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Southern Dobrogea coastal potable water sources and Upper Quaternary Black Sea level changes

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Southern Dobrogea is a typical geologic platform unit, placed in the south-eastern part of Romania, with a Pre-Cambrian crystalline basement and a Paleozoic – Quaternary sedimentary cover. It is bordered to the north by the Capidava – Ovidiu fault and by the Black Sea to the east.

A regional WNW – ESE and NNE – SSW fault system divides the Southern Dobrogea structure in several tectonic blocks.

Four drinking water sources have been identified: surface water, phreatic water, medium depth Sarmatian aquifer, and deep Upper Jurassic – Lower Cretaceous aquifer.

Surface water sources are represented by several springs emerged from the base of the loess cliff, and a few small rivers, barred by coastal beaches.

The phreatic aquifer develops at the base of the loess deposits, on the impervious red clay, overlapping the Sarmatian limestones.

The medium depth aquifer is located in the altered and karstified Sarmatian limestones, and discharges into the Black Sea.

The Sarmatian aquifer is unconfined where covered by silty loess deposits, and locally confined, where capped by clayey loess deposits.

The aquifer is supplied from the Pre-Balkan Plateau.

The Deep Upper Jurassic – Lower Cretaceous aquifer, located in the limestone and dolomite deposits, is generally confined and affected by the regional WNW – ESE and NNE – SSW fault system.

In the south-eastern Dobrogea, the deep aquifer complex is separated from the Sarmatian aquifer by a Senonian aquitard (chalk and marls).

The natural boundary of the Upper Jurassic – Lower Cretaceous aquifer is the Capidava – Ovidiu Fault.

The piezometric heads show that the Upper Jurassic – Lower Cretaceous aquifer is supplied from the Bulgarian territory, where the Upper Jurassic deposits crop out. The aquifer discharges into the Black Sea to the east and into Lake Siutghiol to the northeast.

The cyclic Upper Quaternary climate changes induced drastic remodeling of the Black Sea level and the corresponding shorelines.

During the **Last Glacial Maximum (MIS 2),** the shoreline retreats eastwards, reaching the 100-120 m isobaths. In these conditions, the surface drainage base level was very low. Phreatic nape closely followed the river valleys dynamics.

Mean depth aquifer discharged on the inner shelf , where Sarmatian limestones outcrop.

The deep aquifer discharge was restricted by the Capidava- Ovidiu Fault to the north-east and by a presumed seawards longitudinal Fault.

This process enabled the migration of the prehistoric human communities, from Asia to Europe, who established settlements on the newly created alluvial plain on the western Black Sea shelf.

The **Holocene Transgression (MIS 1)** determined a sea level rise up to the modern one, and probably higher.

Under the pressure of these environmental changes, the Neolithic settlements slowly retreated upstream.

During the Greek colonization, the rising sea level caused the salinisation of the previous drinking water phreatic sources. In these conditions, in the Roman Age, a new hydraulic infrastructure had to be developed, using aqueducts for available inland water delivery.