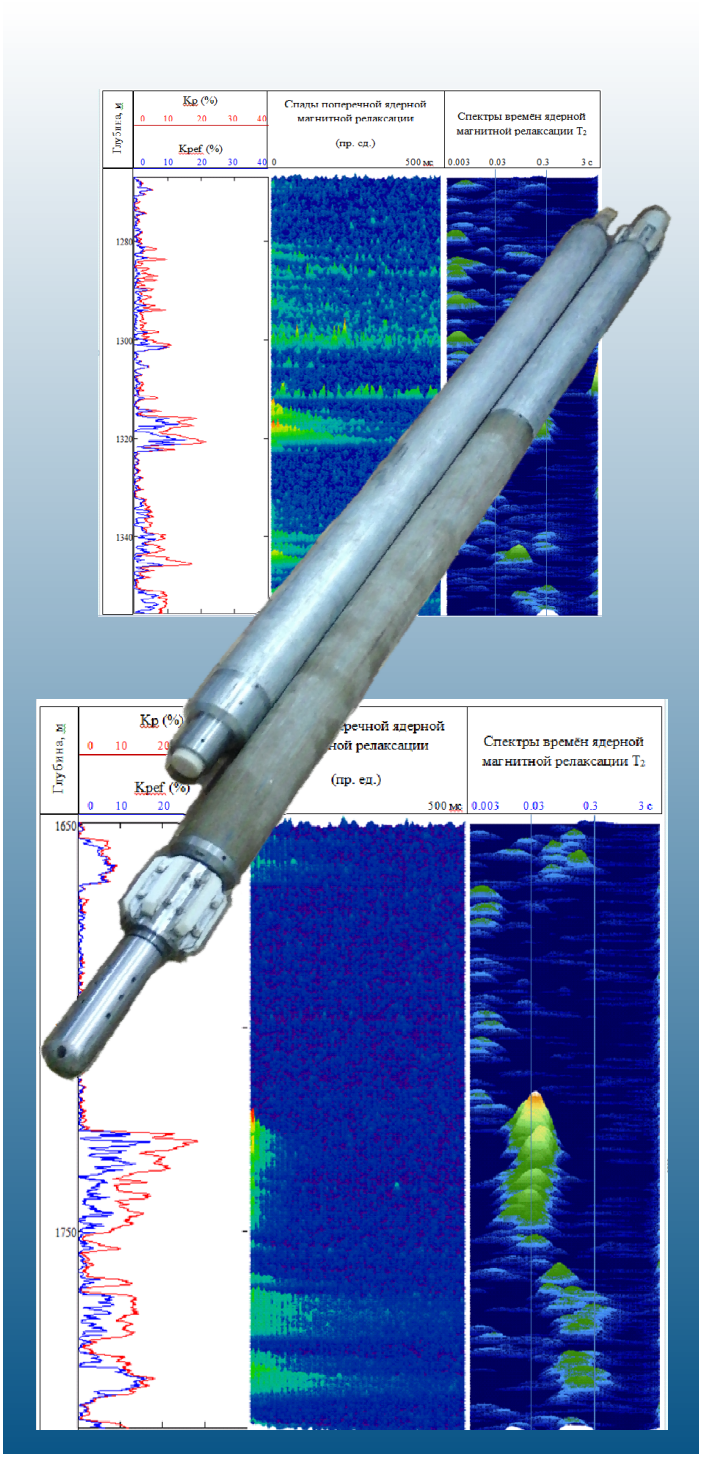
KAZAN (VOLGA REGION) FEDERAL UNIVERSITY

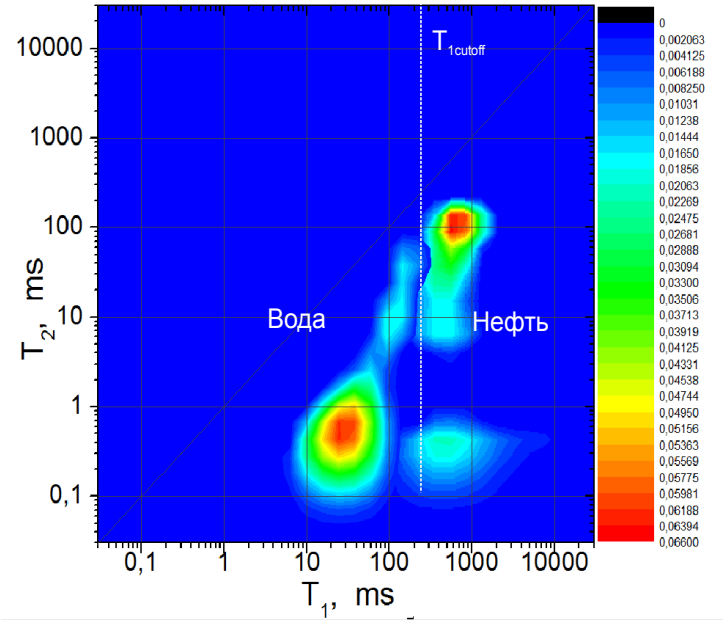
DEPARTMENT OF PHYSICS

Model: Logging NMR Tool “NMC-1”.
Purpose: Open hole logging to characterize porosity and permeability properties of oil reservoirs using nuclear magnetic resonance (NMR) data.
Scope of Application: NMR logging and oil reservoir characterization in real time of measurements on being drilled (prospecting, exploration and producing) wells.

Distinctive features of the tool:

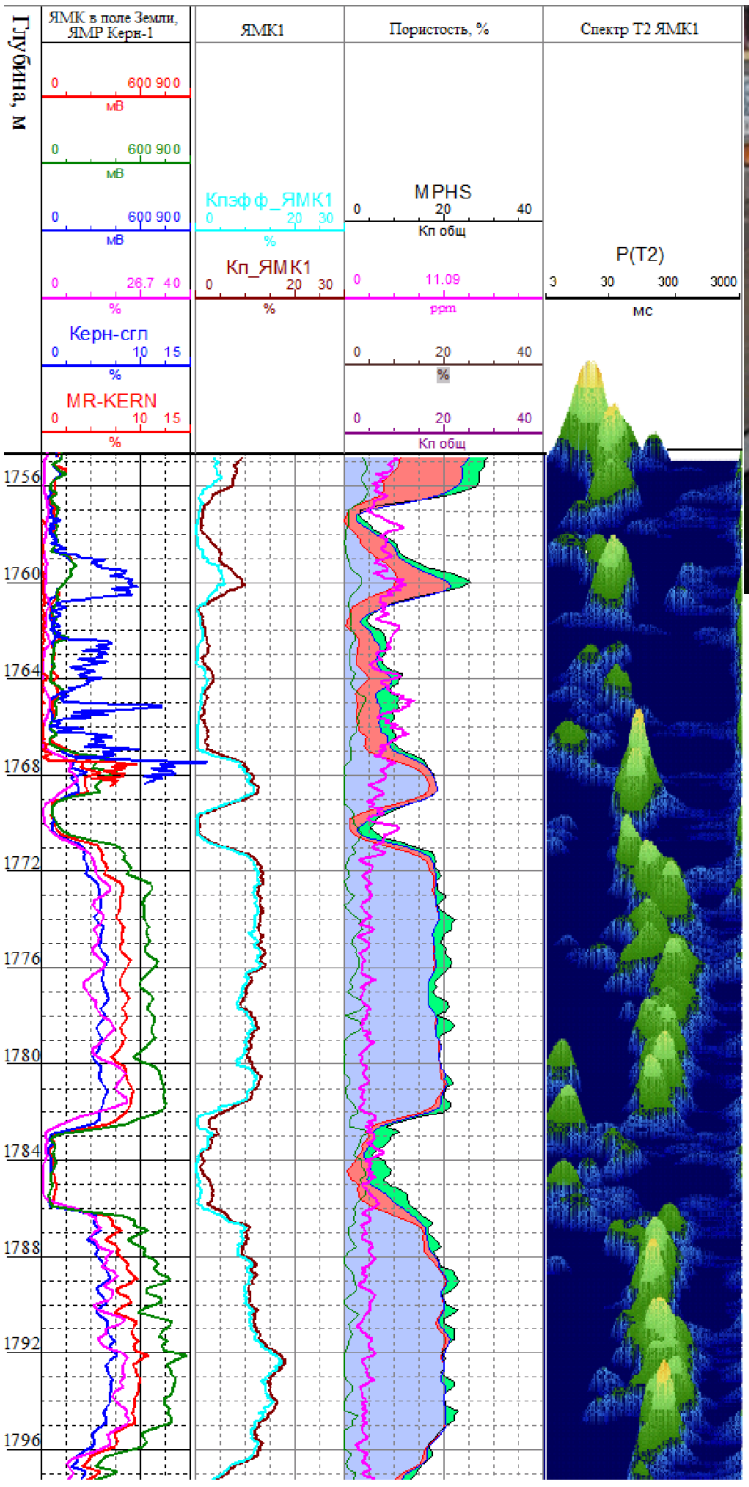
- **increased depth of the investigation**, which allows excluding the influence of the drilling fluid infiltration and integrity reservoir incompletion on the logging as a result of drilling;
- evaluation of oil reservoir characteristics in real time of logging by the automated control system of data measurement and data processing, which allows quick calculation characteristics using the **fast processing algorithms of NMR logging data** to calculate the 1D spectra of the nuclear transverse relaxation times;
- the possibility of the oil reservoir **fluids typification** in the process of logging by suspending the basic measurements and performance of additional measurements with the calculation of **2D joint spectrum** of transverse (T_2) and longitudinal (T_1) magnetic relaxation using the original fast algorithm.

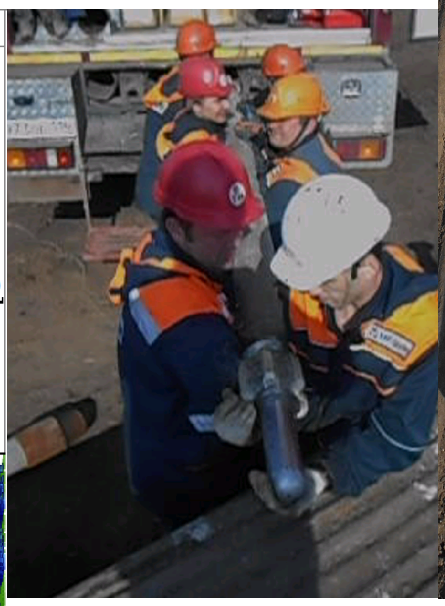




Technical characteristics of the tool “NMC-1”:

Type of the logging tool	- centric;
Size of study field:	
• форма области исследования прибору;	- toroid coaxial to the tool;
• depth of investigation (radii to the resonance from the instrument axis)	- 185 до 215 mm;
• resonance field thickness	- 25 mm;
• volume of study field	- 940 cm^3;
Resonance frequency on ^1H nuclei	- 362 kHz;
Ranges of measured characteristics:	
• spin-spin relaxation times (T_2)	- 0.003 ÷ 3 sec;
• spin-lattice relaxation times (T_1)	- 0.01 ÷ 10 sec;
• NMR poro(φ)	- 1÷100%;
Characteristics measurement mode	- real time mode;
The minimum vertical resolution	- 30 mm.





Operational features:

Logging rate at lifting	- 50÷200 m/h;
Preparing time for the tool use	- 40 min;
Dimensions in use::	
• diameter of the tool body	- 155 mm;
• diameter of centralizer	- 176 mm;
• length of the tool	- 7.1 m;
• weight	- 250 kg;
Dimensions in transportation:	
• length of separable modules	- 3.1и 4.0 м;
• weight of modules	- 100 и 150 kg;
The number of cable cores	- 7 cores;
Permissible borehole diameter	- 190÷295 mm;
Permissible drift of the borehole	- до 25°;
Maximum operating pressure	- 800 atm;
Maximum operating temperature	- до 150°C.

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