

Geophysical Research Abstracts  
Vol. 21, EGU2019-10639, 2019  
EGU General Assembly 2019  
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## Conservation of Sr-isotope values during wine-making of white wines: the $^{87}\text{Sr}/^{86}\text{Sr}$ , from geological substrata to wine, used as indicator for food quality and safety

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The recent development of a high precision analytical technique for the determination of  $^{87}\text{Sr}/^{86}\text{Sr}$  in grape and wines, with uncertainty levels comparable to that of geological materials, allows the direct comparison between the products of the wine production chain and the isotopic fingerprint of a geographic area.

Sr isotopes are widely recognised and accepted as a robust tracer for constraining the geographic area of provenance of red wines, whilst little data are available for white wines, which have also a more complex wine-making procedure. Indeed the addition of yeast and the use of geologic additives, used to stabilise and clarify the final product, may be the source of possible isotopic variability.

A complete Sr-isotopes characterisation of the production chain from rock to final white wine was performed in order to investigate the possible variations of  $^{87}\text{Sr}/^{86}\text{Sr}$  during the winemaking process of white wines and its potentialities in the case of wine blends of different grape varieties.

This study focuses on four different mono-varietal and multi-varietal White Wines from a single farm, whose vineyards develop on the volcanic units of the Vulsinian Volcanic District, in southern Tuscany. The sampling campaign considered each step of the production before and after the treatment with additives. Samples of grape, grape juice, must and wine were collected and analyzed, along with few samples of yeast and bentonite, added during the wine-making process.

The geologic bedrock of the vineyards and the overlying soil were also sampled and analyzed for comparison with the final product.

The results clearly show that the Sr isotope composition is consistent through all the wine-making process also for white wines, and that the obtained  $^{87}\text{Sr}/^{86}\text{Sr}$  values are comparable to those of the labile fraction of the soil where the vines are farmed. Our data confirm the robustness of Sr-isotope systematic for defining terroirs and geographic provenance of white wines since the treatment with additives does not significantly affect their isotopic composition.