Silica sand is known to exhibit time-dependent properties when left at rest. A hypothesis is suggested that the key cause of those changes comes from stress corrosion cracking of the textural features at grain surfaces at contacts. Atomic Force Microscopy was used to quantify the roughness of the grain surface (texture), and long-term experiments were carried out on individual grains in a custom-designed apparatus. The results revealed primary dependence of time effects on the initial roughness of the grain surfaces. The process associated with stress corrosion cracking was found prevalent in the first three weeks after application of the load, and it was termed contact maturing. The contact maturing process was modelled using the distinct element method, with an individual grain simulated as an assembly of bonded sub-particles. Preliminary calculations indicate that the process of contact maturing may be associated with the evolution of contacts where the number of “micro force chains” across a nominal contact increases in time as a result of stress corrosion cracking. The consequences of this process on the behavior of grain assemblies (sand) will also be discussed.

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