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Interactive comment on "2010–2015 methane trends over Canada, the United States, and Mexico observed by the GOSAT satellite: contributions from different source sectors" *by* Jian-Xiong Sheng et al.

Anonymous Referee #1

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<General Comments> Satellite observation is the most important method to provide decade long and global data of anthropogenic methane emission. In 2010s, GOSAT is the only satellite to provide column CH4 density but its spatial coverage is limited and a single data has large fluctuation. Therefore, statistical analysis is important. In addition, selection of reference point together with emission point or estimation of the background is critical for quantitative analysis. This paper proposed and described new analytical method clearly. The trend data from different emission source by this work is innovative. It is worth publication after minor revision.

C1

<Specific Comments> (1) Page 3, Line 1, Proxy method. "The proxy method uses prior knowledge of carbon dioxide" Brief description of prior knowledge is needed. Does it include seasonal variation plus annual growth only or anomalies such as caused by heat wave in 2010 and El Nino?

(2) Page 3, Line 21 "instrument error" Page 3 line 23 "instrument noise" Page 3 Line 25 "Local instrument bias" Supplemental material, Page 3, Line 12, "instrument error" Supplemental material, Page 4, Figure S2 caption, "instrument noises"

Do these terms have the same meaning? TANSO-FTS onboard GOSAT has two major random error sources and there are also several systematic errors. Detector noise and pointing fluctuation in 4 sec to acquire single interferogram creates random noise. Radiometric calibration error due to degradation after launch, spectral calibration and spectral line shape error, radiative transfer calculation error, molecule parameter cause systematic bias.

(3) Page 5, Line 26, Gulf of Mexico observation by GOSAT "are not directly detectable by GOSAT because the nadir measurements are only over land" It should be described more accurately. Over ocean including Gulf of Mexico, GOSAT can observe column averaged CH4 using glint mode by tracking specular reflection point but the data are sparser.

<Technical Corrections> (1) Supplemental material, Page 7, Figure S5, Description of blue, black and red lines in the figure caption will help readers' understanding even though they are described in the text.

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