

Interactive comment on “Terrestrial carbon sink observed from space: variation of growth rates and seasonal cycle amplitudes in response to interannual surface temperature variability” by O. Schneising et al.

Anonymous Referee #1

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This paper uses SCIAMACHY data from 2003 to 2011 to investigate variations of growth rates and seasonal cycle peak-to-peak amplitudes in observed XCO₂. They find significant interannual variabilities (IAV) of XCO₂ growth rates and seasonal cycle amplitudes, and the IAVs correlate with growing season surface temperature anomalies. The results from SCIAMACHY data show good agreement with those from CarbonTracker. SCIAMACHY is only the satellite to provide XCO₂ over a decade, and it covers wide areas over the globe as opposed to accurate but localized surface measurements. The paper is well written and focused. It is well worth being published to

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show the usefulness of long-term satellite observations to global carbon cycle studies.

Specific comments

Page 22736, line 2: More than two years data is now available for GOSAT (e.g. ACOS, NIES) though they are still shorter than SCIAMACHY's long-term data.

Page 22736, line 24: The year 2007 is a La Nina year. CO₂ emissions might change over the equatorial Pacific Ocean compared to a normal year. Does fitting to the 2007 data have any influence to the regression results?

Page 22736, line 24: I would like to know the reason of selecting these 7 Carbon Tracer sites. In addition, are the regression coefficients robust against site selection?

Page 22737, line 25: I would like to see spatial distribution of XCO₂ at some year (say 2007) and the Carbon Tracker site locations. Did you retrieve over the oceans?

Page 22738, line 5: Which version of TCCON data did you use? GGG2012 or a previous version?

Page 22738, line 10: The correction method is recently often applied to satellite retrieved data. In this case, the model-data-mismatch at the selected Carbon Tracer sites is already small (Page 22737, line 1). How much improvement is there before and after applying the correction at the 11 TCCON sites?

Page 22738, line 17: What shape is a typical column averaging kernel of SCHIAMACHY? Do they have enough sensitivity near surface to take correlations with surface temperature anomalies?

Page 22739, line 24: Are these contributions of biospheric fluxes, fossil fuel and fire emissions referred from Carbon Tracker results? I couldn't understand how you derive these contributions from the text.

Page 22740, line 13: For the Southern Hemisphere, which database did you use for the analysis?

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