Geophysical Research Abstracts
Vol. 16, EGU2014-15132, 2014
EGU General Assembly 2014

Soil erosion on vineyards: impacts on vine performances

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Many agricultural practices increase soil degradation processes. The measurement of the effects of such practices helps for the management of constraints and ensures the stability of agricultural production. In viticulture, soil is one of the components that define the specificity and quality of wine. Chemical and physical soil properties indeed exert a strong influence on vine performances. However, the precise influences of soil properties, such as rock fragments, clay or lime contents, soil depth or mineral content are subjected to debate. Actually, vine performances derive also from climate and vintage, viticulture and winemaking techniques and plant genetic.
Nerveless, soil erosion can significantly change the root growing zone properties and therefore the vine responses. In fact viticulture is the agricultural production that is the most prone to erosion, with an average rate of 12 t.ha -1.yr-1 in the European context (Cerdan et al., 2010). The soil's capacities to support crop growth, without resulting in soil degradation, need to be brought under control, to improve environmental sustainability and minimize in-site and off-site impacts.
The aim of this study is to better quantify the effect of soil erosion in vineyards on soil parameters (such as available water content) that exert a key role in the specificity of viticultural terroirs. Two study areas are considered in Corsica and in the Loire Valley. Our approach is divided into three steps. Firstly, the identification and the mapping of soil properties that have an impact over vine performances, using digital soil mapping techniques and pedotransfer functions. The soil characteristics are identified by field survey at two spatial resolutions: the field and landscape. In the same study areas, the erosion dynamics is assessed. Various techniques are employed such as: 137Cs activities, spatial distribution of copper and stock unearthing. In order to comprehend erosion dynamics and evolutions, the third step consists in applying a physical model at the field scale and a simplified model at the appellations scale to test the evolution of production practices and climate with different scenarios. These simulations will help quantify the impacts of erosion on vineyard soil and its impacts on vine performances.