

Interactive comment on “Quantifying the Loss of Processed Natural Gas Within California’s South Coast Air Basin Using Long-term Measurements of Ethane and Methane” by D. Wunch et al.

Anonymous Referee #3

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The manuscript presents an interesting new result and is generally well-written. I would recommend publication with some revisions to clarify several points.

Comments on the text In the paragraph starting on line 187, the authors relate the extraction of petroleum from the SoCAB to the production in the rest of the state. This seems likely to be a valid assumption, but it would be helpful here to provide some additional justification. Would the results of the analysis be substantially different if it is assumed that SoCAB petroleum extraction tracked regional or national trends? Lines 230-235 discuss how non-petroleum sources can close the methane budget. It would be helpful to discuss changes in these sources here to corroborate the conclusion that petroleum accounts for only half of the observed methane increase.

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Comments on the figures The panels on Figures 2 and 3 have “squashed” aspect ratios that make them slightly difficult to read. The bottom panel of Figure 2, for example, compresses much of the data into a small region of the graph. In Figure 3, the presence of four panels in a single figure makes it difficult to see the trends described in the caption. Could some of these panels be merged and their axes modified to make the graphs taller? The error bars on the atmospheric ratios in Figure 5 are quite large and imply a large uncertainty in the calculated slope. Indeed, this uncertainty is reflected in the text as well. A visualization of this uncertainty in the figure would be beneficial. Line 219 reports the ratio of slopes as $54 \pm 20\%$, which is thereafter referred to as “about half.” However, the large uncertainty in the slope means that the atmospheric increase could be anywhere from not well explained by the changing storage ratios (about 1/3), to very well explained (over 2/3). Do the authors have speculation as to whether the percentage is on the high or low end of this range?

Editorial comments In line 244, the slope of the ethane/methane correlation is $4.28 \pm 0.07\%$. This piece of information is in agreement with the storage “ratios exceeding 4%” in line 209. I suggest placing these pieces of information closer together to emphasize this connection, because it provides further evidence that the Aliso Canyon plume was detected. The uncertainties are reported in an inconsistent manner in the text. Line 8 of the abstract contains the quantities 13 ± 4.5 and 25.8 ± 3.9 ; and line 234 of the text contains the quantity 32 ± 7 . Some further discussion of how these different levels of uncertainty for these and other quantities reported in the text were chosen would be helpful.

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