especially when the rock in the unweathered state exhibits low porosity. As another approach, Denissov et al. (1966) suggest that drilling rates are related to the degree of weathering.

A specific example of mineralogical alteration influencing rock behavior is provided by study of the secondary phyllosilicate content (mica, chlorite, pyrophyllite, and chloritoid minerals) in Witwatersrand quartzites (Black, 1962). As the phyllosilicate content increases in the rocks the violence of fracture, linear compressive strength and Young's modulus decrease.

The engineering aspects of recognizing the changes in rock properties brought about by weathering and alteration cannot be minimized. In this Congress, for example, Jumikis (1966) points out how engineers must plan the methods of excavation and the location and design of highways and foundations with regard to the degree of weathering in the Brunswick shale (Triassic) of New Jersey. Indeed, Hagerman (1966) and Hansági (1966) as well as others attempting to classify rocks for mechanical purposes find it necessary to consider the degree of weathering and alteration and the resulting firmness of the rock.

Porosity

In the previous section on alteration porosity was considered as a suitable base for an alteration index for rocks which in the unweathered state exhibit low porosity. In this section porosity is discussed as it influences the mechanical behavior of initially porous materials, primarily the sedimentary rocks. One of the best illustrations known to this reporter is the contribution to this Congress by W. C. Kowalski (1966). He correlated the compressive strengths of air-dried limestones and marls from Poland with their void ratios (volume of pores/volume of solids). These ratios equally could have been expressed as porosity [volume of pores/(volume of solids + volume of voids) × 100]. The rock samples tested were free of fractures and symptoms of