

In this work, the authors proposed a digital filtration method to detect CO<sub>2</sub> source and sink regions. It's an interesting idea to introduce a tool used in Geosciences to the CO<sub>2</sub> community. However, this new method described in the manuscript needs more details so the potential audience can fully comprehend.

- (1) I find the method section is difficult to follow. I would suggest the authors to re-construct this section in a manner that: you first see a CO<sub>2</sub> concentration map (raw data); second, a pre-setup of the boundaries/masks, and basic information about your study region (topography, carbon ecosystem dynamics); third, how you apply your algorithm to detect sources and sinks by steps, and show intermediate figures to help the audience understand.
- (2) Limitations of your methods need to be addressed. A big part of the work that I think is missing is the uncertainty and limitations of your method. For example, some regions are low-hanging fruit for detection, but some regions might be really difficult (topography, complex ecosystem). Also look at the CO<sub>2</sub> concentration dataset, some regions show sufficient enhancement to be easily detected but some regions might look really uniform, how can these different scenarios be handled by your method? All of these need to be at least discussed in detail, so the readers can know how widely this method can be applied.
- (3) Studies of CO<sub>2</sub> point source quantification is well developed in the last couple years. This makes me wonder the meaning of only detecting sources or sinks but not quantifying them. Existing datasets like GPP or NPP are great proxies for this purpose and they serve many more scientific meaning. I would encourage the authors to describe in detail how this detection technique could uniquely provide more information, and if there is potential to further quantify the sources and sinks. I believe that would be a more appealing method to be used by our carbon community.

Minor comments:

Lines 11-12: No this is clearly not your research focus of this work.

Line 15: why a CO<sub>2</sub> concentration dataset is abbreviated as CDC?

Line 72: Eqs. (2) and (3) are identical.