Purification of municipal wastewaters and production of odorless and cohesive zeo-sewage sludge, using Hellenic Natural Zeolite

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Treatment of municipal wastewaters ($pH_{initial}$ 8.2-8.9) with 7.5 g of Hellenic Natural Zeolite (HENAZE) of a grain-size < 1.5 mm, gave overflowed clear water of pH 7.3-7.8, free of odors and improved quality parameters by 89.9-96.7 % for the color, 89.0-98.5 % for the suspended particles, 93.7-97.2 % for the chemical oxygen demand (COD), 92.9-99.3 % for the P_2O_5 content and 98.3-99.9 % for the NH_4 content. The improvement of the quality parameters for the clear water increases with increasing stirring time of the treatment experiments. The correlation coefficient is 0.9423 for the P_2O_5 content, 0.9323 for the suspended particles, 0.9282 for the chemical oxygen demand (COD) and 0.8854 for the color. The correlation coefficient for the NH_4 content and pH are < 0.60. The HENAZE comes from Ntrista stream of Petrota village of Trigono Municipality of Evros Prefecture, North-eastern Greece. HENAZE contains 89 wt. % HEU-type zeolite and exhibit an ammonia ion exchange capacity (sorption ability) of 226 meq/100g. The mineralogical composition and the unique physico-chemical properties, make the HENAZE suitable material for numerous environmental, industrial, agricultural and aquacultural applications, such as: animal nutrition, soil amendment for agriculture, pH soil regulation, greenhouse and flowers substrates, durability and health improvement of lawn, purification of industrial and municipal wastewaters, treatment of sewage sludge, odor control, fishery and fish breeding, gas purification and drying systems, oxygen enrichment of aquatic ecosystems, improvement of drinking water quality, constructed wetlands and wastewater treatment units. The treatment gave as precipitate odorless and cohesive zeo-sewage sludge, suitable for safe deposition and also for the reclamation of agricultural soils. The zeo-sewage sludge produced either from the municipal wastewater treatment or from the mixing of HENAZE and sewage sludge, can be used for the reclamation of agricultural soils. The presence of HENAZE in the agricultural soils, increases the crops yield by 17-66 % and improves the quality of agricultural products by 4-46 %, reduces the use of fertilizers by 56-100 %, reduces the usage of irrigation water by 33-67 %, prevents the seepage of dangerous species into the water environment (e.g., NO_3^- by 55-92 %), protecting thus the quality of surface and underground waters. The usage of HENAZE in vivarium units and in the animal nutrition increases the production and improves the quality of the relevant products, reduces the feed cost, the animal diseases and medication, the new-born animal's death-rate and the malodor, converting thus the manure to odorless fertilizer.

Origin and deformation of the Thrace Basin: constraints from fault-slip analysis

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The origin and deformation style of the Thrace Basin, NW Turkey represent the target of ongoing debate. Uncertainties are partly due to imprecise knowledge of the stratigraphy of basin-fill sediments. In our contribution we report surface structural data including fault-slip analysis which are important for understanding the origin and structure of the Thrace Basin. Measurements were executed along the northern, north-eastern and south-western margin of the basin. The data from the SW margin also contribute to characterisation of the surface segment of the North Anatolian Fault between the Marmara and Aegean seas.

The earliest detected deformation occurs just SW from the Thrace basin, in the Gelibolu peninsula, along the shore of the Aegean Sea. Folding and faulting of Palaeocene to early Eocene sequence was associated with very low-grade metamorphism. Middle Eocene succession seals the deformation features.

Small-scale syn-sedimetary structures (sedimentary dykes and faults) indicate NE-SW to E-W extension along the NE margin of the basin in the Bartonian to Priabonian. Gradual tilting of the beds could occur in map-scale tilted blocks of extensional origin. The repeated normal faulting is deduced from fractures which formed before, during and after the tilting. This deformation process is reflected by progressive transgression on basin margin and intra-basin block margin.

Extensional fractures were also observed in Eocene sequence near the SW margin, in the Ganos Mountains. The age of faulting is not precisely constrained but pre-dates the latest Oligocene – early Miocene folding and related uplift.

All data on early deformation phases point to extensional deformation along both the north-eastern and south-western margin of the basin. Regional geodynamic considerations would agree with fore-arc origin of the Thrace basin.

Before the folding in the Ganos Mountain a strike-slip type deformation occurred during the Late Oligocene - Early Miocene. The E-W compression could induce dextral faulting along the ENE trending southern margin of the Ganos Mountain, the Ganos fault, a precursor of the North Anatolian Fault. This confirms the suggestion that dextral faulting parallel to the NAF could be active already in the late Oligocene-early Miocene.

The large-scale folding itself occurred in a slightly different stress field, in NNW-SSE compression. Progressive fracturing and folding happened in a coaxial deformation process. The folding and related uplift is constrained by fission track data as ~16 Ma.

Post-early Miocene deformation history can be detected south from the Ganos fault, in the Sarköy area. Before the tilting of mid- to late Miocene sediments, a peculiar stress field with SE-NW extension and NNE-SSW compression occurred. This deformation was already observed, but its geodynamic interpretation is not clear. Strike-slip type deformation with E-W to NW-SE compression is connected to dextral faulting and folding (transpression) along the Ganos segment of the North Anatolian Fault. This is in agreement with Pliocene-Quaternary dextral faulting along the North Anatolian Fault. A slight change in compression direction can be suspected during the progressive deformation; this non-coaxial character can also be connected to strike-slip faulting.

Study of a mesoscale convective complex over Western and Southern Balkans

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The purpose of this study is to thoroughly examine the conditions leading to the development of a mesoscale convective complex (MCC) on 24 May 2009 that affected the western and southern Balkan Peninsula, its features and the manifestation of its activity at the surface. To this end, data from a variety of sources were used, such as weather maps, surface records and upper-air soundings, a hailpad network, satellite, lightning, precipitation and radar data. First, the evolution of the system was described, in terms of the track, timing, and areal extent. Second, the synoptic and thermodynamic environment that favored its development was studied. Special features at the surface, such as a cold pool and a mesohigh, were documented by surface observations. Finally, successive satellite, lightning and radar imagery revealed the organization of the system. All data together document well the categorization of this system as an MCC.