A toolkit for assessing soil time lag in agricultural catchments

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Introduction
- There is a time lag between implementation of programmes of measures (POM) (e.g. the Nitrates Directive) and changes in water quality. This lag may be short (<1 yr) or long (several years).
- Policy makers need information on water quality trends in the short term.
- Numerical models (Fig. 1) which estimate the soil component of time lag ($t_u$) can indicate these trends.
- This poster presents a simple toolkit to assess $t_u$ in a grassland and an arable catchment within the Agricultural Catchments Programme (ACP), and presents $t_u$ estimates for each.

Results & Discussion – Soil Time Lag Ranges

Grassland
- Trends in groundwater quality changes may be observed in <15 months for all soil series and slope positions.
- Full exit of the solute was only achieved at the near-stream position, the majority of the catchment exhibited $t_u$ >36 months (3 yrs).

Arable
- This catchment exhibited a greater diversity of soil series, and of $t_u$.
- Trends in groundwater quality changes in response to POM may be observed in <18 months for all soil series and all slope positions.
- Full exit of the solute was only achieved at the near-stream position (c. 24 months/2 yrs), the majority of the catchment exhibited $t_u$ >36 months (3 yrs).

Conclusions
- Within these catchments, the 2015 reporting period is an unrealistic timeframe in which to expect changes to groundwater quality in response to POM. Implemented in 2012. While the results of measures in the near-stream position may be observed in a matter months, the response at mid-and up-slope positions exceeds 36 months/3 yrs.
- This methodology, in which modal profile parameters, coupled with watertable depths and meteorological data are used as inputs to Hydrus 1D, presents a low-cost, rapid means by which the trend response to POMs may be assessed in agricultural catchments.
- Longer meteorological datasets may be applied, in order to comment on later reporting periods. The results of those tests are forthcoming.

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References
Vero et al., 2014. Journal of Contaminant Hydrology