Fluid connective faults' prediction and their current activity evaluation based on seismic and gravimetric data

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Recent years studies have shown that oil and gas fields could be considered as a permanent active hydrodynamic system ((Muslimov R.Kh. et al., 2004), and fluid connective faults (channels) are parts of the system (Trofimov V.A., Korchagin V.I., 2002; Trofimov VA, 2006). These channels prediction on CMP seismic method and their current activity's evaluation by the instability of gravitational field (IGF) facilitate improving the efficiency in Petroleum prospecting.

This is a very important result, and this evidence of fluid connective faults' identification is not single. Under certain conditions of oil-refilling channels activity and inflow of deep-oil product are able to supply a sufficient trap breaching pressure regime and hydrocarbon products mass-transportation (Volgina A.I, et al., 2018). In this case, migration channels could be formed over the trap and it's possible to conduct trap breaching by observed microseisms, which are sometimes relatively strong. Such channels can have a through nature, and deep hydrocarbons break through to the surface and bring environmental pollutions problems. A bright example would be the well-known plump hole on Yamal peninsula.

In this abstract, the results of field tests, including discrete and continuous measurements of the gravitational field for a long time using Scintrex gravimeters, are presented and discussed. Trap breaching by deep-seated gas has some similarity with mud volcano phenomena when mud masses and gases as a result of seal breaching are erupted and often accompanied by water and hydrocarbons content.

Gas breaching to the earth' ground along fractured zones, as in case of mud volcanism, is accompanied by seismicity and mass movement. Correspondingly, while monitoring of gravimetrical observations, such as gravity survey of instable filed is, we can observe microseisms as well and gravity field variations, including the high-frequency ones.

Consequently, the obtained results quite clearly demonstrate an opportunity of this complex methodology application how to rise up the efficiency of appraisal well drilling, to identify the structures prospectively on seismic method, and to predict contemporary permeable zones.