

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-401

Anonymous Referee #1

Referee comment on "Hydrology and riparian forests drive carbon and nitrogen supply and DOC:NO₃⁻ stoichiometry along a headwater Mediterranean stream" by José L. J. Ledesma et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-401-RC1>, 2021

Review of "Hydrology and riparian forests drive carbon and nitrogen supply and DOC:NO₃⁻ stoichiometry along a headwater Mediterranean Stream" by Ledesma et al.

General comments

This study analyses DOC, NO₃⁻ and the DOC:NO₃⁻ ratio along three stations in a Mediterranean headwater, and across flow conditions, during a 2-year period. Spatial variability is controlled by the presence of riparian forest and topography, while temporal variability is controlled by hydroclimatic conditions. The authors conclude that this spatiotemporal variability influences stream metabolic processes.

The manuscript is well written and the conclusions are clear. This work is within the scope of HESS but I find this is a modest contribution to the literature.

Here are three options to make a stronger paper:

- Relax the selection criteria for the storm events to include in the PLS regression (currently only 5 observations)
- Include data on DOC and N composition, not only in the discussion. The discussion suggests that such data is available. Is nitrate the only N form in this stream?
- Include more recent data to make a more complete synthesis of research in this catchment. The references indicate that other studies have taken place in this catchment since the monitoring period 2010-2012 considered here.

Specific comments

Figure 1: add location of the weather station

L115 "Rating curves obtained from the relationships between stream flow and stream water level measurements were used to construct daily time series of stream flow data at each site" can you provide the rating curves in SI?

L122 "the dynamics of this dataset capture well the dynamics of the groundwater table variation in the surrounding riparian area and therefore we are confident that the recorded pattern at the monitoring location was representative of the groundwater table variations in the riparian zone" please provide stronger evidence that this piezometer is representative of the whole downstream area.

L174 "hydroclimatic analysis of large storm events" I understand that the authors chose to analyze the largest storm events because they probably exhibit the clearest signal, but the selection criteria here are very strict and only 5 storm events were kept for analysis. This is a very small number, even though PLS regression can handle datasets with few observations and many variables. Wouldn't it be more interesting to relax the selection criteria and include more storm events?

L322 "given that this is a predominantly heterotrophic system (Lupon et al., 2016c)." please explain how this was determined (most readers won't read the reference)

L340 "This result is in line with the idea that headwater streams can remove substantial amounts of NO₃ - within relatively short distances (Peterson et al., 2001) [...] providing groundwater inputs with low NO₃ - concentrations driven by denitrification, as observed in temperate forest catchments (Cirimo and McDonnell, 1997)." Both instream removal and dilution from the middle part of the catchment can explain this decrease. Is it possible to estimate the share of each process?

L375 "The magnitude of change between flow conditions was different for DOC and NO₃ - at the upstream site..." please specify which of DOC or NO₃- increases more.

L395 "another study from Font del Regàs showed that DOM has a prominent protein-like character in both riparian groundwater and stream water (Bernal et al., 2018)" suggest to include this data in the analysis (not only just in the discussion) to make a more complete paper. The speciation of DOC and the N species other than nitrate should be analyzed further.

Technical corrections

L110 "All data and analyses were integrated and carried out for daily resolutions, which were determined by the availability of the stream chemical data." This sentence is unclear