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CLAY MINERALS IN A LOESS PROFILE AT DOLNÍ VĚSTONICE

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ABSTRACT. It was study the mineral composition of loess profile in Dolní Věstonice. The studied profile was divided into climatic subcycles in the sense (Kukla 1961a;b; 1975).

The samples have a polymineral composition in the all grain size fractions. Dominant components in mineral association are: illite and chlorite, and occur some other minerals: quartz, feldspar, plagioclase and authigenic minerals (e.g. gypsum).

In the study profile are not changes in the mineral composition, only it attend to quantitative changes in the ratio substitute component.

1. INTRODUCTION

In the frame of the study of loess profiles in the Czech Republic was study profile in Dolní Věstonice. The profile represented climatic cycle B in the sense of (Kukla 1961a; b; 1975). The profile was divided in to 3 climatic subcycles.

The base of the profile is composed of loess of the last glacial cycle C3. On the top of loess C3 the argilic and calcerous horizons of B1 are development and fossil Bt–horizon and covered by loess materials.

Sedimentation of the marker horizon B1 during abrupt climatic change was followed by a thick accumulation of humic pellet sands.

Subcycle B2 begin with a phase chernozem development on the underlying pellet sands. The following is further interruption of sedimentation and deposition of marker B21 and accumulation of pellet sands. The period of sedimentation rest is represented again by the chernozem. The close of subcycle B2 was marked of the thick last glacial loess complex (Hradilová, 1996).

Subcycle B3 was not study.

2. METHODS OF STUDY

The loess samples from selected horizons of loess profile were taken for studies of particle size analysis and ultrasonic sieve instrument USG type by fy RETSCH Co. and the fine fractions were analysed by the sedimentograph SHIMADZU SA CP2. For mineralogical purposes the following fractions were prepared: under 0.063 mm

(by wet sieving method), under 0.020 mm (by wet sieving method using the ultrasonic sieve instrument, USG type, by Retsch Co.), under 0.002 mm (by pipette analysis).

For the studies of mineral composition the dense suspension of each fraction in distilled water was prepared. Basal reflection 001, important for identification of clay minerals increase during sedimentation on the glass slide when the clay particles get a preferential orientation. The oriented samples were studied on X–ray diffractograph DRON UM–1 in its natural state, then saturated with ethyleneglykol (EG) and heated at 550 °C for 1 hour under following working conditions: Cu K_α radiation, 35 kV, 25 mA, scanning speed of goniometer $1° \cdot min^{-1}$ (2θ).

3. Results

The clay minerals forms substantial component of study loess section. The all samples have a polymineral composition, to some extent identical mineral association but different quantitative number. The development of mineral associations corrorate cycling of changes.

The differences in the composition of mineral association in the specific section are left with changes in the contribution of source materials and with changes of intensity of weathering.

In the section Dolní Věstonice were study 3 size partial fraction:

In the fraction under 0.063 mm predominate illite and chlorite, and occur some other minerals – feldspar, plagioclase, quartz and authigenic mineral – gypsum.

In the fraction under 0.020 mm dominate illite, the content of chlorite and clastic minerals is smaller, higher is the content of feldspare and plagioclase. Appear the mineral up to in present time no identified.

In the fraction under 0.002 mm occur illite, chlorite and increase very well content of authigenic minerals (e.g. gypsum), decrease the content of clastic minerals.

In the locality was not confirm constancy of mineral composition of coarser and finer fractions have not been proved. In finer fractions there strongly decrease the content of clastic minerals but also partly that of clay minerals. The content of some non–clay minerals (e.g.gypsum, lepidocrocite and others) increase.

During subcycle B1 to go frequently not to very big oscillation, the substitute of illite is constant, to waver of content is see for change subcycle B1/B2 (see fig. 2). The subcycle B2 is more wavering, see by other profiles (Hradilová, Šťastný, 1996). In the study profile is not kaolinite which demonstrate strong influence of weathering processes on the source materials (see Hradilová, Šťastný, 1996, e.g. in profile Praha–Sedlec).

In the study profile change not the mineral association, only it attend to quantitative changes in the ratio substitute component. Typical are carbonate maximum, and to for transition subcycle B1 to B2 and for the end subcycle B2 and the begin subcycle B1.

The substitute of illite is in the subcycle B1 constant, the waver of content is see for change of subcycle.

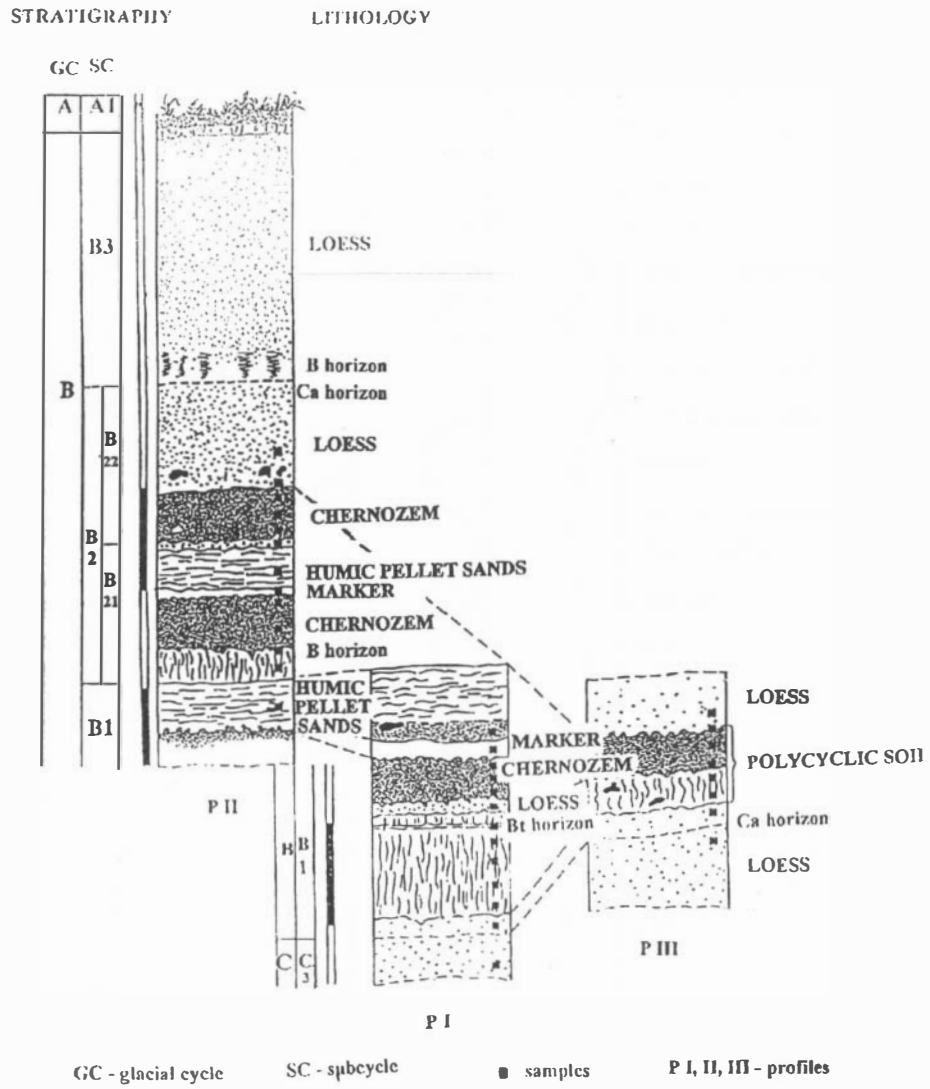

FIG. 1. Pleistocene Dolní Věstonice loess profile by Hradilová (1996)

Very interesting is the evolution of content of chlorite in the profile on the one hand oscillate of chlorite which sensitive reflect all changes on the other total decrease of chlorite in the profile (see fig. 2).

4. DISCUSSION

The differences in the mineral content are set by changes of source materials and respectively also by changes of weathering processes and their intensity.

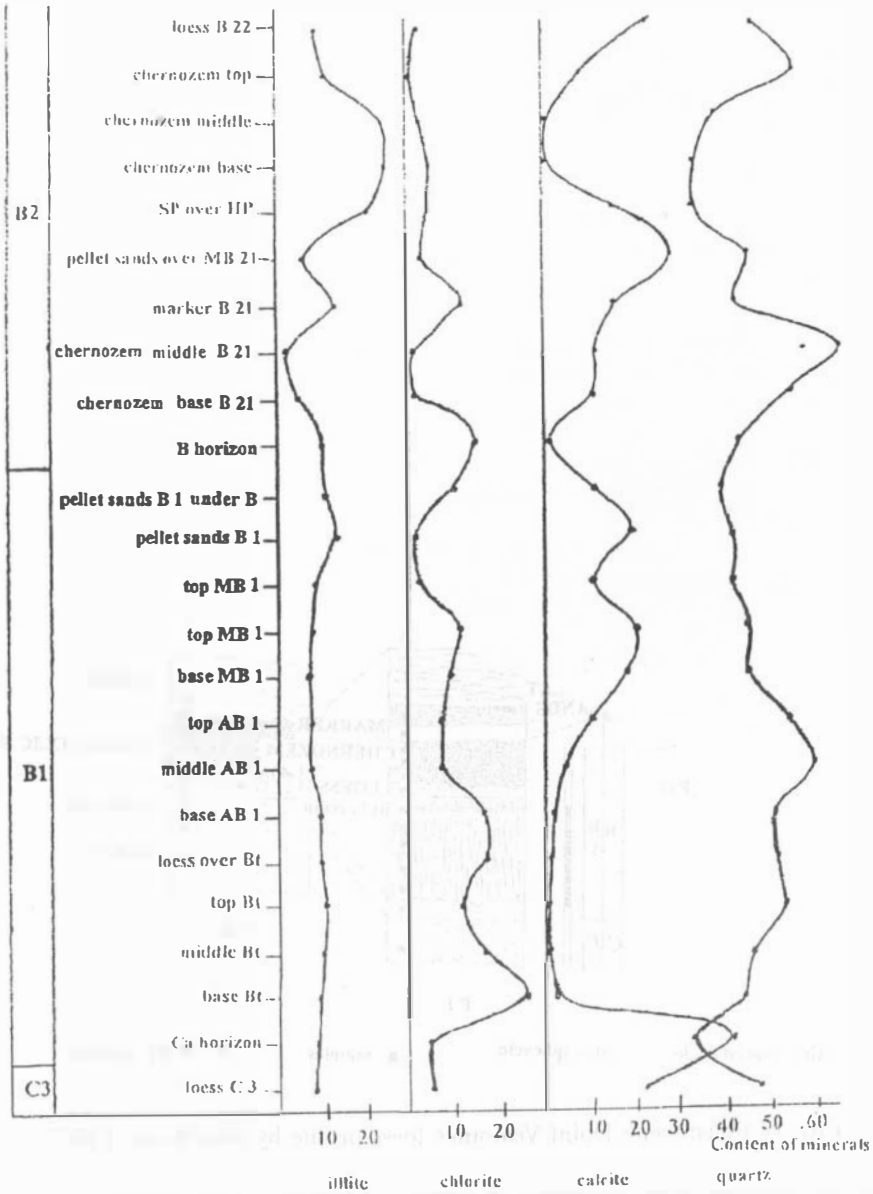

FIG. 2. Content of minerals in the loess profile Dolní Věstonice

The clay matter is very sensitive indicator of various changes by geological history (Schwarzacher, 1987) were her give detailed attention. In the young sediments indicate the changes of climate (Naxian, Baoyin, 1987). The study of composition of

clay minerals including their properties (crystalinity, type of texture) and character (allogene, authigenic) this changes very well reflection.

On the base of study this profile it is possible say, that the changes were not so expression that changed mineral association, e.g. appear very kaolinitic horizon and changes of mineral association, e.g. profile Praha–Sedlec. Probably it not comes to kaolinitic weathering.

Quantitative changes of contents carbonates are well correlated with the changes content of clay minerals. The waver of ratio carbonate/clay is the important data by climate cycles.

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