



## Supplement of

## Estimation of seasonal methane fluxes over a Mediterranean rice paddy area using the Radon Tracer Method (RTM)

Roger Curcoll et al.

Correspondence to: Roger Curcoll (roger.curcoll@upc.edu)

The copyright of individual parts of the supplement might differ from the article licence.



5 Figure S1. CORINE land cover map 2018 for the Iberian Peninsula with a zoom, on the right side, over the Ebro River Delta (European Union, 2018). DEC station is marked with a black asterisk.



Figure S2. Average 2013-2019 <sup>222</sup>Rn exhalation maps: a) Constant value of 15.8 mBq m<sup>-2</sup> s<sup>-1</sup> over land; b) ERA5-Land radon exhalation map; c) GLDAS-Noah radon exhalation map; c, d and e, same as a, b and c for the 150 km x 150 km window around DEC station (green cross).



Figure S3. Modelled back trajectories (between 0 - 200 m a.g.l.) from DEC with Flex-WRF for two different synoptic situations: day 19/04/2019 at 00h UTC (a, b and c panels) and day 20/05/2019 at 00h UTC (d, e and f panels). Colours represent the logarithm of the residence time (seconds) in every 0.05° x 0.05° grid cell.









Figure S4. Wind roses for air coming at DEC station (10 m a.g.l.) for: a) midday hours (11h UTC to 17h UTC); b) nocturnal hours (RTM window, 21h UTC to 03h UTC).



Figure S5. 10 meters wind speed RMSE, bias and correlation between measurements and model. Dotted lines represent the RMSE, bias and correlation for the nocturnal RTM period

Table S1. Simulation of radon concentrations at DEC station: models' performance measures across different time periods based on the comparison of models' predictions vs. observed values.

Period	Statistics	Flex-WRF-ERA5	Flex-WRF-GLDAS	Flex-WRF-Const*
		vs. Observations	vs. Observations	vs. Observations
March - April 2019	Bias (Bq m <sup>-3</sup> )	-0.38	0.084	-0.43
	R (-)	0.21	0.18	0.24
	RMSE (Bq m <sup>-3</sup> )	1.57	1.63	1.47
	WRMSE (Bq m <sup>-3</sup> )	0.61	0.58	0.54
May 2019	Bias (Bq m <sup>-3</sup> )	0.33	0.54	0.21
	R (-)	0.54	0.54	0.52
	RMSE (Bq m <sup>-3</sup> )	0.87	1.03	0.76
	WRMSE (Bq m <sup>-3</sup> )	0.48	0.52	0.45
July - August 2019	Bias (Bq m <sup>-3</sup> )	-0.05	0.22	-0.82
	R (-)	0.51	0.53	0.58
	RMSE (Bq m <sup>-3</sup> )	1.33	1.47	1.28
	WRMSE (Bq m <sup>-3</sup> )	1.62	1.65	0.7
October - November 2019	Bias (Bq m <sup>-3</sup> )	-0.52	-0.23	-0.92
	R (-)	0.46	0.38	0.33
	RMSE (Bq m <sup>-3</sup> )	1.94	1.97	2.13
	WRMSE (Bq m <sup>-3</sup> )	0.61	0.62	0.63

\*Constant value of 15.8 mBq m<sup>-3</sup> s<sup>-1</sup> on land pixels and 0 mBq m<sup>-3</sup> s<sup>-1</sup> on sea pixels.









Aug 12

2

0

Aug 02

Aug 07

date

Aug 17

Aug 22

Aug 27



Figure S6. Measured (black) and simulated radon atmospheric concentrations at DEC using ERA5 radon exhalation maps (solid blue), GLDAS radon exhalation maps (dash-dotted red line) and a constant radon exhalation value with a land-sea mask (dashed green line) for different periods: a) March-April 2019, b) May 2019, c) July 2019, d) August 2019, e) October 2019, and f) November 2019. The red lines in Figure *a* and *b* corresponds to the back trajectory simulations of S3.