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Early Visean carbonates platform facies distribution (Dnieper-Donets basin, Ukraine)

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The Dnieper-Donets basin (DDB) is located in the southeastern part of the East European Platform between the Ukrainian Crystalline Shield and Voronezh Crystalline Massif. It belongs to the chain of rift depressions along the intracratonic Sarmatian-Turan lineament. The sedimentary fill includes the rocks from Mid-Devonian to Quaternary. The total thickness of the sedimentary column reaches as much as 15-20 km.

This study is aimed to detaile facies distribution over of the Early Visean carbonate platforms. An analysis is based on an integrated interpretation of core and well logs for more than 1500 deep,regional and local seismic data as well.

Carbonates of Early Visean occur at depth of 1500-5500 m and extend over the most of structural-tectonic zones of the DDB. The thickness of these sediments changes from 30-40m to 300-400m. Carbonates consist of two series that reflects two main phases of marine transgression during the Early Visean. Upper part of the carbonate platform corresponds to the XIIIth micro-faunistic unit (MFU), and lower one to the XIVth MFU.

The study has revealed several facies zones in the carbonate sediments of Early Visean. For carbonates of the XIIIth MFU it is found a presence of such zones as follows: basin (shales with intercalation of bituminous carbonates) with scattered pinnacle-reefs, slope (alternation of shales, lime mudstones, skeletal wackestones and floatstones), reefal – marginal carbonate massifs (massive biohermal coral-brya-crinoidal, brya-crinoidal-algal baundstone and their detrital derivates – floatstones and rudstones), shallow marine with build-ups (skeletal wackestones and packstone, grainstones; biohermal brya-crinoidal-algal baundstone in the core part of the inner shelf build-ups),

littoral (alternation of skeletal wackestones and packstone, lime mudstones, calcareous sandstones and siltstones), and lagoonal (micrograined and finegrained limestones with rare intercalations of dolomites) ones.

For carbonates of the XIV MFU it is recognized followings zons: basin (alteration of lime mudstones, skeletal wackestones and carbonate shales), shelf (skeletal wackestones and packstone, grainstones, nodular limestone and rare biomorphic algal limestones), transitional (alternation of limestones, shales and sandstones), and littoral (grainstones, lime mudstones, sandstones) zones.

Ten oil and gas-condensate fields are discovered within the Early Visean carbonate to date. Three of them produce gas-condensate from reservoir within pinnacle reefs, four produce oil and gas-condensate from reservoir within reef of marginal zone and three produce oil from reservoir within intrashelf build-ups.