

Experimental study of rock strengthening tuff, limestone, and andesite by using nanolime and other consolidants

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This study is focussing to the efficiency and evaluation of up-to-date consolidants (a non-aqueous colloidal nanolime ($\text{Ca}(\text{OH})_2$) suspension, a well-known oligomeric tetraethoxysilane product (Wacker SILRESR BS OH 100), an extremely low viscous epoxy resin (Araldite 2020) and for cultural heritage the most frequently used thermoplastic acrylic resin (ParaloidTM B-72 or also called AcryloidTM B-72) which is known from its good durability, high transparency and non-yellowing film-properties for the consolidation of Oya-tuff. The consolidation effect of nanolime particles were also studied on Ryukyu-limestone and Indonesian basaltic andesite.

The actuality of this study is given by the fact, that degradation (corrosion) of the rocks is incredible speeded up in the last decades by the increased air-pollution e.g. acid rain etc. This makes the stone buildings, objects and sites much more vulnerable. The stone material weakens and loses its original binder to a considerable depth. Consecutively many stone historical constructions require consolidation, conservation and restoration in recent days.

The consolidants were tested by the measurement of tensile strength, Equotip surface hardness, p-wave velocity.

Keywords: Rock strengthening, nanolime, resin, tuff, limestone, andesite