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How soil forms in a Mediterranean granitic region: a progress report

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Granitic rock is the soil parent material in the central part of Sierra Morena near Cardeña, in Southern Spain, at about 800 m a.s.l., where the average annual rainfall is over 900 mm distributed between the autumn and the early spring with a low period at the middle of the winter, the mean annual temperature is 15ºC, and the vegetation is a mixture of oak trees species, shrubs, and grass. Although these materials do not decompose easily, special weathering conditions can be found even in the Mediterranean region in elevated areas with high annual rainfall and low annual evapotranspiration which keep a relatively high moisture content during the whole year. The hydrological processes of the experiment site are evaluated by a network of piezometers and soil moisture sensors along a valley cross-section. The information is used to explore granite weathering reactions with the SoilGen, a 1-D model developed to simulate pedogenesis in various parent material and environments (Opolot and Finke, 2015). Different weathering indexes such as the Chemical Depletion Fraction (CDF) were evaluated, and simulations were done for two toposequences of opposite aspect in the area.
As a first step, the hydrological outputs of the soil model were confronted to measurements. The comparison between observed and computed soil moisture in the measurement period, indicated a good fit, with differences in the maximum values only. The next step will be to evaluate differences in simulated soil development between two hillslopes of opposite aspect at multi-millenium timescales.

Ref:
Opolot,E., Finke, P.A. 2015. Evaluating sensitivity of silicate mineral dissolution rates to physical weathering using a soil evolution model (SoilGen2.25). Biogeosciences, 12, 6791–6808.