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# Fourier and wavelet analysis of the thermograms: application to the rock sequence investigations

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The article focuses on the results of Fourier and wavelet analysis of more than 300 thermograms. The thermogram of each well contains spatial temperature variations (temperature waves) with amplitudes of several tenths of degree and from 50 to 1000 m in wave length. Certain wave phase values appeared to be tied to a certain depth or boundary dividing rock strata. The lengths of the most expressed waves are related as 1, 1/2, 1/3, 1/4… The most interesting particularity is that the wave phases have been found to be associated with stratigraphic and lithologic boundaries in the rock sequence penetrated by the well. The authors have found that in those wells where the lithostratigraphic section is most inhomogeneous (i.e. contains a great number of various stratigraphic units) more than 80 percent of stratigraphic and lithofacies boundaries correspond to inflection points or extrema (critical points) of the temperature waves. On the other hand, temperature waves have also been recorded in the geological environments that are homogeneous, - for instance, in the thick (3.5 km) salt-bearing mass and in the thick mass (4 km) of the crystalline basement. Some features of the temperature wave behavior can be of great practical importance. For instance, an amplitude of short-period wave sharply grows in the oil and gas bearing layers. This feature can certainly be used as an indicator of oil and gas promising strata in unexplored regions or in the regions where oil and gas reservoirs were omitted.