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Assesing the spatial coverage of aircraft CO_2 measurements in the Iberian Peninsule

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The ICARO Aircraft Program to measure atmospheric CO_2 mixing rations started late 2005 with the objective to reduce uncertainties in CO_2 atmospheric balances in the Spanish region. Its results are used in inversions techniques to estimate fluxes from source regions to the individual sites.

The Crown Design was first implemented in the Ebre's watershed basin in the Linyola's region (41º 43.5 N, 0º54.6 E), an agricultural zone combining dry and irrigated land, through the sampling of a triangle measuring 60 km in each side and a total area of 1500 km^2. The Crown Design integrates three vertical profiles from 600 to 4000 masl at the vertexes of the triangle and horizontal transects following the edges of the triangle at 600 and 1200 masl.

New sites following the 42º parallel in the same river basin were added: La Muela (41º35.7N, 1º 5.9ºW), also surrounded by dry and irrigated land, in the West part of the river basin, and an eastern site, Ullastret (42º 0.5ºN 3.1ºE), close to the Mediterranean Sea, covering both land and sea. In all of them the same CO_2 sampling pattern was applied.

The CO_2 variability inside each triangle sampled (in the vertical and horizontal axis) and the specific distribution of the sampling sites in the Ebre's basin maximizes comparison among different spatial scales: the local one; the 10^2 km, due to the triangle size; and the 10^3 km, due to the distance between the sites.

In order to assess the spatial coverage of the atmospheric CO_2 mixing rations from the three sites in the Ebre's basin, a Lagrangian Particles Dispersion Model is used. FLEXPART (Stohl, A., 1998) simulates the long-range and mesoscale transport for

tracers released from a point, area or volume. Seasonal and annual spatial coverages obtained from the measurements done in 2006 for the three sites are shown. Maps showing the air masses residence time obtained from FLEXPART reflect the spatial coverage of CO_2 measurements.