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Hydrology and Earth System Sciences Discussions

Interactive comment on "Dissolved inorganic carbon export from carbonate and silicate catchments estimated from carbonate chemistry and $\delta^{13}C_{DIC}$" *by* W. J. Shin et al.

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This study aims to delineate the annual seasonal variations of carbon isotopes in springs and streams with distinctively different basement lithology - carbonate and silicate rocks - and to estimate the effects of various carbon exchange processes. This will definitely contribute to understanding of carbon dynamics in streams at base flow conditions in the headwater area. However, some additional information may be helpful to better interpret the results, say, mass balance of DIC and effect of seasonal variation of microbial activity in the soil zones, which are shown below for specific points.

- It seems necessary to provide the proportion of cultivated land and major crops in the

study area because authors mentioned the effect of C4 plant such as corn. Also, if the cultivated land is significant, use of EC as a measure of “natural” mineralization may be hampered.

- It may be helpful to provide DIC variation over the sampling period because microbial activity may greatly differ in this mountainous area with thin soil depth and wider range of air temperature resulting in variation of total carbon budget in the soil zone and also, possibly, in groundwater. It seems that the carbonate spring have much higher DIC even the contribution of carbonate minerals is considered. If so, microbial activity in soil zone may greatly differ between silicate and carbonate area, which may have affect on the interpretation of the results.

- What about the seasonality of d13C in the silicate spring? Information of soil depths and vegetations may be useful, especially for comparison with carbonate springs.

- For the interpretation of the seasonality of d13C in the carbonate spring, authors employed the difference in extents of exchange between atmosphere and soil zone as the cause of d13C variation. But, what about microbial activity in the soil zone which can widely differ with seasons? Also, how relevant is it to use Amiotte-Suchet et al. (1999) as a reference for that because their study area (France?) may have climate conditions different from this study area?

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