Supplementary Table S1. Soil section 1 of the Kamyane-Zavallia site (Figure 3-4)

Index	Depth, m	Description	Thin-section	Reference to micro-photo
H (arable)	0.0 – 0.3	dark-grey, blackish-light loam. It is very loose in the upper 10 cm, with a granular-blocky structure, and without visible carbonates. Some krotovinas (D 5-6 cm) filled with dark and mixed material and corn roots cut this horizon.	The thin section of the sample taken from 0.1-0.2 m depth yielded a light-grey substance of spongy texture with primary humic-clayish micro-aggregates (worms' excrement, D 0.02-0.04 mm). Micro-aggregates of the lower order are united in complex (up to IV order) structures of circular or oval shape, sometimes including grains of sand. The network of inter and inner- aggregate pores is well developed. The grains of the mineral skeleton are packed loosely. There are grains of sand (D 0.06-0.2 mm), but primarily the sample consists of medium and large quartz grains of silt. Humus of mull type colored the background, which is weakly anisotropic.	Figure 4, а-г
Hpk (under arable layer)	0.3-0.5	dark-grey or blackish-light loam. It is much denser than the upper horizon. It has a granular-blocky structure with large stable aggregates. The soil does not boil with HCl (10%). It is cut by some krotovinas (d 5-7 cm) and rare long vegetation roots. The contact with the underlying horizon is smooth and is marked by low-intensity boiling on contact with HCl (10%).	In thin-section, the sample from 0.3-0.4 m depth reveals that spongy grey matter consists of primary micro-aggregates (0.02-0.04 mm) collided into larger aggregates of II-IV order separated by a system of wavy outer and inner channels and pores. Sand grains are united in larger micro-aggregates. Grains of the mineral skeleton with humus and clayish shells took over half of the thin section. They consist of rounded sand grains (D 0.05-0.2 mm) and medium and large silt.	Figure 4 е-и
Hp(k)	0,5-0,85 m	dark-grey, blackish-light loam. It is rather loose with a granular-blocky structure and without visible carbonates. It reacts with HCl. The reaction is intense from a depth of -0.6 m. It is getting lighter with depth. The contact with the underlying layer is smooth and visible by a slight change in the color of sediments.	In thin-section, the sample 0.5-0.6 cm deep contains more sand and has remarkably lighter color. The material is loose, with the evident presence of humus: every sand grain (D 0.05-0.1 mm) has a shell of humus and clay.	Figure 4 к-м
Phk	0.85-1.2	grey, yellowish in the lower part, loose light loam. It reacts actively with HCl and contains many krotovinas with mixed material.	In thin-section, the sample (0.9-1.0 m deep) is light-grey, with a spongy, weakly anisotropic structure done of simple primary micro-aggregates (D 0.02-0.04) as well as of complex (II-IV order) micro-aggregates (D up to 0.3 mm). Moreover, a new type appeared, namely carbonate-clayish micro-aggregates with flat	Figure 4 н-т

Index	Depth, m	Description	Thin-section	Reference to micro-photo
			relief resembling nodule contractions. The mass is filled with microcrystalline calcite. Every visible grain of primary minerals has a carbonate-clayish shell. There are sand grains (d 0.05-0.2 mm) and medium and large silt .	
Pk	1.2-1.6	yellow, light yellow in its lower part, loose, light loam with micellar carbonates. It is cut by many krotovinas and contains cameras of burrowing animals 20 cm in diameter. It has a blocky structure. The soil reacts actively with HCl (10%).	In thin-section, the sample (1.3-1.4 m deep) is light yellow, with a spongy texture and loosely packed grains of mineral skeleton against carbonate – clayish background, with loess particles. The thin section is filled with microcrystalline calcite. There are also larger crystals of CaCO3. The massive carbonate content leads to large carbonate–clayish nodule contractions (d 0.05 – 0.15 mm). The material is anisotropic. The material resembles the known microscopic descriptions of loess.	Figure 4. у-щ