The $\delta^{13}C_{PDB}$ and $\delta^{18}O_{PDB}$ values of bulk carbonate samples from the Mesozoic formations of the Pădurea Craiului Mountains vary from -2.27‰ to +2.97‰ and from -8.07‰ to -2.91‰, respectively. All isotope compositions correspond to seawater carbonates. An increasing trend of the $\delta^{18}O$ values with the age of the formations is to be noted. The highest values $\delta^{18}O$ (-4.44‰ to -2.91‰) correspond to the Cretaceous formations. The Triassic limestones display the lowest $\delta^{18}O$ value (-8.07‰) and this could be a consequence of the global oxygen isotope excursion recorded at the Permian/Triassic boundary. Such light $\delta^{18}O$ values are consistent with an Early Triassic warm, depleted of oxygen and stagnant ocean. The lowest $\delta^{13}C$ value (-2.27‰) was obtained for the Upper Jurassic limestone formation. As these limestones have been uplifted and karstified under lateritic conditions during the late Jurassic and early Cretaceous, the ^{13}C-depleted value probably resulted from an admixture of primary and diagenetic carbonate. The lower value could also be a remnant of the carbon isotope negative shift documented worldwide and caused by the Early Jurassic (Toarcian) oceanic anoxic event. All Cretaceous limestone formations display positive $\delta^{18}C$ values (1.78‰ to 2.97‰). Positive carbon-isotope excursions are generally compatible with times of low atmospheric carbon dioxide content. The Barremian marine limestones (Blid formation) display slightly lower $\delta^{13}C$ and $\delta^{18}O$ values relative to the Albian-Aptian limestones. Paired carbon and oxygen isotope determinations provide a possibility of interpreting not only changes in the global carbon and oxygen cycle through time, but as a discrimination criterion in problems of stratigraphic correlations as well. Paleotemperature estimations based on calcium bicarbonate and seawater isotopic fractionations give temperatures as high as 26^{o}C for the Triassic limestones and between 22–23^{o}C for the Jurrasic – Lower Cretaceous formations. These results are similar to the isotope temperature records of other carbonatic sequences of equivalent age. A larger number of data and high-resolution carbon and oxygen-isotope stratigraphy are required to develop a better understanding of changes in paleoenvironmental conditions.

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Time-Dependent probability distribution on faults associated to strong earthquakes (M≥6.5) in the broader Greece area

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Greece and the surrounding area are characterized by high seismicity. Strong earthquakes (M≥6.5) have repeatedly occurred in this area, as historical information and instrumental recording reveal. Using as input data 67 strong earthquakes that occurred since the beginning of the 20th century, the coseismic stress changes are calculated, in order to make a probabilistic earthquake forecast in the study area under the influence of past events. For this purpose, the calculated coseismic stress changes are translated into earthquake probability using an earthquake nucleation constitutive relation, which includes permanent and transient effect of the sudden stress changes. According to this method, a sudden change in stress seems to modify earthquake rate, moving other faults toward or away from failure, changing the probability of potential earthquake on these faults. Earthquake probability on a fault is lowest after the last event but as tectonic stress grows the odds of another earthquake increase. For all needed calculations a pdf (probability density function) for the time of failure for an earthquake of defined magnitude on the fault of interest must be taken into account along with the calculated stress changes on the fault. Specifically, the estimated probability values concern the probability in each part of a given fault or fault segment, and the probability distribution is illustrated across the specific fault. All calculations were performed at 10 km depth but it was necessary to check whether the estimated probability values vary with depth. Therefore, all estimations were performed for each fault or fault segment at the depth of 8, 12 and 15 km. The probability calculations were carried out and given for the whole study area during the next 30 years in the form of tables and maps.

Pre-Alpine history of the Ukrainian Carpathian Foreland and its combustible minerals

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Pre-Alpine history of the Ukrainian Carpathian Foreland is connected with the ancient continental marginal areas of the East European Platform, and succession of the formation – with a long and varied interaction between surrounding regions at different stages of their development: active geosyncline, orogenic and young platform during several tectonic stages – Baikalian (R3), Caledonian (V-D1) and Hercynian (D2-P). At each of these stages on the territory of the western region of the Ukraine the structures, characteristic of that stage only and unlike others, were formed. By genetic principle one can distinguish here: 1. Volyn-Orsha Baikalian transverse foredeep (as it was understood before). However, if this structure is considered on a scale of the whole East European Platform and its distribution is taken into account, then it should be called through foredeep (avlakogene), although its formation undoubtedly is connected with the events occurred near the platform edges. 2. Caledonian fore-system included in Volyn-Podillya area of the Baltic-Black Sea pericraton (s.s) deep (V-D11) and Boyanets foredeep (foothills) (D12-3). 3. Lviv-Lublin Hercynian posthumous foredeep (D2-C2). 4. Hercynian fore-platform uplift composed of dislocated deposits from Riphean to the Lochkovian stage of the Lower Devonian. 5. Hercynian foothill deep (Silesia-Pokuttya) (C2-P) which is now overlapped by formations of next Alpine stage, but lets us know about itself by fragments of its rocks (black coal and conglomerate of verrucano) in flysh and molasses along the whole northern slope of the Carpathian. It is known that main belts of oil and gas accumulations are often confined to similar structures of the ancient platforms. Pericraton deeps, the constituent parts of the edge systems of continental borderlands, are especially rich in combustible minerals. Similar structures are located in the eastern part of the Arabian Peninsula, Volga-Ural region, in Alberta and Saskatchewan deeps in North America and on Sahara plate. Within the Ukrainian Carpathian Foreland the deposits of natural gas and black coal have been discovered. Gas deposits are mostly found in terrigenous deposits of the Middle and Lower Devonian, black coals – in deposits of Carboniferous. Moreover, analysis of the known criteria of oil and gas potential has allowed us to distinguish perspective complexes: Silurian and Cambrian. In the first of them, the discovery of new hydrocarbon fields is connected with a lithofacies of organogenic limestones that compose a submeridian reef system consisting of organogenic buildups at three levels: Bahovytsk, Malynovetsk and Skalsk, and extends from the Volodymyr-Volyn fracture through Lokachy-Olesko-Buchach to the Ukrainian-Romanian frontier. In the Cambrian complex, promising for oil and gas are both anticlinal traps and traps of non-anticlinal type – lithological zones of thinning out of sand layers, stratigraphic, disjunctively screened and so on. Results of studies devoted to generalization of material on the Late Precambrian sedimentary formations give reasons to classify Wendian and Riphean complexes as promising objects, too.

Coal deposits are connected with the Carboniferous of the Lviv-Volyn Basin where one can count about 90 coal seams. Of commercial value are six of them in the Buh suite of the Serpukhovian stage, and they are worked by 14 mines. Further prospects are connected with the northern part of the basin as well as with the Polish frontier areas.