Phosgene (COCl$_2$) is relatively more abundant in the stratosphere, but is also present in the troposphere in spite of a shorter lifetime (seventy days). Monitoring its concentration by remote sounding of the upper atmosphere is of importance, since some of its strong infrared absorptions, occurring in the important 8-12 µm atmospheric window, hinder the correct retrieval of Freon-11 concentration profiles$^a$. Indeed, the infrared absorptions used to retrieve this ozone depleting compound occur in the same spectral region.

Phosgene, presents two fundamental bands in the 250 - 480 cm$^{-1}$ spectral region, with the lowest ($\nu_2$) near 285 cm$^{-1}$. These are responsible for hot bands, not yet analysed but of great importance for accurate modeling of the 5.47 µm ($\nu_1$) and 11.75 µm ($\nu_3$) spectral regions and consequently the correct retrieval of Freon-11 atmospheric absorption profiles.

High-resolution absorption spectra of phosgene have been recorded at 0.00102 cm$^{-1}$ resolution in the 250–480 cm$^{-1}$ region by Fourier transform spectroscopy at synchrotron SOLEIL. Due to the spectral congestion, the spectra have been recorded at low temperature (197 K) using a 93.15 m optical path length cryogenic cell$^b$. This enables the first detailed far-infrared analyzes of the $\nu_2$ and $\nu_3$ bands of the $^{35}$Cl$_2$CO and $^{35}$Cl$^{37}$CICO isotopologues of phosgene. Using a Watson-type Hamiltonian, it was possible to reproduce the upper state rovibrational infrared energy levels to within the experimental accuracy. The results will be presented in this talk.
