



## Footprint analysis for ground-based total column CO<sub>2</sub> stations

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From early 2009, the satellite instruments OCO and GOSAT will provide dedicated global measurements of CO<sub>2</sub> mixing ratio. These space borne observations will have to be validated with observations of ground based instruments. However, there are distinct differences between CO<sub>2</sub> mixing ratio in the planetary boundary layer versus CO<sub>2</sub> mixing ratio in the free troposphere and above. Since the satellite instruments provide total column observations of CO<sub>2</sub> mixing ratio, their data cannot be easily compared to ground-based in-situ measurements. Therefore, ground-based measurements of total column CO<sub>2</sub> mixing ratio are essential.

To provide such measurements, networks of ground-based Fourier Transform Infrared (FTIR) instruments like the Total Carbon Column Observing Network (TCCON) have been set up. The TCCON network is still growing and several instruments in very different areas of the world should join in the future. One of the important questions is where new instruments should be placed.

This study shows an analysis of the footprints of several active or proposed stations within the TCCON network. The footprint is defined as the typical area where air parcels that are observed by the station originate. The calculations were done by adapting the adjoint of the TM3 model to calculate total columns. The footprint analysis is a useful tool to find optimal locations for new stations and improve overall network performance.