



## Ten years of atmospheric CO<sub>2</sub> airborne observations above the Orleans forest (France)

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As greenhouse gases are largely emitted in the atmosphere by human activities since the pre-industrial era, it is necessary to follow their evolution and to understand how they redistribute in the different reservoirs of our planet. Nowadays, it is known that about one half of the atmospheric emissions stays in the atmosphere, and that the other half is absorbed by the ocean and the continental biosphere. However, the distribution of the biospheric sinks is poorly understood yet, with uncertainties as large as 100% at the regional scale (10-500km). In the framework of European projects such as CARBOEUROPE-IP, LSCE has been recording for the last 10 years greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>) and tracers (CO and C<sup>13</sup>, C<sup>12</sup>, O<sup>16</sup> and O<sup>18</sup> from CO<sub>2</sub>) concentrations above the Orleans forest, located 130 km below Paris city center. The aircraft samples air between 100m and 3000m of altitude at an averaged frequency of at least 2 flights per month. We will present the CO<sub>2</sub> seasonal cycle and long-term tendencies inferred from these flights. The variability in the atmospheric boundary layer and the one in the free troposphere will be assessed in function of air mass origin (oceanic, biospheric or anthropogenic). A comparison between in-situ profiles recorded since 2004 and model outputs from the global model LMDz and the regional model CHIMERE will also be given. Finally, the advantages of in-situ CO<sub>2</sub> measurements compared to flask ones will be explored.