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High spatial patchiness of methane concentrations over the flat landscape of the Ebro River Delta (NW Mediterranean)

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With the aim of evaluate the role of a different water management on greenhouse gases (GHGs) at each side of the Ebro River Delta, five points were chosen to be sampled for GHGs for studying their spatial variability along diurnal cycles.
The daily schedule for sampling was starting one day at the evening/sunset, followed by the next day dawn sampling, and eventually closing the cycle at the evening/sunset. Samples are been taken along the seasonal cycle to cope with the main rice works: seeding, growing, flourishing, maturation, harvesting, fields flooding and soil aeration before new seeding.
The Ebre River Delta terrain is covered in its 200 km2 with the same agroecosystem (paddy fields) at the two riversides, and natural lagoons and marshes are found along the shoreline. The five spots to be sampled were selected to represent all these habitats at each side of the Delta; one is close to paddy fields, another one to the lagoons, and the fifth one to the river embankments up the river, with a pentagonal shape.
Continuous measurements (CO_2, CH4, H_2O) following radial paths transects of the pentagon were performed with a Cavity Ring-Down Spectroscopy (CRDS) analyser mounted on a car. The air inlet was held in front of the car, at forty cm above ground, with a little buffer to filter particles. Due to the constraints imposed by this buffer, every measurement was copying for a track of 30 m, for a 60 km/hour car speed. Flasks for GHGs (CO_2, CH4, CO, N20) analyses by Gas Chromatography were taken at every spot with the car engine stopped while the CRDS analyzer was measuring yet, in order to compare results.
Ebre River Delta rice cultures management is usually characterized for maintaining the paddies flooded after the harvesting of rice to giving enough aquatic life for feeding the migratory birds. Only during the previous time to seed the rice, the fields are dried. Nevertheless, two years ago, the left side of the riversides is being dried during winter to prevent the proliferation of an invading species of a huge snail (Pomacea bridgesii). Overwhelming the variability of in the two riversides, a most prevailing fine grained patchiness is found for the different GHGs analyzed, especially for methane. This unexpected result over the two homogeneous riversides should be taken into account on modelization. Moreover, the spatial approach study undertaken, standing out the fine-grained mosaic of the atmospheric composition close to the ground, could be of a specific interest for the validation of remote-sensing approaches to emissions budgets.
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