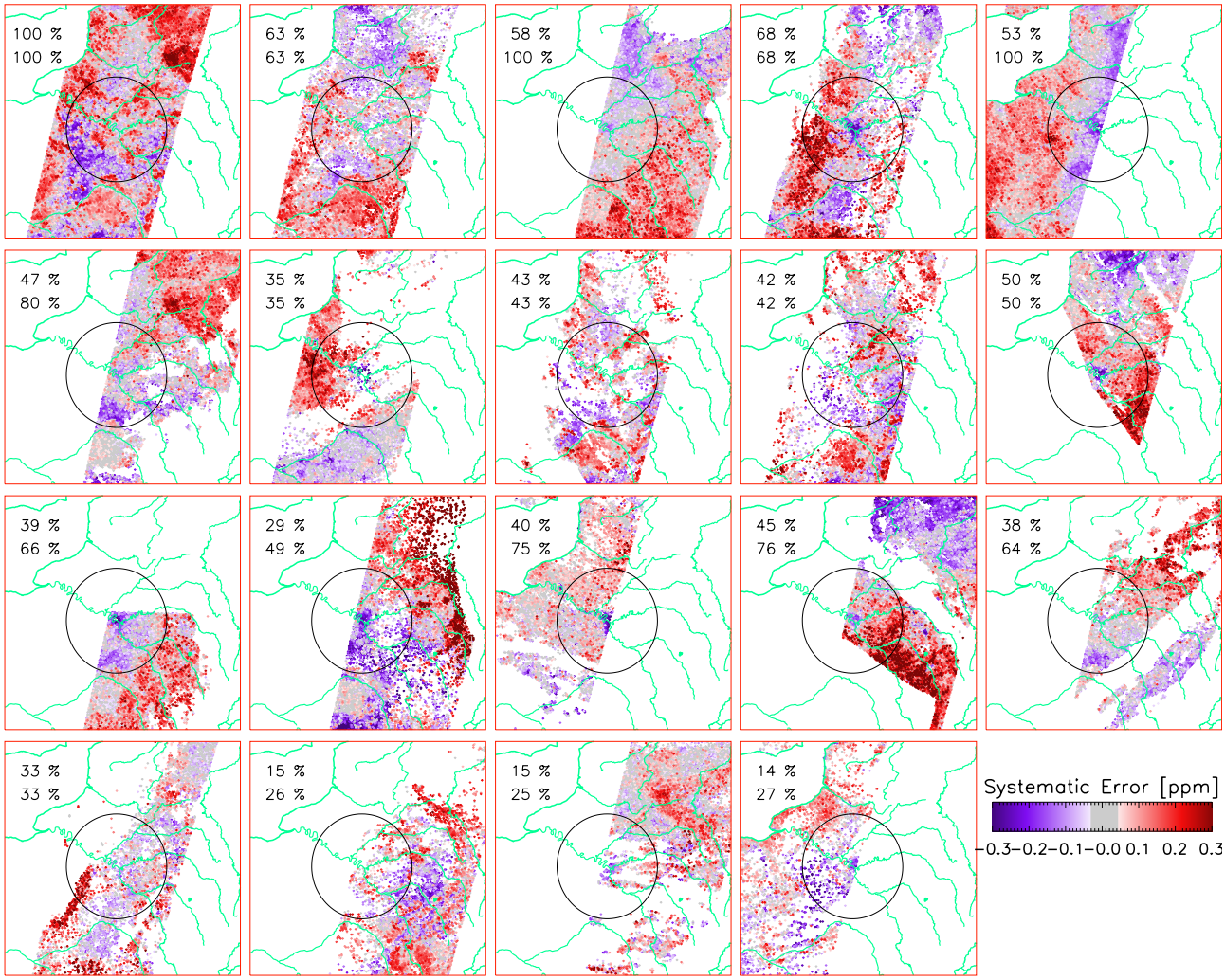

Figure S1. The 19 240 km-swath passes over the Paris area which provide the most observations within a distance of 100 km from the centre of Paris out of 1-year of simulation of the CarbonSat sampling over the globe by Buchwitz et al. (2013) and the associated systematic errors. The 100 km radius circle centred on Paris is drawn in black. These passes approximately correspond to the 19 "SIM-CarbonSat" best observation samplings for a given inversion day that are defined based on scores of theoretical uncertainty reductions. Numbers provided on the top left of each subfigure: percentage of the area within a distance of 100 km from the centre of Paris sampled by the cloud free pixels (top) and percentage of the area within the satellite swath and within a distance of 100 km from the centre of Paris sampled by the cloud free pixels (bottom).

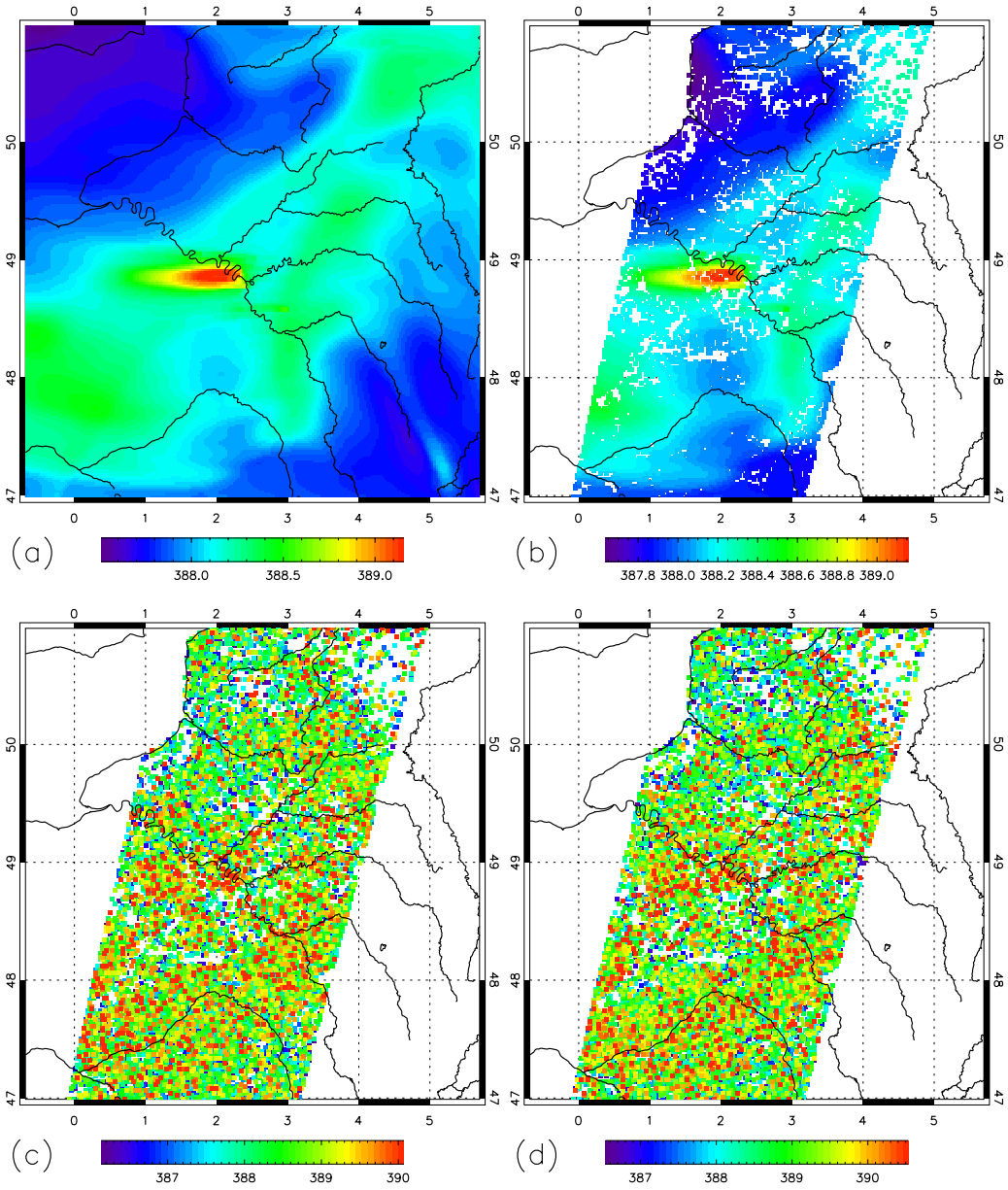

Figure S2. Simulation of XCO_2 (in ppm) as seen from space over the CHIMERE domain used in this study, on October 7th 2010 at 11:00 and at 2 km resolution using the operator described in section 2.5, the flux budgets given by Airparif and C-TESSEL and the model initial and boundary conditions given the global LMDZ simulation. a) Simulation ignoring the limitation of the satellite field of view, the cloud cover and the observation errors (same as figure 1). b) Sampling of (a) corresponding to the second observation sampling of CarbonSat simulated by Buchwitz et al. (2013) shown in figure S1. c) Perturbation of (b) using a map of samples of the random errors corresponding to this observation sampling in the simulation by Buchwitz et al. (2013). d) Perturbation of (c) using the map of systematic errors corresponding to this observation sampling in the simulation by Buchwitz et al. (2013).