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Variability of methane fluxes at the Ebro Delta due to rice field: comparison between inventories and Radon Tracer Method based results.

Roger Curcoll[1], Josep-Anton Morguí[2], Alba Àgueda[3], Arturo Vargas[1], and Claudia Grossi[1]
[1]UNIVERSITAT POLITÈCNICA DE CATALUNYA - BARCELONA TECH, INTE, DRM, Barcelona, Spain
[2]UNIVERSITAT DE BARCELONA, BEECA, Barcelona, Spain
[3]UNIVERSITAT POLITÈCNICA DE CATALUNYA - BARCELONA TECH, CERTEC, Chemical Engineering Department, Barcelona, Spain

The Ebro River Delta, in the northwestern Mediterranean basin, has an extension of 320 km^2 and is mainly covered by rice fields. Rice fields are known to be one of the main sources of anthropogenic methane emissions, and a better estimation of its temporal variability in relation to the different rice cultivation phases is important to help with the implementation of emission reduction strategies (Àgueda et al., 2017),

In the framework of the ClimaDat network, an atmospheric station was installed in the middle of the Ebro Delta in 2012. A Picarro G2301 for greenhouse gases (GHG) atmospheric concentrations and an ARMON (Atmospheric Radon Monitor) for atmospheric ^{222}Rn concentrations were collocated among other instruments. Nocturnal hourly atmospheric observations of CH_4 and ^{222}Rn measured between 2013 and 2019 were used to apply the Radon Tracer Method (RTM) for retrieving CH_4 fluxes over the footprint area.

The Ebro River Delta has a reduced dimension and a complex meteorological regime highly influenced by the Ebro channelled winds and the sea breezes, making it difficult to calculate GHG fluxes using global or regional inversion models. However, the use of high-resolution backtrajectories (model WRF-Flexpart) coupled with the traceRadon daily radon flux maps for Europe (Karsten et al., 2022), with a resolution of 0.05 degrees, has allowed the use of the RTM in this complex area.

Methane fluxes estimated by RTM were compared with fluxes directly measured with chambers in past studies (Martínez-Eixarch et al., 2018) and with data obtained by the EDGAR inventory (Crippa et al., 2022). Results show a promising agreement between methane fluxes obtained with different methods, and a variability clearly governed by the rice crop cycle which is not reflected in the methane emissions values reported in EDGAR inventories.

References

Àgueda, A., Grossi, C., Pastor, E., Rioja, E., Sánchez-García, L., Batet, Ò., Curcoll, R., Ealo, M., Nofuentes, M., Occhipinti, P., Rodó, X. and Morguí, J.-A.: Temporal and spatial variability of ground level atmospheric methane concentrations in the Ebro River Delta, Atmos. Pollut. Res., 8(4), 741–753, doi:10.1016/j.apr.2017.01.009, 2017.

Crippa, M., Guizzardi, D., Banja, M., Solazzo, E., Muntean, M., Schaaf, E., Pagani, F., Monforti-Ferrario, F., Olivier, J., Quadrelli, R., Risquez Martin, A., Taghavi-Moharamli, P., Grassi, G., Rossi, S., Jacome Felix Oom, D., Branco, A., San-Miguel-Ayanz, J. and Vignati, E., CO2 emissions of all world countries - 2022 Report, EUR 31182 EN, Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/730164, JRC130363

Karstens, U., Levin, I. (2022). traceRadon monthly radon flux map for Europe 2006-2022 (based on ERA5-Land soil moisture), Miscellaneous, https://hdl.handle.net/11676/XPxf8v5gfDWmi6BZ597euAJ7

Martínez-Eixarch, M., Alcaraz, C., Viñas, M., Noguerol, J., Aranda, X., Prenafeta-Boldu, F. X., Saldaña-De la Vega, J. A., del Mar Catala, M. and Ibáñez, C.: Neglecting the fallow season can significantly underestimate annual methane emissions in Mediterranean rice fields, PLoS One, 13(5), doi:10.1371/journal.pone.0198081, 2018.