Water, Water Everywhere...

How we can use water as natural tracer by exploiting subtle differences in its isotopic composition

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Example 1:

Increase our understanding of the influence of land use and soil composition on water balance.

Conclusions

1. Rainwater is believed to move rapidly from clay soils, yet the data presented here suggest that this is not the case.
2. Some yet to be understood interaction between clay soil and water results in a more positive isotope shift for drain-flow water as compared to surface runoff.
3. Slurry application mitigates for this effect in surface run-off.
4. No significant variation in δ^2H-values of drainage water occurred over time.

Table 1: Mean δ^2H values of surface run-off and drainage water from heavy clay soil measured during a rainfall event.

	Drain-flow	Surface runoff	Rainfall
Plot 12 (Untreated)	-36.0 (n=18)	-42.5 (n=3)	-68.3
Plot 5 (Slurry applied)	-36.6 (n=16)	-55.1 (n=1)	

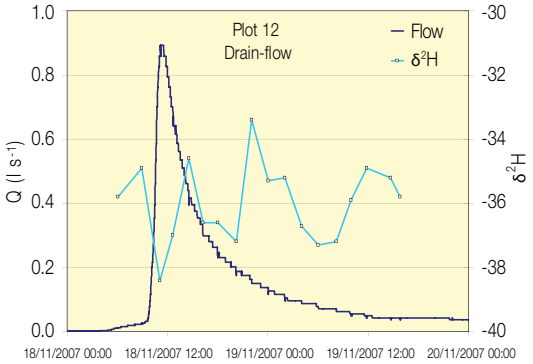


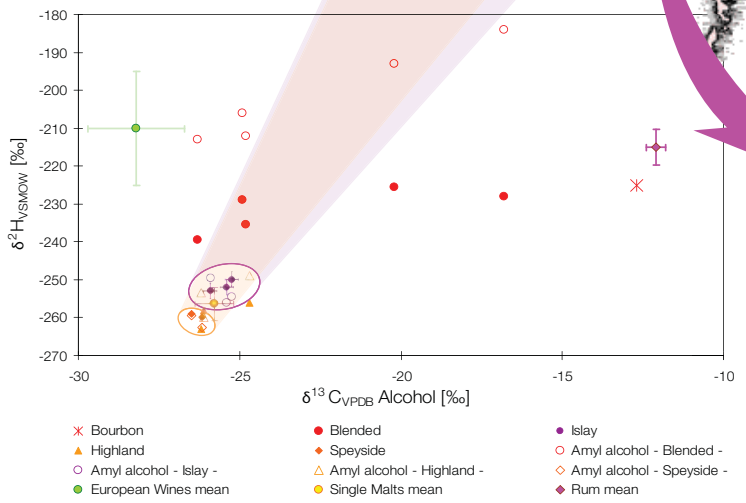
Figure 1: Temporal variation of δ^2H-values plotted against drain flow.

Example 2:

Authenticate premium Scottish produce / brands to protect producers, consumers and Scottish jobs.

Conclusions

1. Bivariate isotope plots of key components are a powerful tool for QC/QA of premium Scottish produce.
2. They can be used for authentication of Scottish brands.
3. They can detect counterfeit products.



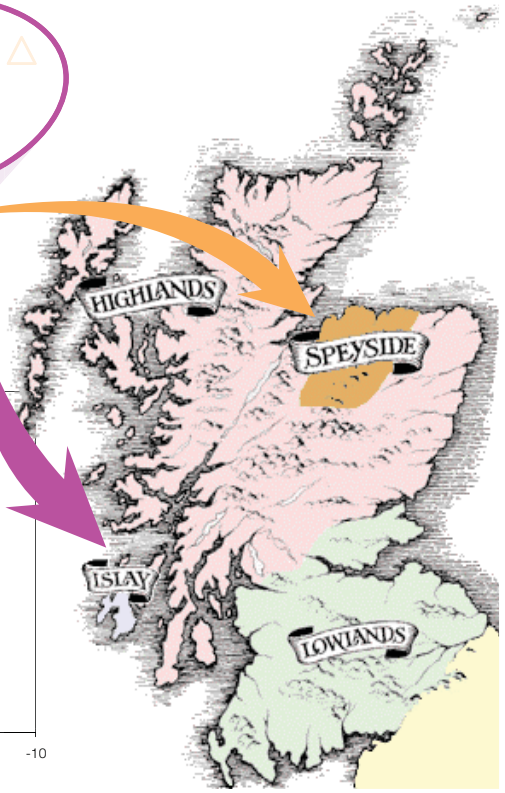


Figure 2: Bivariate stable isotope profiles of alcohol and congeners of premium brand spirits determine provenance and, hence authenticity.