

# CERAMAH TEKNIK TECHNICAL TALK

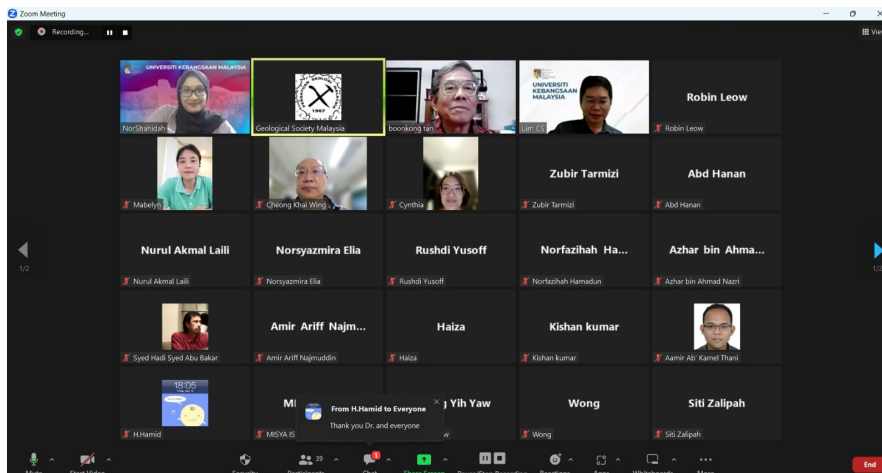
## Field identification of clay minerals based on desiccated crack morphological pattern

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Platform: Zoom

The above talk was delivered by P.Geol. Dr. Nor Shahidah Mohd Nazer (UKM) on 13<sup>th</sup> September, 2023 via Zoom. Some 60 members participated. An abstract of the talk is given below:

**Abstract:** Clay is a common constituent of soils and controls the engineering behaviour of soils with the presence of water. Clay particles are much smaller compared to silt and sand and cannot be identified in situ by conventional optical or physical methods. Therefore, a novel qualitative method based on the concept of the ternary diagram and relying on the morphological crack pattern of dried soil under dry conditions was proposed. Kaolinite-, illite-, vermiculite- and montmorillonite-rich soils were used for the simulation, sieved to 0.075 mm and first mixed with distilled water with double liquid limit to form slurry mixtures. The mixtures were then placed in a petri dish and air dried at controlled room temperature for 1 week. The results showed that all the soils formed quadrangular to pentagonal crack patterns with angular to subangular intersection ( $60^{\circ}$  -  $90^{\circ}$ ). Kaolinite-rich soils and illite-rich soils show a more angular polygonal pattern with smooth, linear sides, while montmorillonite-rich soils show a more subangular pattern with wavy, undulating sides. All 3 clay soils had a high number of crack segments, with illite having the highest number, followed by kaolinite and montmorillonite-rich soil. Vermiculite-rich soils have less significant polygon patterns due to the low number of crack segments. Regular crack patterns are more pronounced in clay minerals with low to medium plasticity (kaolinite and illite) than in clay minerals with high plasticity (montmorillonite and vermiculite). It can be deduced that the soils show different morphological patterns for different clay minerals and can therefore be used to identify the type of clay minerals present in each soil. This allows for practical and rapid identification of clay minerals without the use of robust and advance technology in the laboratory.

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