Coastal Instability and Urban Changes - the Case of the Nessebar Peninsula

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The Nessebar Peninsula has a narrow and elongated shape located at the northern part of the Bourgas lowland at the west Black Sea coast. One of strongest factors forming out its coasts is the destructive activity of the sea waves. During the last two and a half milleniums the urbanization and constructive works on the peninsula envisaged a free of flooding strap up to several dozens of meters for protection from the destructive power of the storm waves. In a stagnating sea level and in a protected sea basin, the fortification works are situated along the sea and even enter it. The *diateikhisms* of the classical and late antique fortifications of Mesambria in the northern and southern bay had probably also harbor functions, while the pre-Roman arch-like wall in front of the fifth isobath in the southeastern bay reflects the tradition to closely "follow" the sea. An immediate proximity to the water basin is evident from constructions directly on the rock ground. This is the case with the pre-Roman trapezoid wall in the northeastern zone of the peninsula or with the pilot fortification of the bases and the substructions of the late antique wall in the southeastern bay. A much more disruptive effect upon the coastal zone has the destructive impact of the waves in the periods of transgressive rising of the sea level. In the southeastern coastal zone, the localization of the early Thracian and of the classical Dorian fortification in the zone of the fifth-fourth isobath, presumably sets the lower mark of the variation of the water level in the 12^{th}-5^{th} centuries BC up to a depth of 5-7 m. The rise of the sea level in the 1^{st} millenium AD imposed the displacement of the fortifications onto higher terrain. Walls erected in the 5^{th} c. AD in *opus mixtum* are discovered in the southeastern bay in front of the second isobath. In the middle and the second half of the second millenium the waves scraped niches in the cliff slopes of the peninsula. The overhanging land layers fell down together with the fortification works and public buildings on the head of the peninsula. Next to the late antique fortification wall, dropped in the southeastern bay, the northern part of the church of "The Mother of God Eleousa" fell into the sea before 1341/42, and also the church "St. Protomartyr Stephen" fell during the earthquake in 1855. The same happened up to the beginning of the 18^{th} c. to the Dorian temenos of Zeus and Hera, to the theatre of the antique city and the early Christian basilica that has been topographically inherited by the church "St. George the Old" in 1704. After the transport of the abradant mass by the coastal sea currents a slightly sloped terrace formed out. In the northeastern zone of the peninsula after the submergence of the rock coast up to the end of the 20^{th} c. a strap has been abraded. It is some 15-25 m wide and lies between the trapezoid hellenic wall and the basilica "Mother of God Eleousa". At the southeastern coast between the church "St. George the Old" and the late antique wall the peninsula lost at least 70 m wide strap. Most intensive is the coastal erosion to the east. There, some 240-250 m from the fortified Dorian settlement submerged. At the end of the 20^{th} c. the peninsula has a specific shape with narrow and elongated bays and outreaching capes. After the construction of the multifunctional structures for coastal protection the three-millenium-old cultural heritage of Nessebar is preserved for the future.

Upper Cretaceous silicites from the Bohemian Cretaceous Basin (Czech Republic) as a versatile building material

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Bohemian Cretaceous Basin extends over 15,000 km^2 and makes the largest sedimentary unit of the Bohemian Massif (Czech Republic). Its lithology is characterized by

prevalent clastic sedimentary units but more shallow parts of the sedimentary basin were filled by mudstones and carbonate rocks. Fine-grained rocks of aleuropelitic character and variable mineralogical composition in which silica (mostly less crystalline forms like CT-opal, tridymite etc., but also clastic quartz), carbonate (calcite locally enriched in magnesium) and clay minerals (illite, kaolinite and glauconite) prevail can be classified in the range from clayey-calcareous silicites to siliceous-clayey micritic limestones.

Traditionally, these rocks have been used as a common building stone but also as sculptural stone. Along these traditional uses, recent investigations show that some varieties of silicites are also employed as raw material for hydraulic lime binders burning. This paper discusses properties of these traditional stones and possibilities for determining their source locality. Their durability is discussed based on the thorough analysis of physical and mechanical properties and on the experience with their long-term behaviour in outdoor exposures.

Geological Timescale of Tectonostages for Continental Margins

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The lithosphere plate tectonics theory describes the process of oceanic crust opening and closure in geological history of the Earth using the Wilson cycle. Upon the end of the cycle, the oceanic crust being formed at its early stages is almost completely destructed in the process of subduction. As for the continental margin, it is modified during the cycle with formation of volcanic and non-volcanic island arcs, back- and fore-arc sedimentary basins, and orogens. During the next stage of the cycle, the previously formed continental margin is again affected by deep transformation, leaving in the structure of the newborn margin only some relics of the previous ocean crust known as ophiolites. However, as the study proves, complete destruction of the previous continental margin is not reached. Always or quite often a significant part of the newborn continental crust is preserved and laterally accreted to an existing continental plate and is being modified during further transformations passing through consecutive stages that could be called a vertical line of the tectonostages for particular continental margin. Evidence for that conclusion is an age rejuvenation of the continental crystalline crust while moving from the central parts (shield) towards their outskirts (continental margin). It is proposed a geological timescale of tectonostages derived from the Wilson cycle and establishing their time boundaries for the last 2500 million years. Along with the developed model for continental margins evolution, it allows application of the concept of horizontal sequence of tectonostages transition into vertical and vice versa to study structure of continental margins. It is supposed that for the Wilson cycle of 1200 million years every continental margin is subjected to the tectonic process as follows. During the first stage of a divergent epoch (0-200 Ma), a new oceanic basin is forming due to a continental rift. Present-day example of such a rift one can consider the Red Sea Rift and latitude-oriented rift system between North and South America stretched into the Pacific and Atlantic Oceans. Predecessor of the future Red Sea Ocean were the Tethys and the Prototethys paleo-oceans, which originated during the stages of 590, 75-385, 75 Ma and 992,5-793,0 Ma ago. The Tethys is corresponding to present-day Alpine-Himalayan orogenic zone and related sedimentary basins, and the Prototethys – to the Donbass Foldbelt and its eastern prolongation into Karpinskiy Ridge. Rejuvenation of continental margins age towards the periphery of the continents set the problem of studying evolution of those margins applying concept of vertical and horizontal sequences of tectonostages. For this purpose, the model of evolution (tectonic stratification) of continental margins is developed. It includes six stages of tectonic evolution: origination of a new ocean and its opening (divergent epoch of the Wilson cycle), stage of the oceanic basin shortening and thermal subsidence (convergent stage), stage of partial inversion, and the next stage of the complete inversion along with the