

Philippines TCCON Project: Result on One-year Measurements and Future

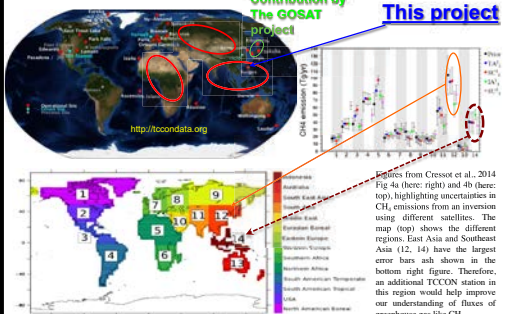
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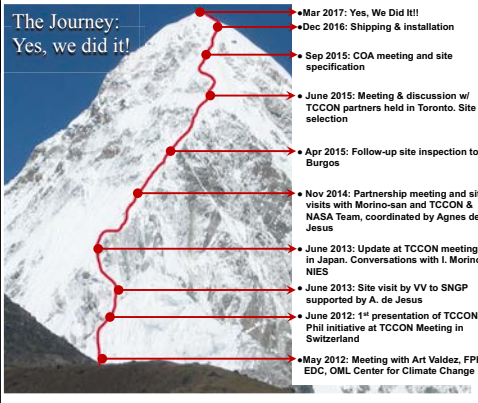
Expansion of TCCON for validating space-based GHG data and reducing uncertainties in carbon cycle studies

- Established in 1994 and the measurements at Park Falls, Lauder, and Ny Alesund have started. Now 25 sites! Operating by individual sites.
- The lack (red ellipses) of reliable validation data for the satellite-based greenhouse gas observing missions in the tropical regions is a common limitation in global carbon-cycle studies that have a tropical component.



Journey, EDC-TCCON partnership meetings and site visits

The Journey: Yes, we did it!



Meetings and site assessments

Site 1: LEYTE

Site 2: DUMAGUETE

Site 3: BURGOS

External technical assessment factors:

- Site 1: LEYTE**
 - Site conditions: good
 - Power: 220V, 50Hz, strong cloud cover
 - Logistics: port of entry is clear, good roads, mostly paved, internet
 - Security & safety: fenced, secured platform or inside building, access 24/7 provided
- Site 2: DUMAGUETE**
 - Site conditions: good
 - Power: 220V, 50Hz, strong cloud cover
 - Logistics: port of entry is clear, good roads, mostly paved, internet
 - Security & safety: fenced, secured platform or inside building, access 24/7 provided
- Site 3: BURGOS**
 - Site conditions: good
 - Power: 220V, 50Hz, strong cloud cover
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A new TCCON site within EDC Burgos Wind Farm Project

The Burgos Wind (and solar) Farm is located in the "coal-free" northernmost province of Luzon, Ilocos Norte (18.52°N, 120.65°E). It is the second wind farm built in the province of Ilocos Norte and started operations on Nov. 9, 2014.



Instruments installed within EDC Burgos Wind Farm Project

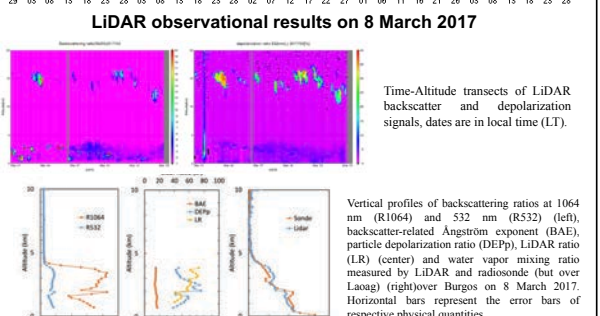
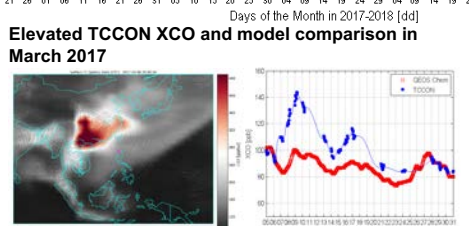
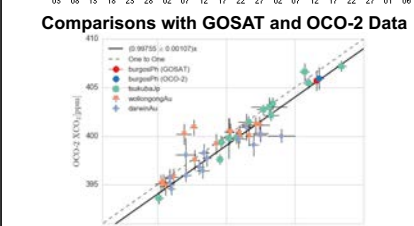
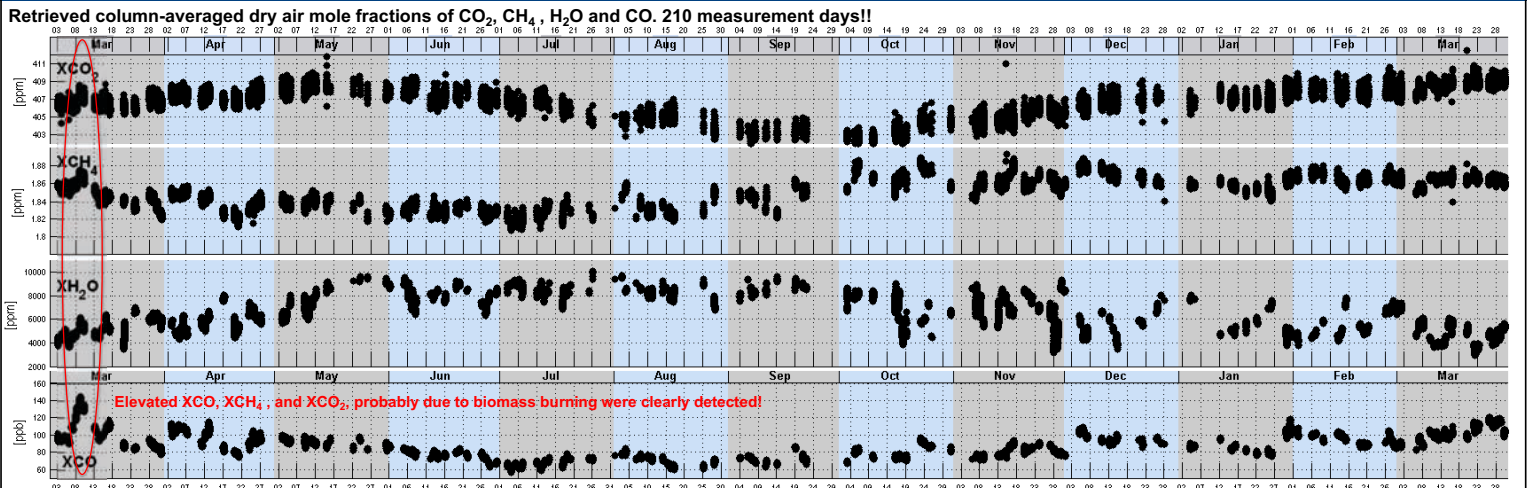
TCCON container where Bruker FTS 125 HR FTS and Mie LIDAR are installed on right and left sides, respectively

Mie LIDAR in operation

An EM27/SUN portable FTS to compare the TCCON FTS and contribute the EMeRGE campaign in March 2018

- Bruker IFS 125 HR FTS** and a solar tracker with CamTracker function; BS: CaF₂ and KBr; det.: Si, InGaAs, InSb, and HgCdTe; max. resolution: 0.0035 cm⁻¹; ghost lamp and NDACC filters; HBR and HCl cells; operation by remote control.
- Weather station** according to the TCCON data protocol; temp., humidity inside and outside of the container, wind speed and direction, and pyranometer
- Mie LIDAR:** 1064 and 532 nm, two polarizations for aerosol and cirrus profiles up to the stratosphere
- Skyradiometer:** Aerosol and cloud AOD, SSA etc.

Results for One-year operation (March 2017 – March 2018)



Summary

- A new TCCON site in Burgos, Philippines was selected by request on communities in satellite greenhouse gas observation and carbon cycle through discussions in the TCCON and GOSAT-2 science team meetings.
- Starting an operation**
 - Clearly detected CO₂, CH₄ and CO enhancement probably due to biomass burning in Mar. 2017.
 - GOSAT specific point observations have started from Apr. 19, 2017.
 - OCO-2 potential target mode mail has started from Apr. 7, 2017; target mode days: 21 Apr., 2017, 7 and 23 Mar. 2018.
- The official TCCON site: approved as Provisional site in the TCCON meeting in Jun. 2017.
- Calibration using EM27/SUN and aircraft profiles of EMeRGE campaign using the HALO aircraft in March 2018.
- CAMP2EX campaign 2019.

References

Cressor, C., et al., On the consistency between global and regional methane emissions inferred from SCIAMACHY, TANSO-FTS, IASI and surface measurements, Atmos. Chem. Phys., 14, 577-592, doi:10.5194/acp-14-577-2014, 2014.
 Velazco, V.A., et al., Total Carbon Column Observing Network Philippines: Toward Quantifying Atmospheric Carbon in Southeast Asia, Climate, Disaster and Development Journal, 2(2), 1-12, doi:10.18783/cddj.v02i02.011, 2017.
 Velazco, V.A., et al., TCCON Philippines: first measurement results, satellite data and model comparisons in Southeast Asia, Remote Sens. 9, 1228, doi:10.3390/rs9121228, 2017.