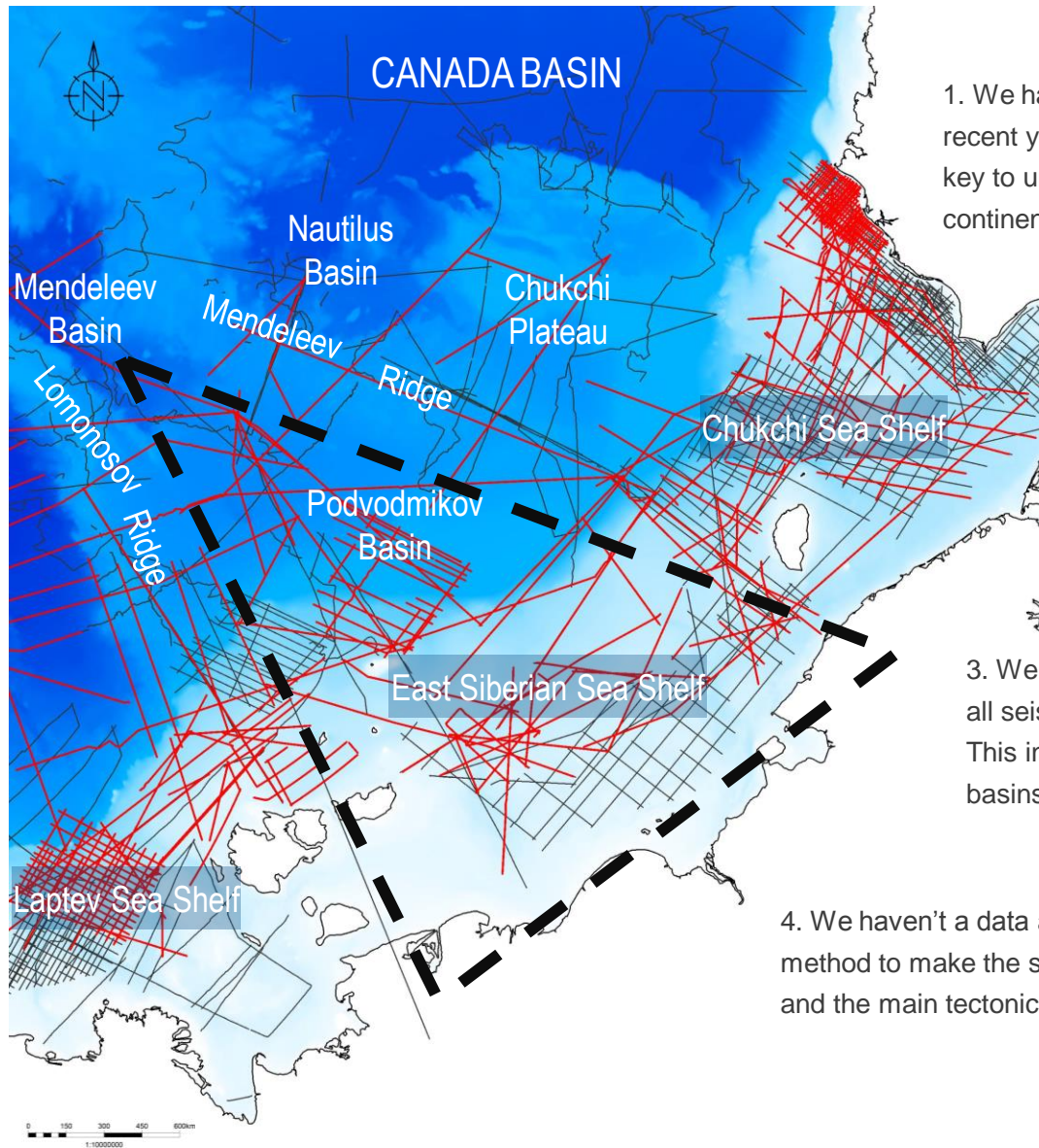
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## 1. Geological and geophysical researches, factual material



# Geophysical researches and database in Petrel software



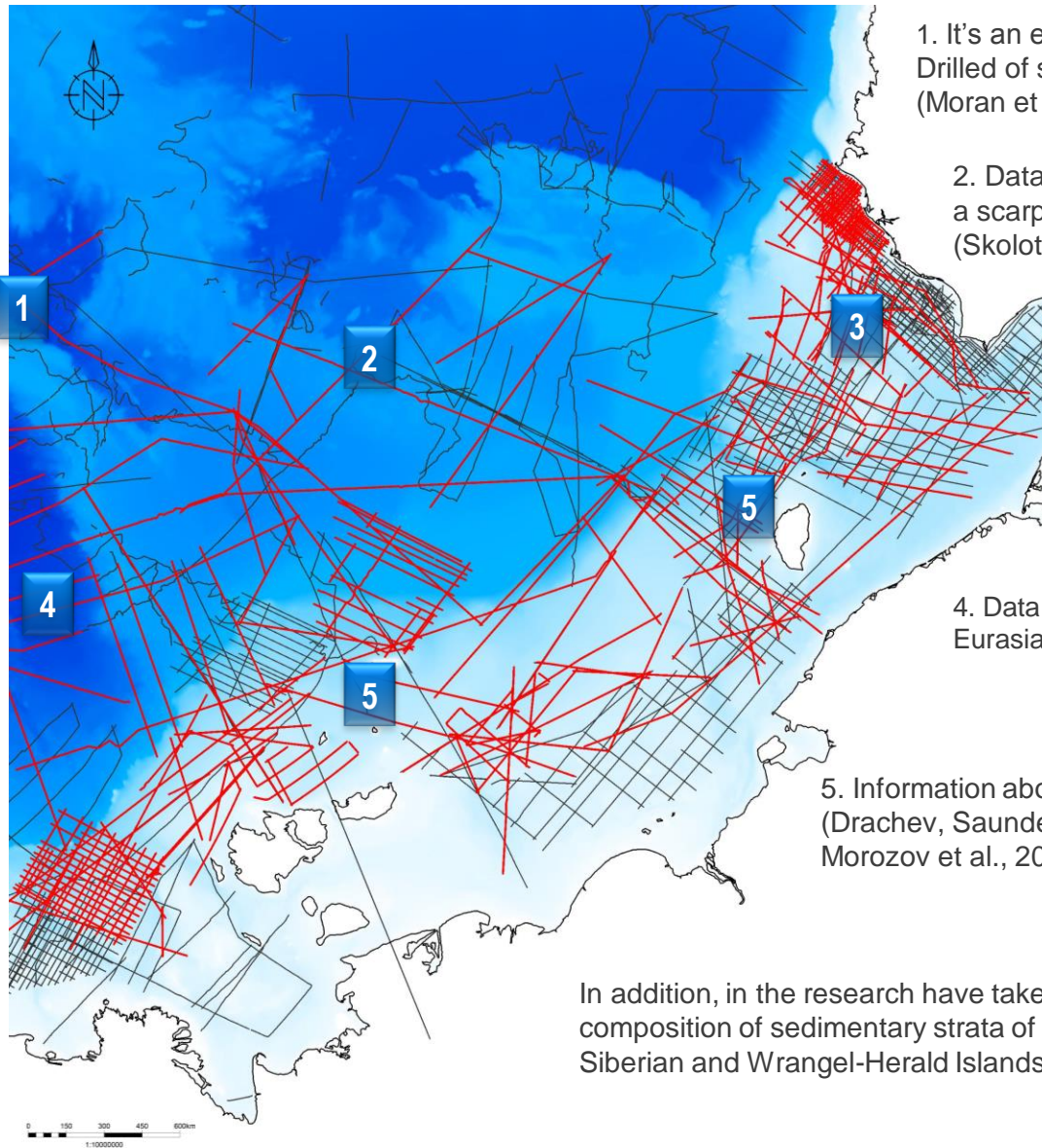
1. We have new seismic lines, that have been opened in recent years. The interpretation of seismic data provides a key to understanding the structure of the East Siberian continental margin.

2. We operate the regional seismic 2d data, that have done on Russian government and federal projects (join the companies MAGE, DMNG, and ION Geophysical).

3. We have a great seismic project in Petrel, which we have loaded all seismic lines, bathymetry maps, coast line and other materials. This information allows us to make a composite lines cross Arctic basins, and we can to trace reflecting horizons

4. We haven't a data about deep wells in the research area, however the key method to make the seismostarigraphy is a link between the seismic complexes and the main tectonic events, which has happened in East Siberian Sea.

# Factual material



1. It's an expedition *Integrated Ocean Drilling Program 302*. Drilled of several wells on Lomonosov ridge, the project ACEX (Moran et al., 2006; Backman et al., 2008).

2. Data research materials (rocks, minerals), have collected on a scarps of Mendeleev ridge with a manipulator of a submarine (Skolotnev S., za 2017-2019 rr.).

3. Data about ages sedimentary cover of the Chukchi sea, linked to American wells (Kumar et al., 2011; Hegewald, Jokat, 2013; Nikishin et al., 2017-2019).

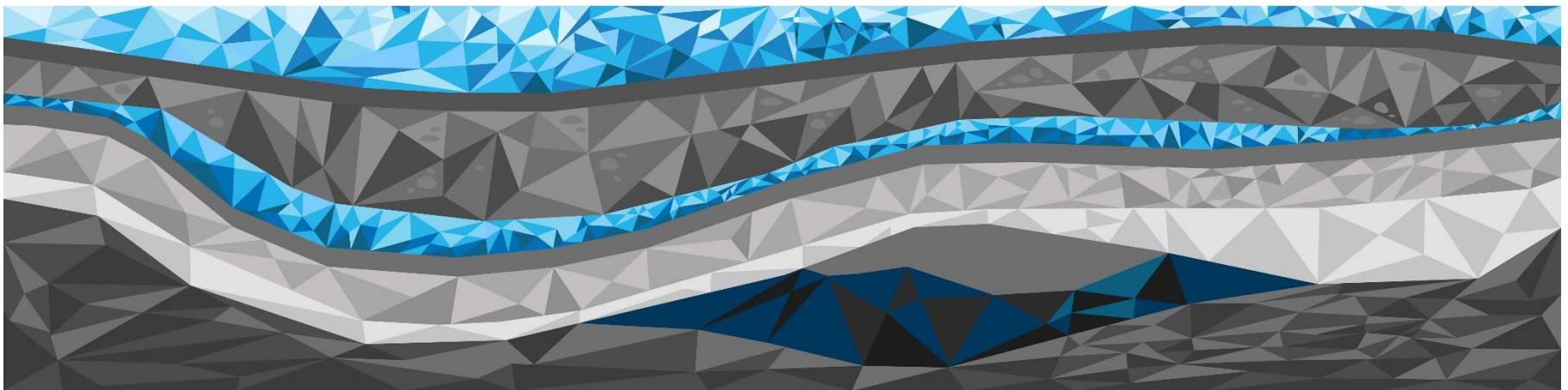
4. Data on the ages of linear magnetic anomalies of The Eurasian basin (Glebovsky et al., 2006; Gaina et al., 2011).

5. Information about ages of De Long's basalts – HALIP. (Drachev, Saunders, 2006; Grantz et al., 2011; Morozov et al., 2013; Brumley, 2014).

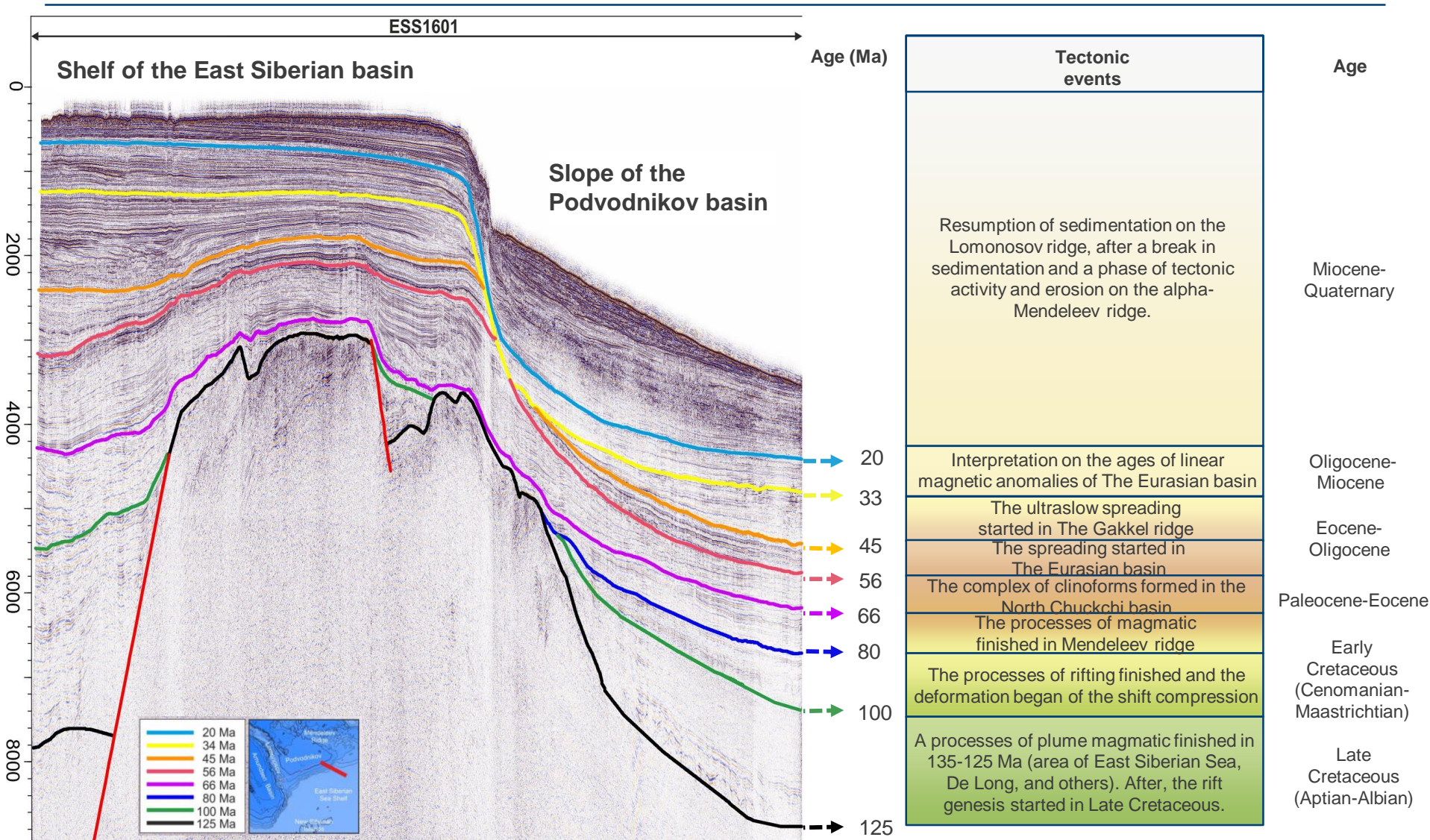
In addition, in the research have taken data and materials on the structure and composition of sedimentary strata of different ages on the archipelago of De long, New Siberian and Wrangel-Herald Islands (Verzhbitsky, 2015; Kos'ko, Sobolev et al., 2013).

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## 2. Seismostratigraphy and age of the sedimentary cover



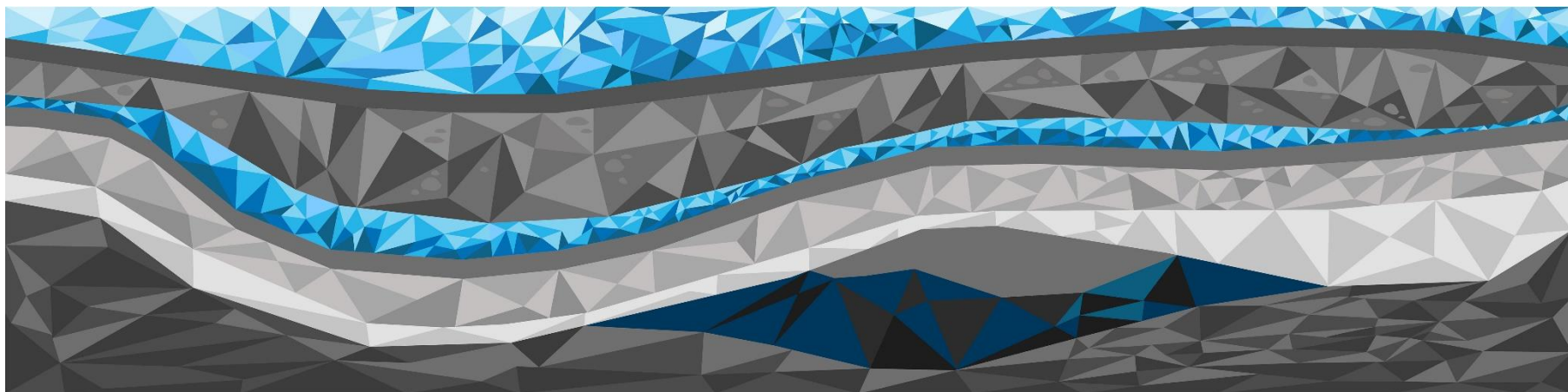
# The Seismostratigraphy and age of the sedimentary cover



The diagram has made according to the data by Nikishin et al., 2019-2020.

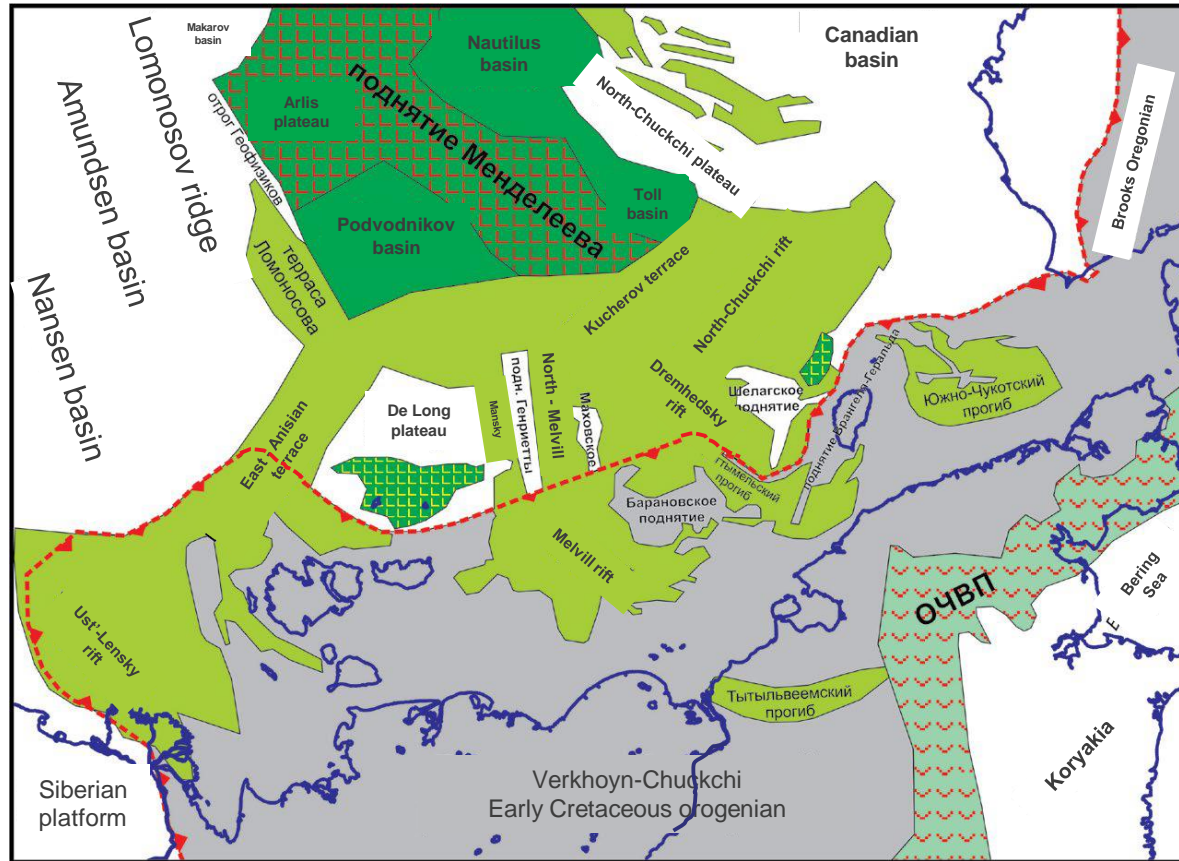
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### 3. Rift systems of the East Siberian basin





# Rift systems of the East Siberian basin



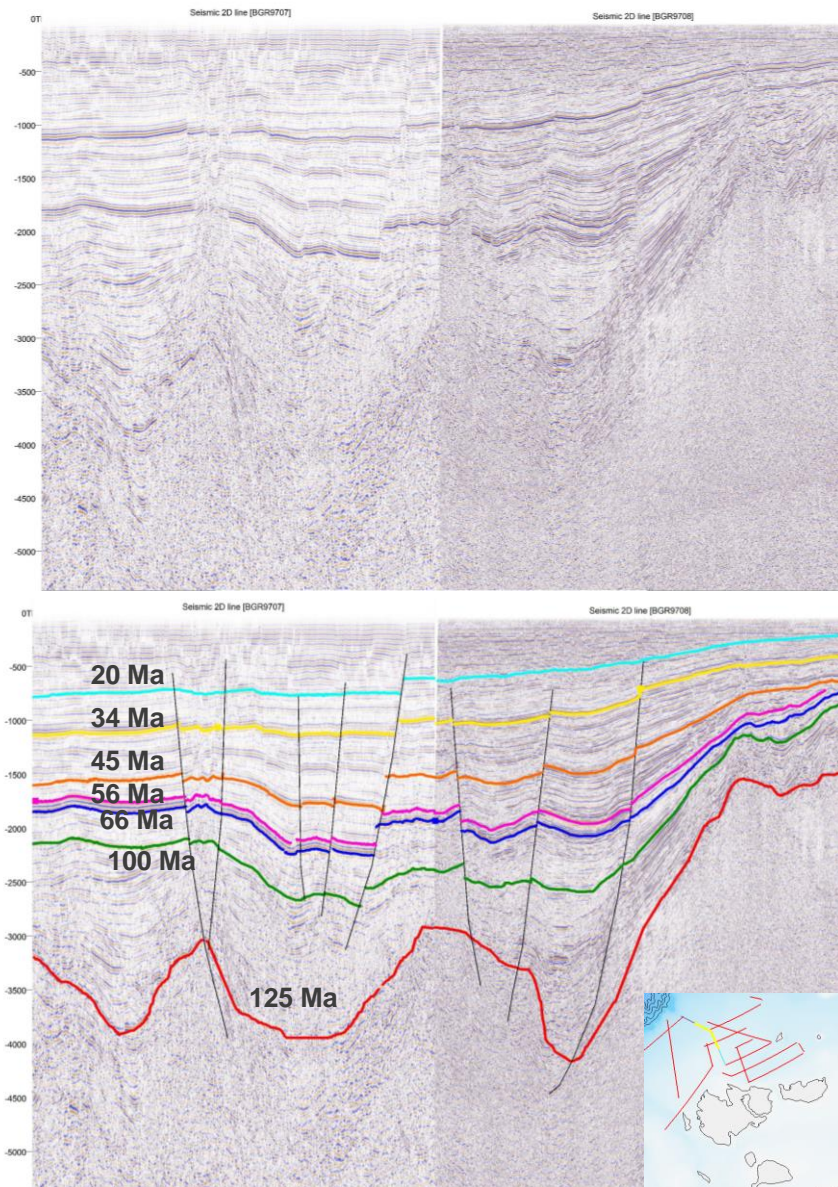
## *A types of aptian-albian seismic complex:*

- 1–2 – synrift complexes on the crust:
  - 1 – continental,
  - 2 – hyper-stretched continental;
- 3 – rift-volcanic complexes of the Mendeleev uplift;
- 4 – probable basalt traps;
- 5 – Okhotsky-Chuckchi Cretaceous volcanic belt;
- 6 – areas of Cretaceous orogeny;
- 7 – after aptian (neocomian) front of shifts.

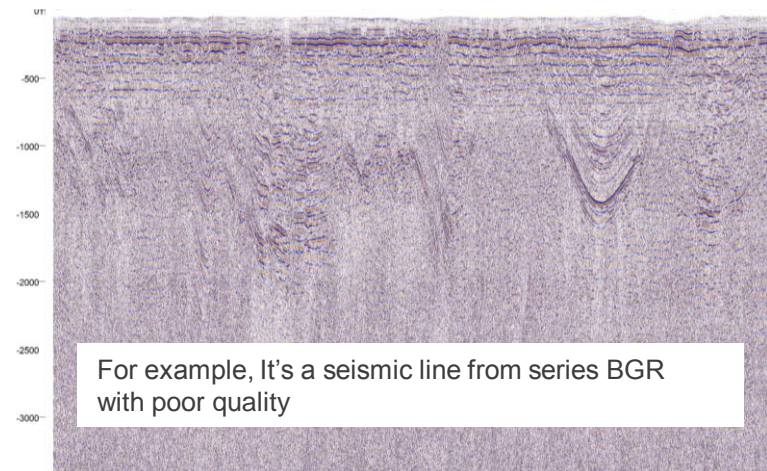


Data of Nikishin et al., 2019-2020.

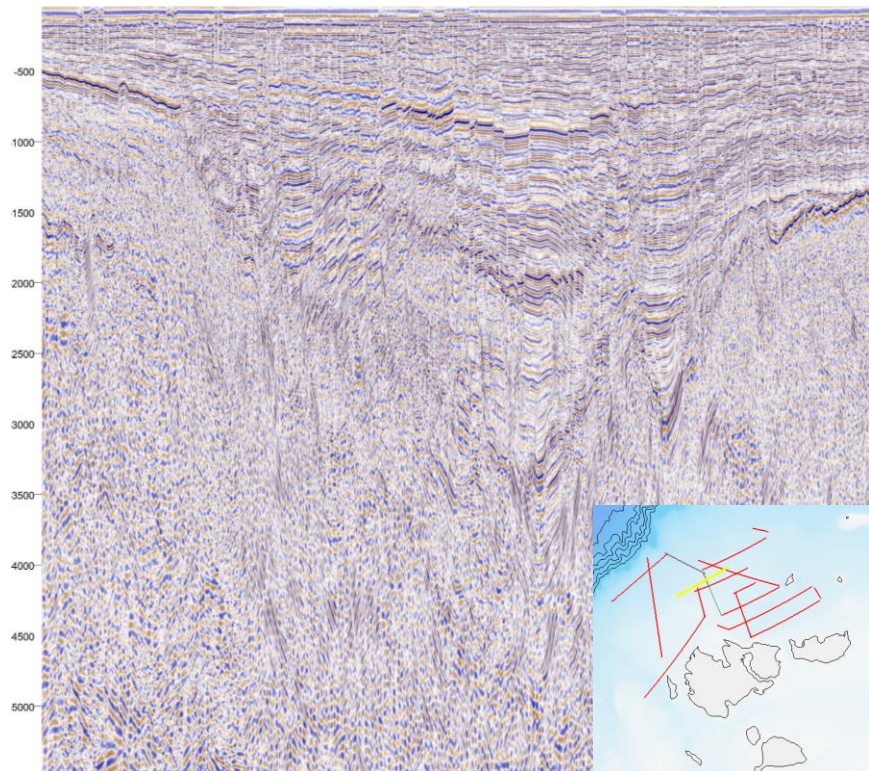
# New Siberian rift (BGR research)



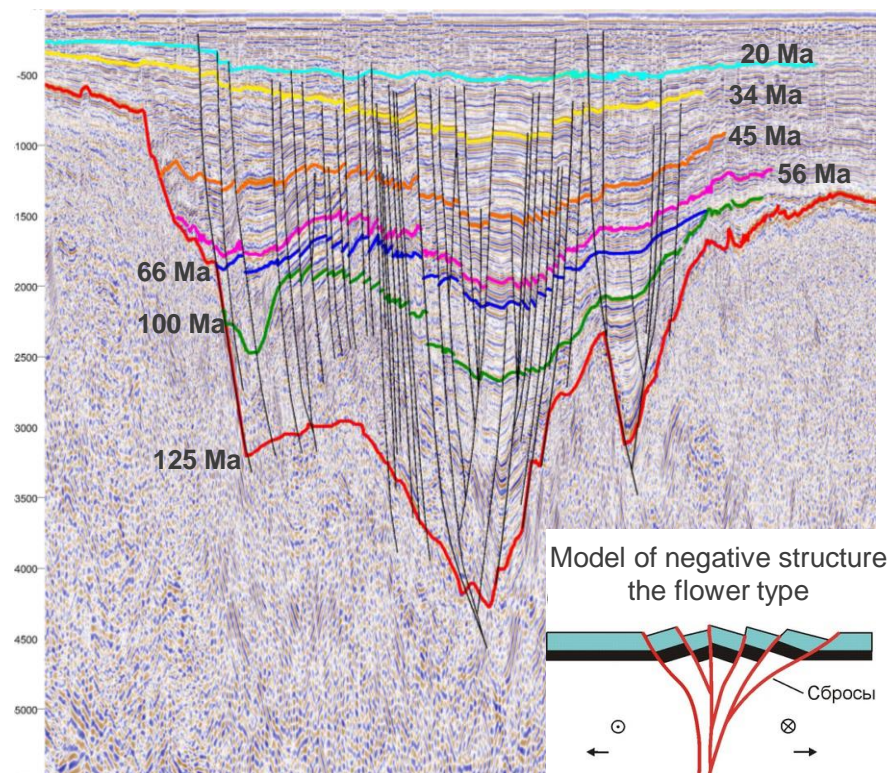
- Located between the elevations of the New Siberian Islands and the De long archipelago. Rift has 300 km long and 100 km wide. Extends in a South-easterly direction from the Eastern Aniskinsky basin to Fadeevsky Islands and New Siberia.
- First in the 90's the Northern part of the New Siberian rift was explored by company of MAGE. Than, the rift was studied during the joint Russian-Germany geophysical expeditions BGR in 1993, 1994 and 1997 (Hinz et al., 1997).
- The BGR seismic surveys have a poor quality, however we can to interpreted only the outline of the Novosibirsk deflection and some local faults can be detected.



## New Siberian rift (research of ION Geophysical)

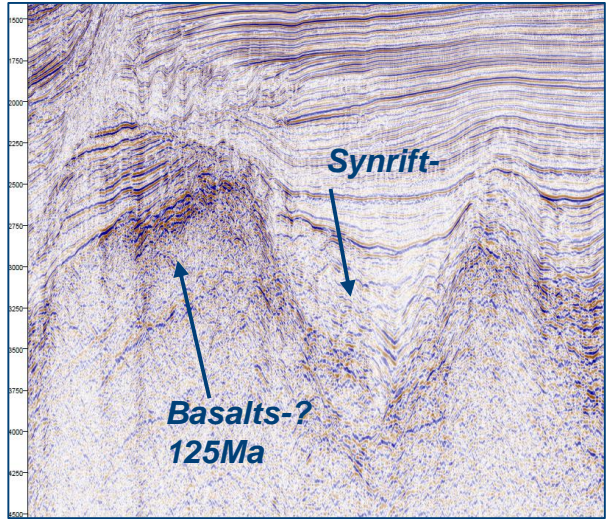
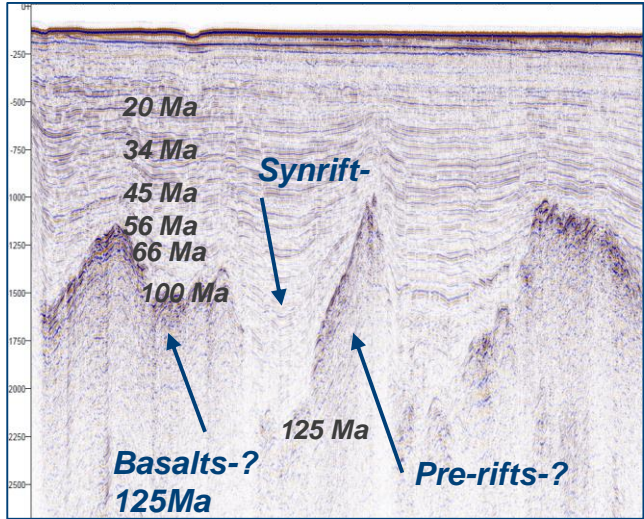
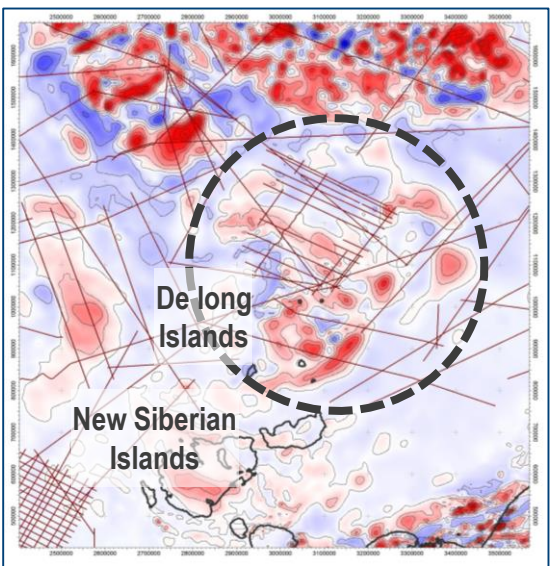
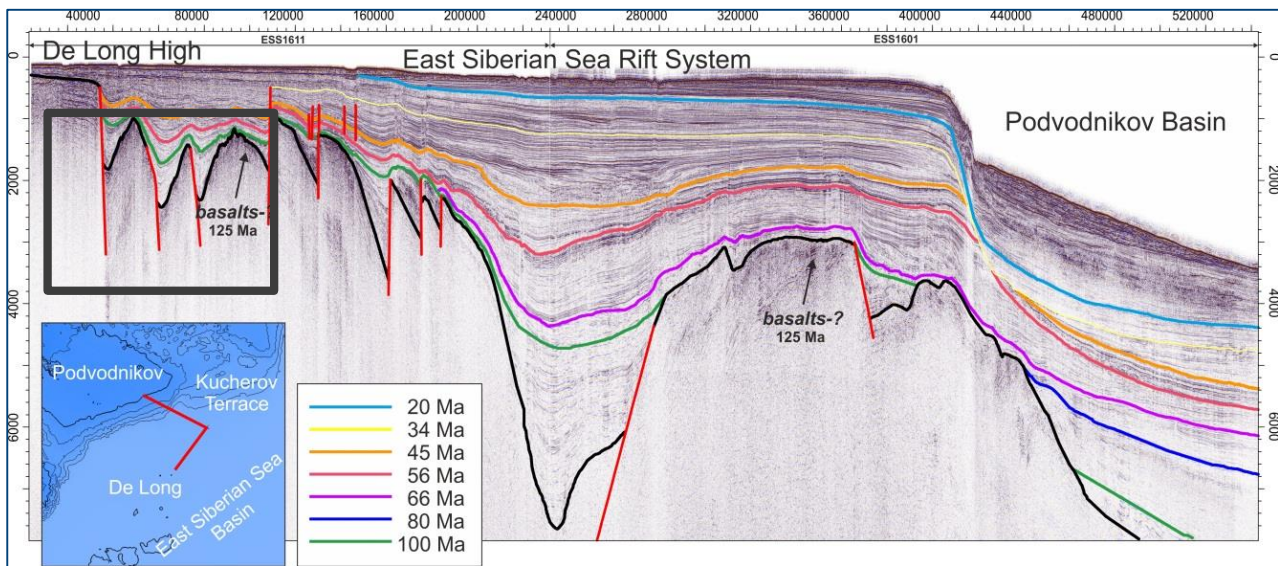


- In 2011, the rift was studied by the regional high-quality ION-GTX seismic survey. The seismic survey has clarified the complex structure of the rift and allowed to interpretation an ensemble of tectonic faults.



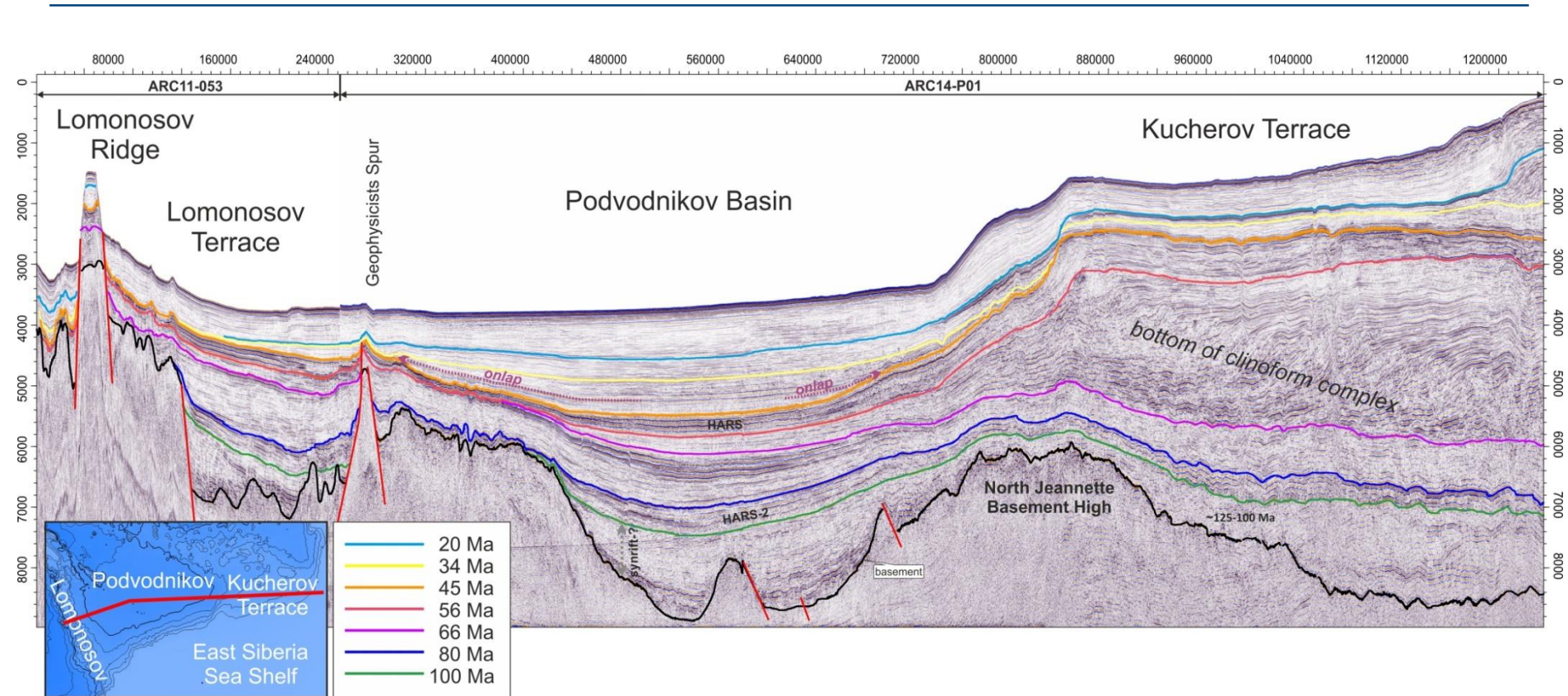
- The rift is a negative structure element of the flower type.
- This structure of the rift is typical for shear-tension and transtension structures.

# De Long's magmatic province



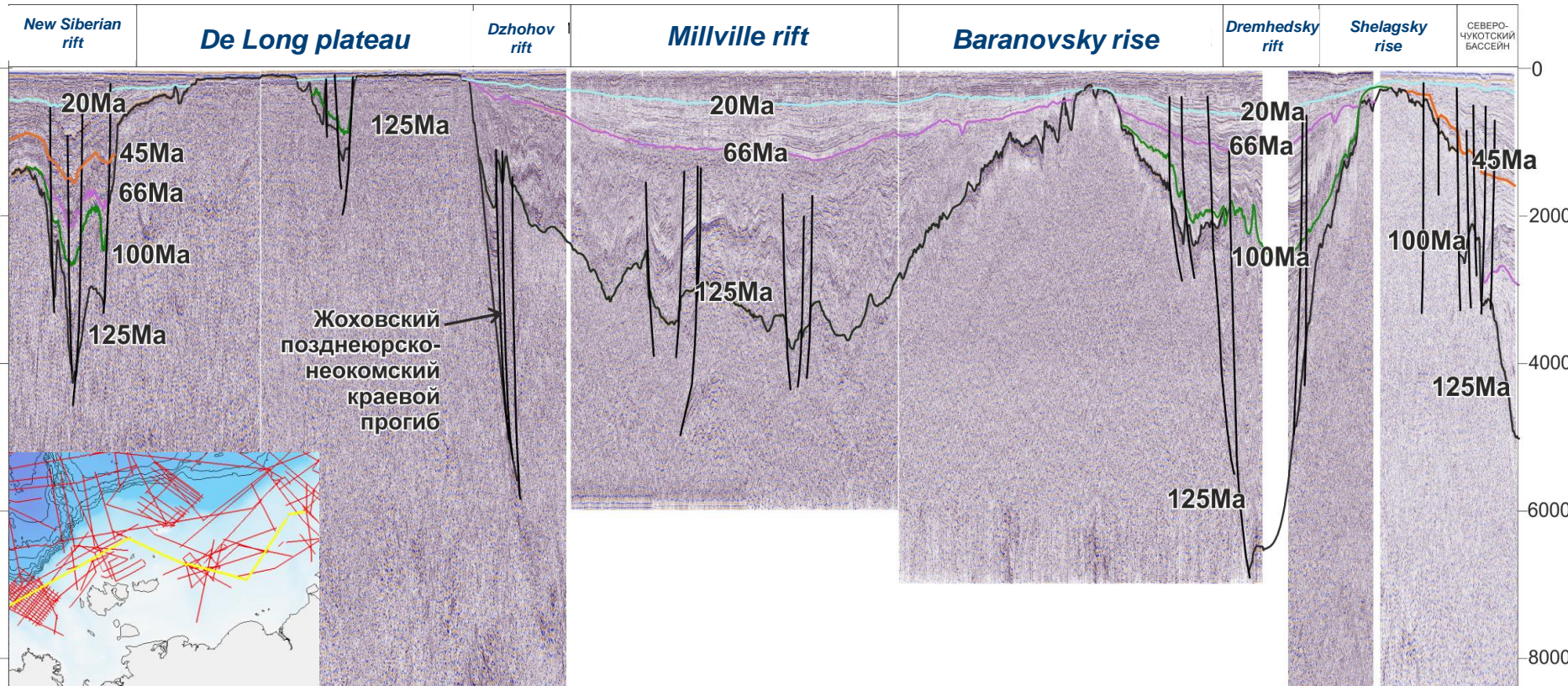
1. At the base of the rift basins of the De long uplift, there are high-amplitude packets, possible that may correspond to the basalts of the De Long Plateau with an age range of 130-110 Ma.
2. The processes of rifting started after to the time of trapping magmatic on the rise of the De long.
3. The synrift sedimentary covers have traced in a base of acoustic basement

# Rifts of the Podvodnikov basin



- The structure of the Podvodnikov basin formed in Aptian – Albian. The Podvodnikov basin links with processes rift-genesis.
- Probably, the Podvodnikov basin has a highly stretched and thin continental crust.
- This rift's geometry is a typically for continental rifting.

# Rift systems of the East Siberian continental margin



- This picture illustrates the main rift systems of the East Siberian.
- The Millville graben has a typical rift system (phases of rifting – 125Ma).
- The Dremhedsky rift has an angular unconformity (indicates con-sedimentary genesis of folds).

## Conclusions

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1. The main phase of rifting was formed in 125-100 Ma in frame East Siberian basin.
2. The rifts system of East Siberian basin, probably, formed in Aptian – Albian time, after plume magmatic De Long plateau.
3. This rift's geometry is a typically for continental rifting.
4. The processes of rifting links with highly stretched and thin continental crust of the Podvodnikov basin, in the result was formed a big continental sedimentary basin.

**Thank you for attention!**

