



The origin of the Dargom canal in the oasis of Samarkand (Uzbekistan). A new scenario from geoarcheological data

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As the main oases developed in the arid regions of Central Asia, the region of Samarkand is the outcome of large hydraulic works carried out since the past times. The main result of such a great landscape transformation is a complex irrigation network formed by several artificial channels and useful for both urban water supply and irrigation purposes. Within the framework of the Italo-Uzbek Archaeological Project begun in 2001, a specific study was aimed to reconstruct the history of Dargom, the primary canal on the South of the city, and its relationships with the settlement dynamics.

According to the most accepted theories, the Dargom was dug during the Achaemenid Age (6th-4th c. BC) as a consequence of a master plan linked to a strong central political power. The new investigations carried out by a joined team of Archaeologists and Geologists from the University Bologna allowed a new hypothesis on the way of digging and the chronology of the Dargom itself.

The analyses on the historical settlement patterns seem to suggest a low development of Samarkand's territory during the Achaemenid times, whilst the increasing of sites during the Early Middle Age (5th-8th c.) can be explained throughout the rich trades along the Silk Road as well as the development of irrigated agriculture.

The present-day Dargom is a high sinuosity channel deeply incised into the bedrock flowing to the east, strongly resembling a natural channel. It has been excavated for around 70 km along an apron of alluvial fans sourced by a southern mountain range. Its morphology clearly document a natural evolution after excavation: incision and meandering took place, likely due to the increasing gradient related to the headward migration of lowering of the base-level and the decrease of the bed load through time.

Field survey around the fortress of Kafir Kala, the main archeological site geographically linked to the Dargom, allowed reconstructing the original bed of the canal, marked by a layer of sand with different composition respect to the substrate. In several places, the artificial cut in the most elevated (left) bank of the canal was recognized, interrupted by depression of the banks associated with crevasse deposits reaching several tens of meters uphill. In the less elevated bank (right) of the canal, the original artificial levee was never observed. It is worth mentioning an important reworking of the landscape due to the land reform of the Soviet administration in the years '60 of the last century.

A trench cut across the left side of the canal, showed a clinostatified body of sand covering the sand deposits of the ancient Dargom. The composition is local and it bears fragments of bricks and bones, to be interpreted as waste material shed from the top to protect the bank. Radiocarbon ages of two bones each separated 60 cm, are 1700 ± 30 and 1680 ± 120 BP.

A DEM was created based on a 1:10.000 scale topo map preceding the land reform, to document, thanks to a high detail of the contour lines (1 m), the micromorphological features associated to the canal. The resulting TIN was processed through the ESRI hydrology modeling functions, and the flow accumulation rate in the study area was calculated with the grid of 1 m. A slightly discontinuous ridge, with only a few meters of elevation from the surroundings, was identified on the right bank of the canal. Several cross sections document that this ridge correspond to the original levee and it is located 100 to 400 m north of the present-day incised bank.

Therefore, the original profile of the canal was reconstructed, much larger than expected and interspersed with artificial mounds, previously thought outside the canal, whose function has to be reconsidered.

The new geo-archaeological researches allowed a new interpretation on the history of Dargom. According to it the canal should be dated back to the Early Middle Age and its morphology can be reconstructed but other consideration can be advanced in relation to the labour investments required to realize such a great hydraulic work.

Thus, in our opinion the Dargom is not an imposition by a central power authority but the result of the common effort carried out by cities and villages around Samarkand in order to supply more water for the agricultural development of the region.