icago sativa L.) is being or has been grown. Alfalfa has extensive, deep, perennial roots. The cracks may form where snowdrifts or runoff accumulated to moisten the lower soil to a greater depth than in the adjacent areas. As the cracks in the lower subsoil become wider, the smaller cracks between prisms in the upper soil decrease in width and the space will move to the larger crack.

When the soil dries and contracts to form cracks, the shrinking also decreases the elevation of the soil surface (White, 1962). Calculations of crack volume from wet and dry clod volumes need to be adjusted for this decrease in surface elevation that accompanies soil drying.

Soil areas with wavy gilgai have prisms but the largest desiccation cracks occur in the microvalleys. The prisms are often not well developed because parallelepiped structure distorts the prism boundaries (White, 1967). As in most soils, the smaller blocky structure in parallelepiped and prismatic structure is surrounded by narrow cracks that are not extensive. The microvalley cracks are oriented in the slope direction so that crack widths should be measured along transects on the contour. In normal gilgai, the largest desiccation crack forms in the moat-like circular depression that surrounds each microhigh. The crack space around the microhighs in an area could be used to calculate the total crack amount. As with prisms, the crack depths increase as the distance from one microhigh to the next increases. The microhighs in wavy gilgai are generally from about 1 m to 5 m apart (White, 1997) but in one small area they were found to be 6.6 m apart. This small area may have collected windblown snow from a nearly level area to the north. When the added snow melted, the soil would have been moistened to a greater depth than is typical.

Soil structure can be used to determine the location of cracks and cracking depth. Parallelepiped structure should be present in the subsoil of swelling clays if the layer has been moistened and dried frequently. If structure boundaries are not present it seems obvious that the soil has not had cracks at that depth, which could be a factor in hydraulic conductivity. The hydraulic conductivity would then be controlled by the pore characteristics of the material.

An objective of Chertkov’s study was to measure crack space at the soil surface to study hydraulic conductivity. Presumably, water would enter the surface crack. Is this infiltration (White, 1986) rather than conductivity? Hydraulic conductivity has been defined in the geologic literature as flow under saturated conditions; but, in most soils, water movement is more by unsaturated flow.

Reply to “Comments on ‘Using Surface Crack Spacing to Predict Crack Network Geometry in Swelling Soils’”

I thank Dr. White for his interest in my work. His objection consists in the assertion: “... random cracking is not natural in soils”. For confirmation, he gives a number of his works dedicated to ped structure development. In replying, I would like to emphasize the following points: (i) in fact Dr. White’s objection relates not only to the discussed work (Chertkov, 2000), but also to the cited basic model (Chertkov and Ravina, 1998); (ii) the distribution of cracking in the works to be cited by Dr. White is descriptive and qualitative. Unlike that of Chertkov and Ravina (1998) which proposed and validated a model capable of a quantitative prediction; (iii) in my opinion there are no contradictions between the model and Dr. White’s major assertions.

Dr. White asserts that “... random cracking in soils”. However, random cracking was observed in a clay (Konrad and Ayad, 1997) and in coal mine tailings (Et al., 1992) undergoing desiccation and shrinkage. Distributions of crack spacing, width (at the surface) were measured in a number of works (Zein el Abedine and Robinson, 1971; Yaalon and Kalmar, 1984; Dasog et al., 1988). Even though one considers that shrinkage cracking in a dry season, totally follow ped boundaries will be deduced from soil structure characteristics”, it does not mean that random cracking is not natural in soils. Cracks themselves, forming ped boundaries, appeared in an intact clay soil under the actions of drying, sinking and shrinkage. In any case, the distribution of cracks between the intersections of the cracks with an answer is random from the viewpoint of an observer (1986; Zein el Abedine and Robinson, 1971; Yaalon and Kalmar, 1984; Dasog et al., 1988). In the frame of the discussion the distribution of vertical cracks is connected with shrinkage as a function of soil depth (Chertkov, 1998). The distribution of horizontal cracks is vertical soil subsidence as a function of depth and drying of thin layers at the walls of the vertical cracks (Chertkov and Ravina, 1999).

Two major points are worth noting. Dr. White claims [peds] size tends to increase with depth”. In connection with this, see a quantitative prediction in Chertkov (1998) Fig. 5. Further, Dr. White writes: “... the upper part of the crack is a function of the depth. In connection with this, see a quantitative prediction in Chertkov (1998) Fig. 5.