

## ***Interactive comment on “Temporary and net sinks of atmospheric CO<sub>2</sub> due to chemical weathering in subtropical catchment with mixing carbonate and silicate lithology” by Yingjie Cao et al.***

**Anonymous Referee #1**

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**Major Comments:** The subject matter fits within the scope of the journal and the results are of interest to the readers. Chemical weathering is one of the major processes interacting with climate and tectonics to form clays, supply nutrients to soil microorganisms and plants, and sequester atmospheric CO<sub>2</sub>. The related researches are always the hot spots in global change. In the paper, the authors first discriminated carbonate weathering and silicate weathering by stoichiometric analysis based on mass balance. Then the DIC apportionments were applied to quantify the anthropogenic acid (major in from of sulfuric acid) contributions to chemical weathering. It is interesting the definition of temporary and net CO<sub>2</sub> sinks. The primary findings are that of (1) Carbonate weathering dominated in the and contributed to about 70% the total weathering

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rate. (2) The temporary CO<sub>2</sub> sink was comparable to other subtropical basins. (3) The net sink was only 2.82% of the temporary sink and human activities dramatically decreased the CO<sub>2</sub> net sink and even make chemical weathering a CO<sub>2</sub> source to the atmosphere. The data analysis is for the most part sound, and the work does appear to be one of the first complete analysis of the chemical weathering and related CO<sub>2</sub> consumption in this river.

**Some questions:** (1) During the calculation of chemical weathering rates, the authors ignore the anthropogenic origins of major ions except for SO<sub>4</sub><sup>2-</sup>, show reasons (2) Part 5.1 is too long, may be it is a good idea to separate it into two parts. (3) Unify the reference format throughout the paper (4) Need to give more details about acid deposition and acid mining drainage (AMD) in the Beijiang River Basin **Specific comments:** Lines 36-37, “regulating the atmosphere-land-ocean fluxes and earth’s climate” should be “regulating the atmosphere-land-ocean carbon fluxes and earth’s climate” Lines 38-39, delete the “A profound case in point” Lines 54, delete “because” Lines 56, delete “(sulfide oxidation)” Lines 72-75, give some reference to this part Lines 93, change into “it covers an area of 52068 km<sup>2</sup>” Lines 129 delete “According to the principle of the mass balance” Lines 245 change into “chemical compositions” Lines 282-284, “Nov”, “Jun” and “Feb” should give full names. Line 289, “It is” should be “It was”. Lines 450-451, Equations are not labeled a Eq. number. Lines 466, “SCW” should give a explain in the Fig. 11 Line 485, “The result of CCRTotal, CCRCCW, CCRCW and CCRNET were summarized in Table 4” should be “The results of CCRTotal, CCRCCW, CCRCW and CCRNET are summarized in Table 4”. Line 514, “significant influence” should be “significant influences”. Line 518, “Runoff manly controlled” should be “Runoff mainly controlled”. Lines 530-531, How human activities induced sulfur acid deposition altered the CO<sub>2</sub> sinks, increased or decreased?