**Summary**

Small-scale turbulence contributes to control the dispersion of chemicals and the general composition of the atmosphere. In the Upper-Troposphere-Lower Stratosphere (UTLS), where convective influence is weaker than at lower altitudes, small-scale turbulence is alone responsible for the irreversible mixing of air masses brought together by larger scale motions. In the TTL (Tropical Tropopause Layer), vertical diffusion also competes with radiatively-induced vertical motions to transport tracers from the troposphere to the stratosphere, thus influencing stratospheric chemistry and the Earth radiative budget.

However, the contribution of turbulent vertical mixing to the tracer budget in the TTL is poorly constrained by observations. While estimates of vertical eddy diffusivity have been previously obtained at a few tropical locations using Radar and radiosonde measurements, those only cover limited areas and are associated with large uncertainties. Recently, during the Airborne Tropical TRopopause EXperiment (ATTREX) and Pacific Oxidants, Sulfur, Ice, Dehydration, and cONvection (POSIDON) campaigns, in situ aircraft measurements have provided extensive sampling of small-scale motions over the tropical Pacific, between 14 and 20 km, partly filling the gap.

In this presentation, I will use high-frequency meteorological observations from those two campaigns to characterize small-scale turbulence in the TTL.
As previously noted for other regions, turbulent activity in the TTL is highly intermittent and localized within shallow patches. I will examine the repartition of those patches, and their relationship with the large scale environment (altitude, stability, background flow gradient Richardson number). Special attention will be given to the impact of clouds, both thin cirrus and deep convective clouds, and to the potential role of inertio-gravity waves in driving the observed turbulence.

Finally, I will provide an observation-based estimate of the impact of "turbulent" bursts on vertical mixing for different tracers such as water vapor, ozone and carbon monoxide. I will also compare the results with those predicted by turbulent diffusion schemes currently used in operational analyses systems.