

Response to Review Comments for *A Decade of GOSAT Proxy
Satellite CH₄ Observations*

Parker et al.

October 14, 2020

This supplement contains the additional figures that go along with our Author Response.

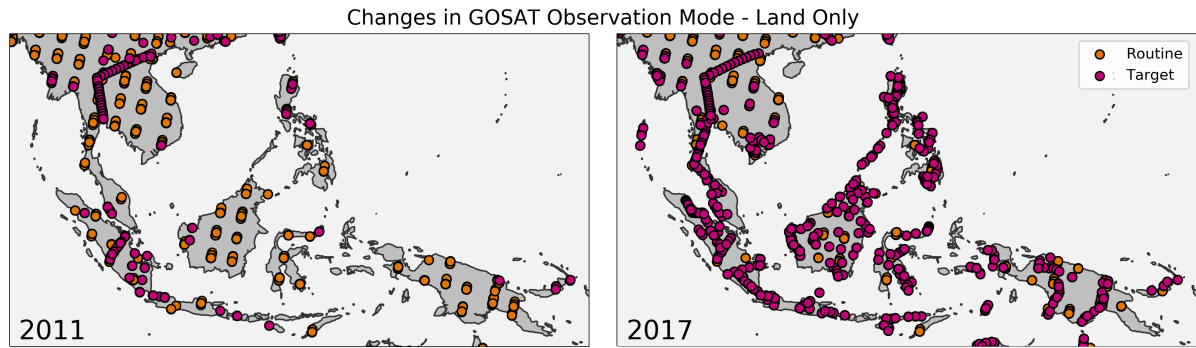


Figure 1: Figure contrasting the routine vs target observation modes for land-only measurements in 2011 and 2017 over Indonesia.

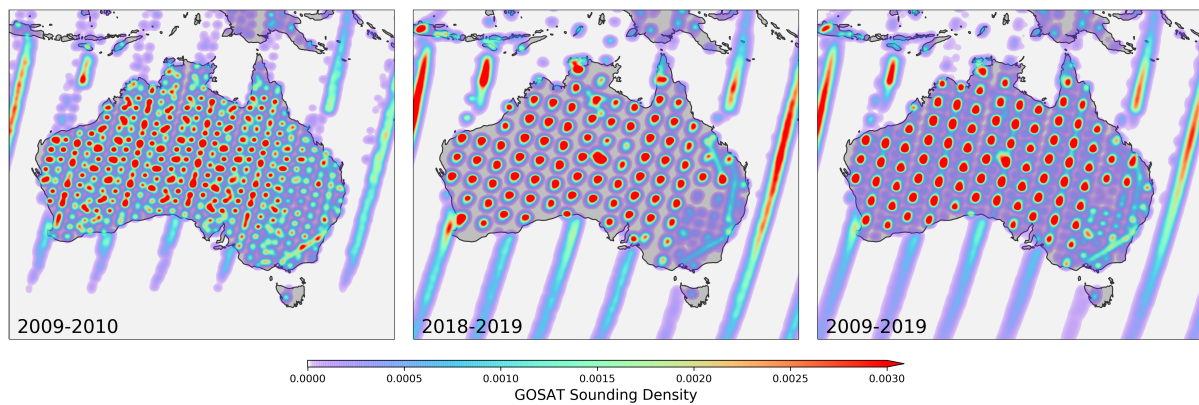


Figure 2: Figure contrasting the sampling density pattern over Australia for early in the mission versus recent years.

Version	Project	L1B	Time Period	Ocean?	Comments	Publications Utilising Data
1.0	NCEO	006 007	2009-2010	No	First release.	Parker et al. (2011)
2.0	NCEO	050 080 100	2009-2010	No	Development version; only processed at TCCON overpasses; new radiometric calibration for L1B from JAXA applied.	
3.0	CCI	050 080 100	2009-2010	No	First version generated as part of ESA CCI Round Robin and Algorithm Intercomparison. Improvements to surface pressure calculation taking into account instrument field-of-view. Significant speed improvements to preprocessing steps to allow multi-year processing.	
3.1	CCI	050 080 100	2009-2010	No	Incremental updates and bug fixes.	
3.2	CCI	050 080 100	2009-2010	No	Incremental updates and bug fixes. First version to be used for atmospheric inversions.	Ross et al. (2013); Fraser et al. (2013); Dils et al. (2014); Wecht et al. (2014); Cressot et al. (2014); Berchet et al. (2015); Worden et al. (2015)
4.0	CCI CRDP1	141 150 151	2009-2011	No	First version that was widely released to scientific community via CCI. Change in CO ₂ model from CarbonTracker to MACCII; tightening of stratospheric covariance; spectral degradation applied as per Yoshida et al. (2013); higher resolution ERA-Interim; variable vertical grid based on tropopause height.	Fraser et al. (2014); Turner et al. (2015); Alexe et al. (2015)
5.0	CCI	160 161	2009-2013	No	Introduction of model median XCO ₂ with MACCII, CarbonTracker and GEOS-Chem (as per Parker et al. 2015); CH ₄ prior combines MACCII (troposphere) and TOMCAT (stratosphere); SRTM DEM used for topography; updated GOSAT L1B degradation correction based on Kuze et al. (2014).	
5.1	CCI	160 161	2009-2013	No	Resolved minor issue with uncertainty variable in 5.0.	
5.2	CCI CRDP2	160 161	2009-2013	No	Resolved minor issue with pressure weighting function in 5.1.	Parker et al. (2015); Stanevich et al. (2019, 2020)
6.0	CCI CRDP3	160 161	2009-2014	Yes	Inclusion of ocean sun-glint observations for first time.	Webb et al. (2016); McNorton et al. (2016b); Siddans et al. (2017); Feng et al. (2017); Buchwitz et al. (2017b, 2018)
6.1	CCI	160 161	2009-2015	Yes	Temporal extension of 6.0.	Ganesan et al. (2017)
7.0	CCI CRDP4	201 202	2009-2015	Yes	New L1B data and updates to CO ₂ models used in ensemble for Proxy calculation.	Parker et al. (2016, 2018); McNorton et al. (2018); Sheng et al. (2018); Maasakkers et al. (2019, 2020); Lunt et al. (2019)
7.0	C3S	201 202	2009-2016	Yes	Time period extended and first delivery to C3S. No changes to processing so retained version number.	
7.1	C3S	201 202 210	2009-2017	Yes	Extension of 7.0 with updated L1B for latter years.	
7.2	C3S	201 202 210	2009-2018	Yes	Extension of 7.1 with updated L1B for latter years.	Zheng et al. (2019); Reuter et al. (2020); Yin et al. (2020); Parker et al. (2020b); ?; Tunnicliffe et al. (2020)
8.0	C3S	210	2009-2018	Yes	Internal version for testing/development of new processing pipeline.	
9.0	C3S	210	2009-2019	Yes	The dataset described in this publication. Fully consistent timeseries. Uses new python-based preprocessing (LRPT).	Parker et al. (2020a); Lu et al. (2020)

Table B1. Table showing the evolution of the University of Leicester GOSAT Proxy XCH₄ data product. Entries include the version number, the project that the data was generated for, the version of the GOSAT L1B data used, the time period covered by the data, whether ocean sun-glint data was generated, comments relating to changes/updates from previous versions and peer-reviewed publications that we are aware of that used the data. For the ESA GHG-CCI project, we also indicate which versions were officially delivered as part of the Climate Research Data Packages through the project. All Copernicus C3S versions were delivered to the Copernicus Climate Data Store.

Figure 3: Table showing details of the evolution of the University of Leicester GOSAT Proxy XCH₄ data product.

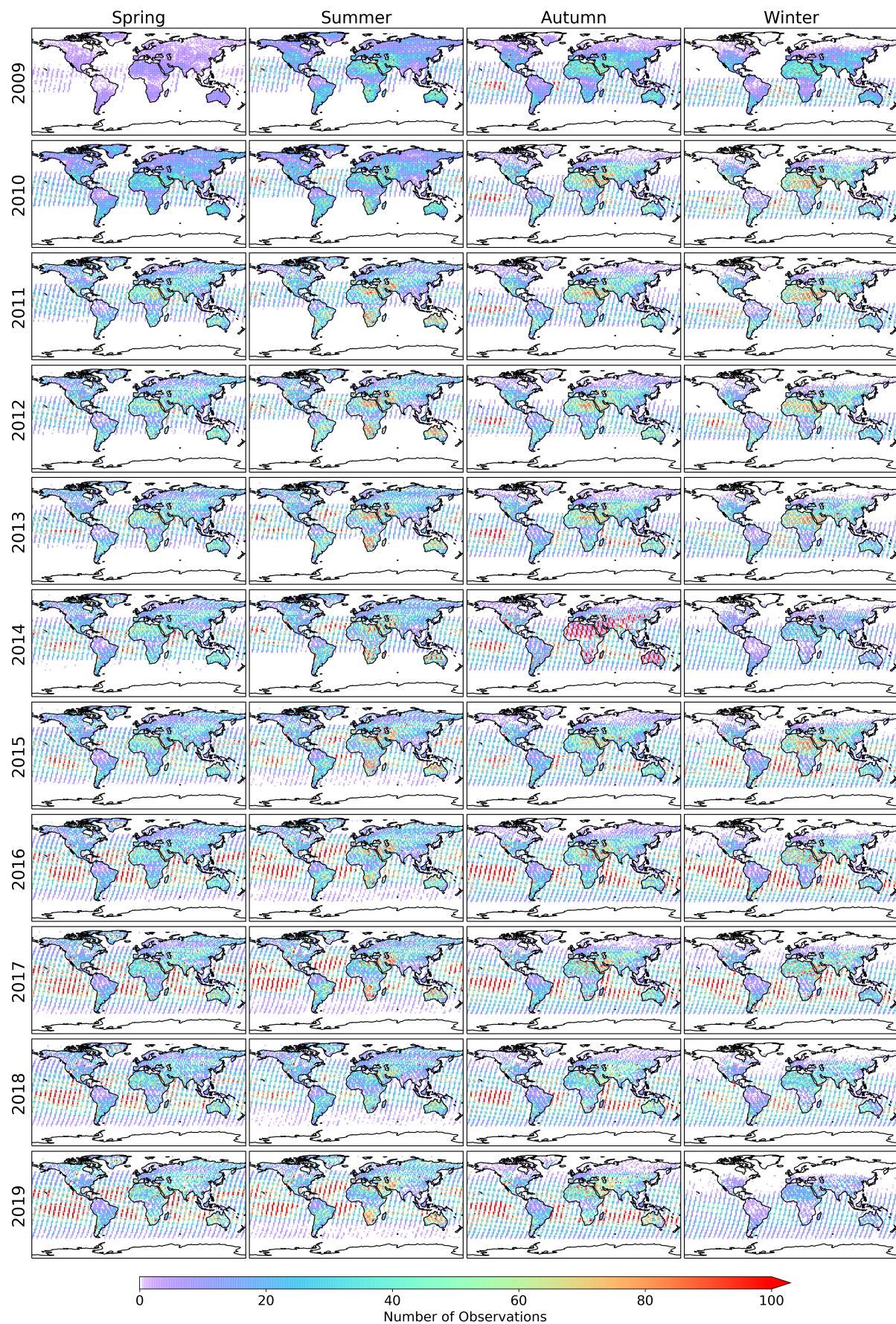


Figure 4: Figure showing the number of successful GOSAT XCH₄ measurements per 2° latitude-longitude bin for each year/season.