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Interactive comment on "Alkalinity and nitrate concentrations in calcareous watersheds: Are they linked, and is there an upper limit to alkalinity?" *by* Beat Müller et al.

Anonymous Referee #1

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To start with, I don't understand the title. Of course alkalinity is linked to NO3(and many other parameters too). And, of course, there is an upper limit which is the solubility product.

The authors tried to link alkalinity with NO3 which is OK in open systems albeit ignoring PO4 leads to an systematic error of 7%(e.g., Chen et al., Geochemical J. 16,1,1982). In closed systems such as groundwater or soil water the problem is huge as NO2 and NH4 come into play. The biggest issue, however, is sulfate reduction which is orders of magnitude larger that the effect of NO3(see Chen, Deep-Sea Research II, 49,5365,2002). The authors are encouraged to present dissolved oxygen data should

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they wish to resubmit so that the readers get a sense of the possible roles of NO2, NH4, and SO4 etc.

Now the model. Eq 5 is valid only for phytoplankton, and is not a generic formula for organic matter as the authors claimed. Land plants have a much higher C/N ratio so the model is invalid. Should the authors wish to resubmit they should also try error analysis so that readers know how much uncertainty there is and how errors propagate.

Minor issues: 1. How is pH defined and in what scale? 2. Explain "CO2 bound in HCO3" in the caption for Fig. 3. 3. The groundwater has a pH range of 7.1-7.8 so I question the average value of 7.14 used for the model

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