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

CORINE land cover 2018

Color	Label	Color	Label
	Continuous urban fabric		Complex cultivation patterns
	Discontinuous urban fabric		Agricultural and natural areas mosaic
	Industrial or commercial units		Broad-leaved forest
	Road and rail networks and associated land		Coniferous forest
	Port areas		Mixed forest
	Mineral extraction sites		Natural grasslands
	Dump sites		Sclerophyllous vegetation
	Construction sites		Transitional woodland-shrub
	Sport and leisure facilities		Beaches dunes sands
	Non-irrigated arable land		Inland marshes
	Permanently irrigated land		Salt marshes
	Rice fields		Salines
	Fruit trees and berry plantations		Water courses
	Olive groves		Coastal lagoons
	Pastures		Sea and ocean

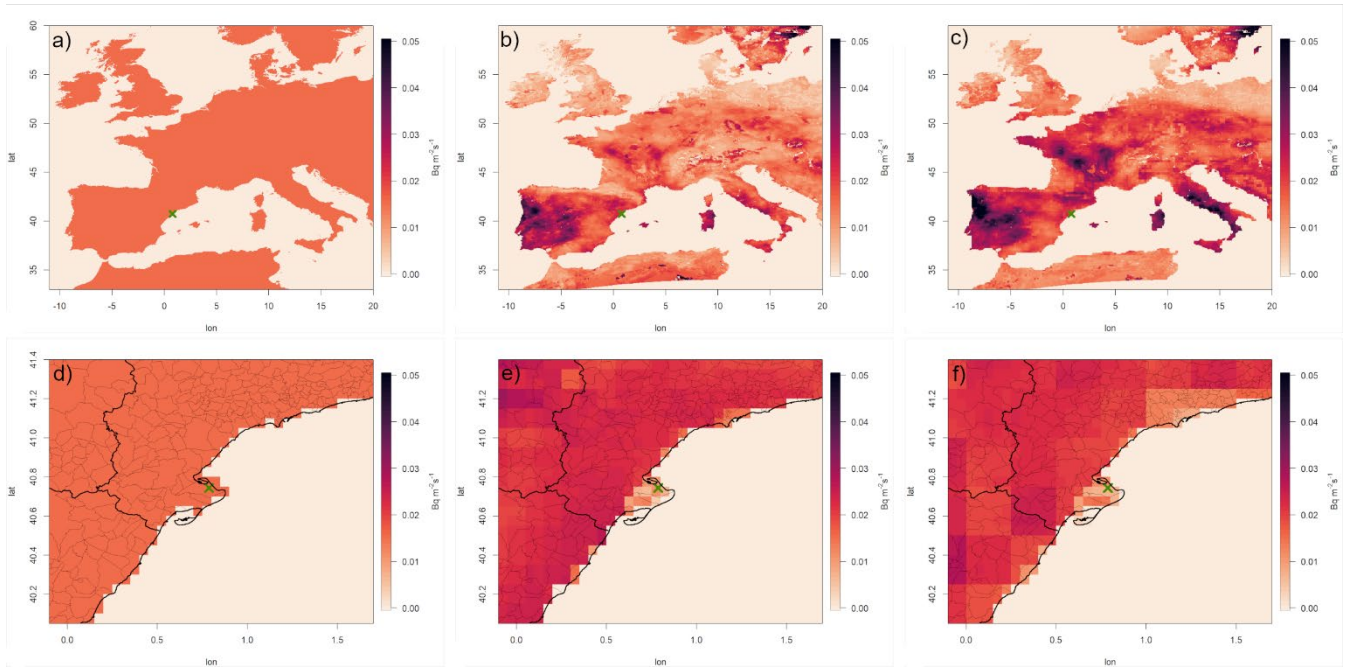
10 **Figure S1. CORINE land cover map 2018 for the Iberian Peninsula with a zoom, on the right side, over the Ebro River Delta (European Union, 2018). DEC station is marked with a black asterisk.**

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Figure S2. Average 2013-2019 ^{222}Rn exhalation maps: a) Constant value of 15.8 mBq m^{-2} s^{-1} 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 70 km x 70 km window around DEC station (green cross).

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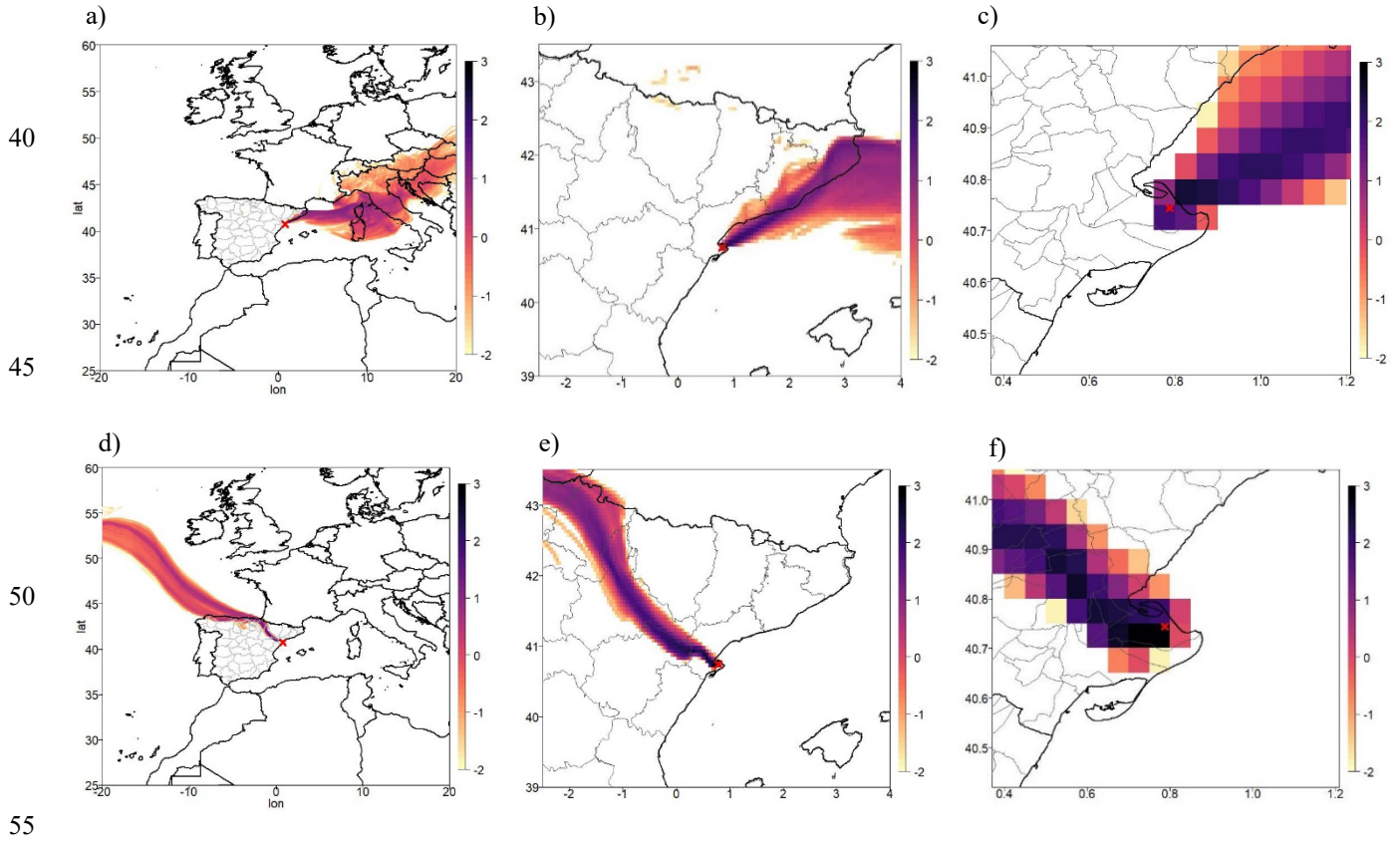
Figure S3. Modelled back trajectories (between 0 - 200 m a.g.l.) from DEC with Flex-WRF for two different synoptic situations: day 19/04/2019 at 00h UTC (a, b and c panels) and day 20/05/2019 at 00h UTC (d, e and f panels). Colours represent de logarithm of the residence time (seconds) in every 0.05º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

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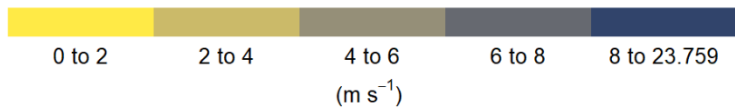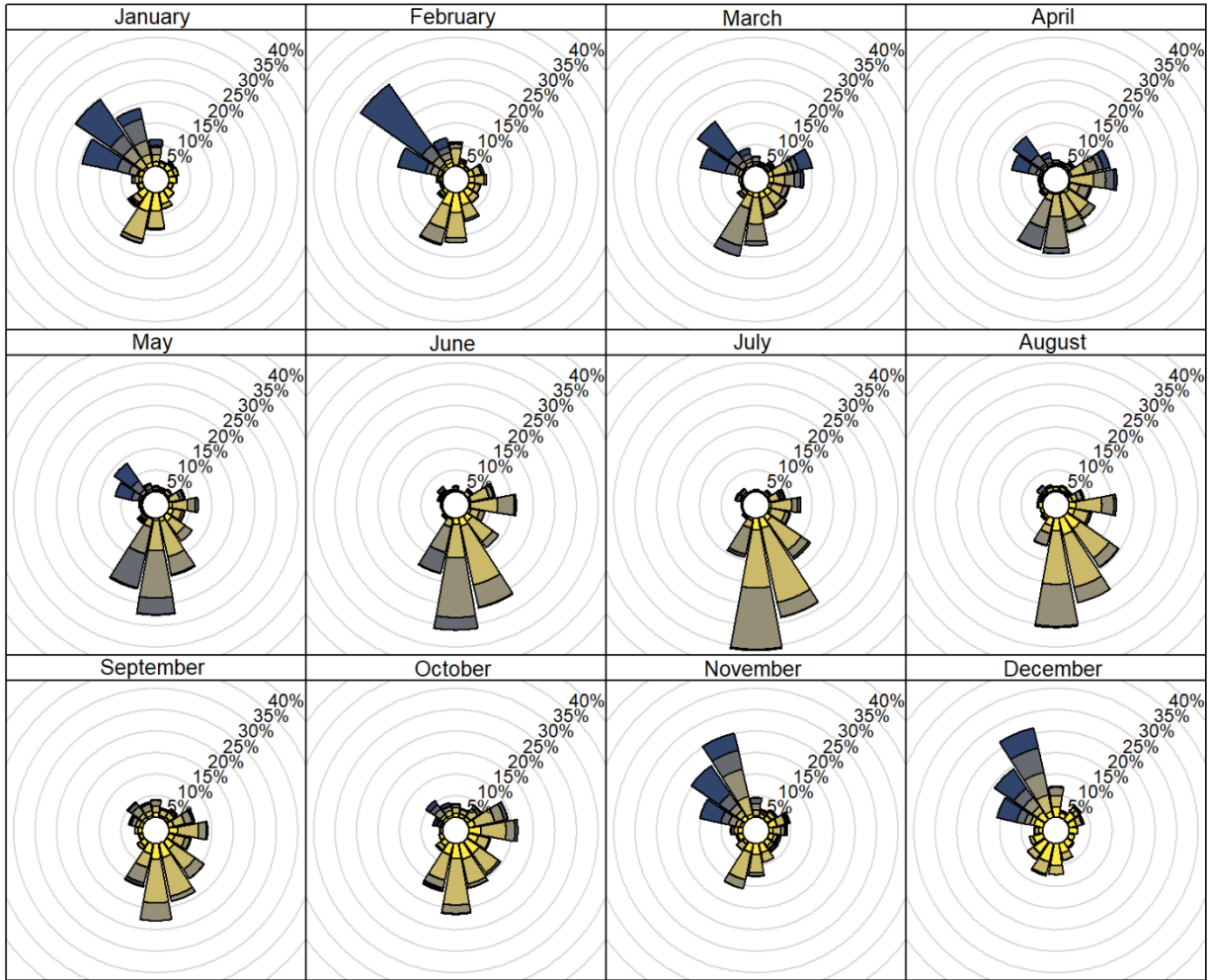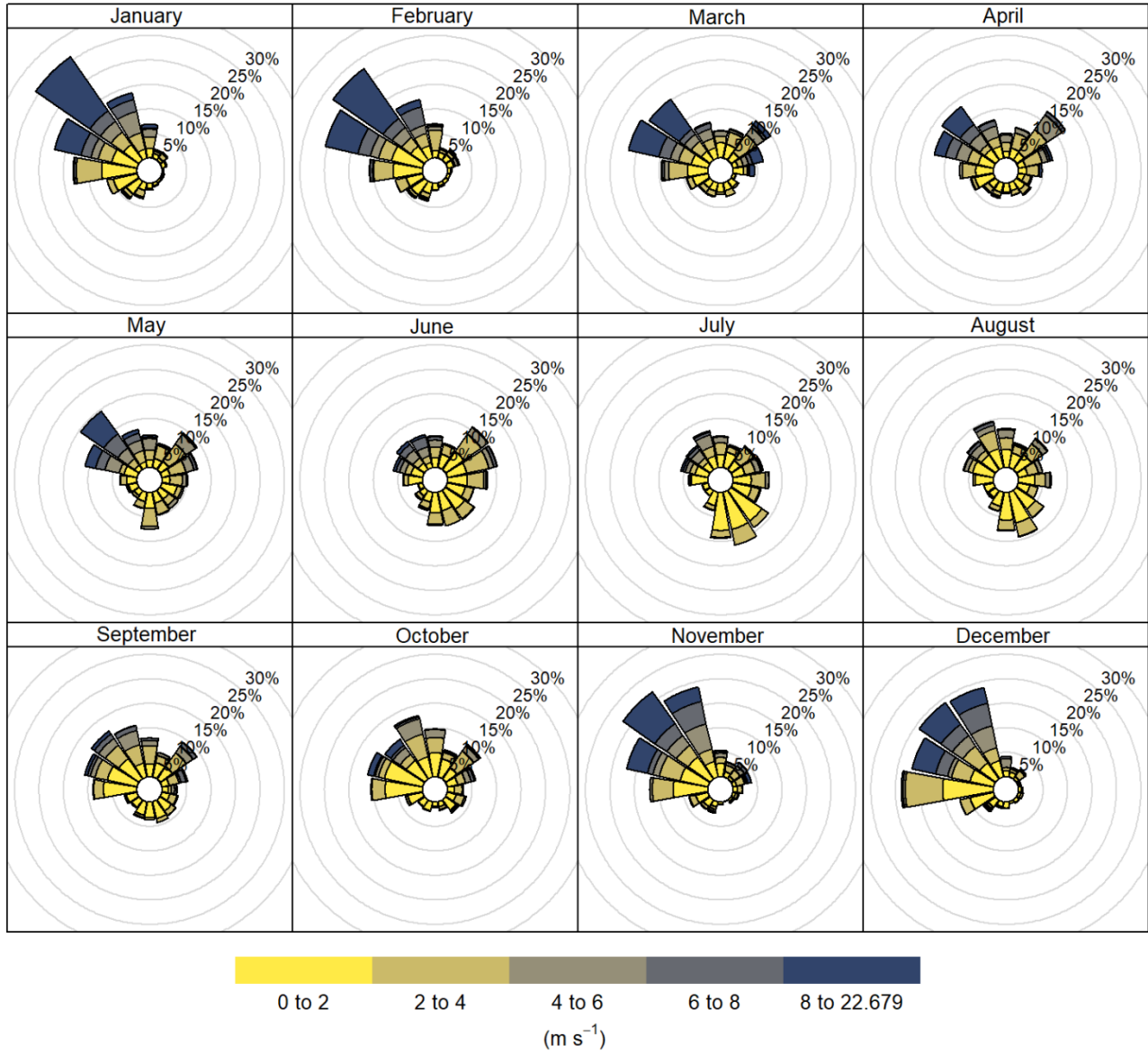
Figure S4. Wind roses for air coming at DEC station (10 m a.g.l.) for: a) midday hours (11h UTC to 17h UTC); b) nocturnal hours (RTM window, 21h UTC to 03h UTC).

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

*Constant value of 15.8 mBq m^{-3} s^{-1} on land pixels and 0 mBq m^{-3} s^{-1} on sea pixels.

a)

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b)

c)

d)

e)

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f)
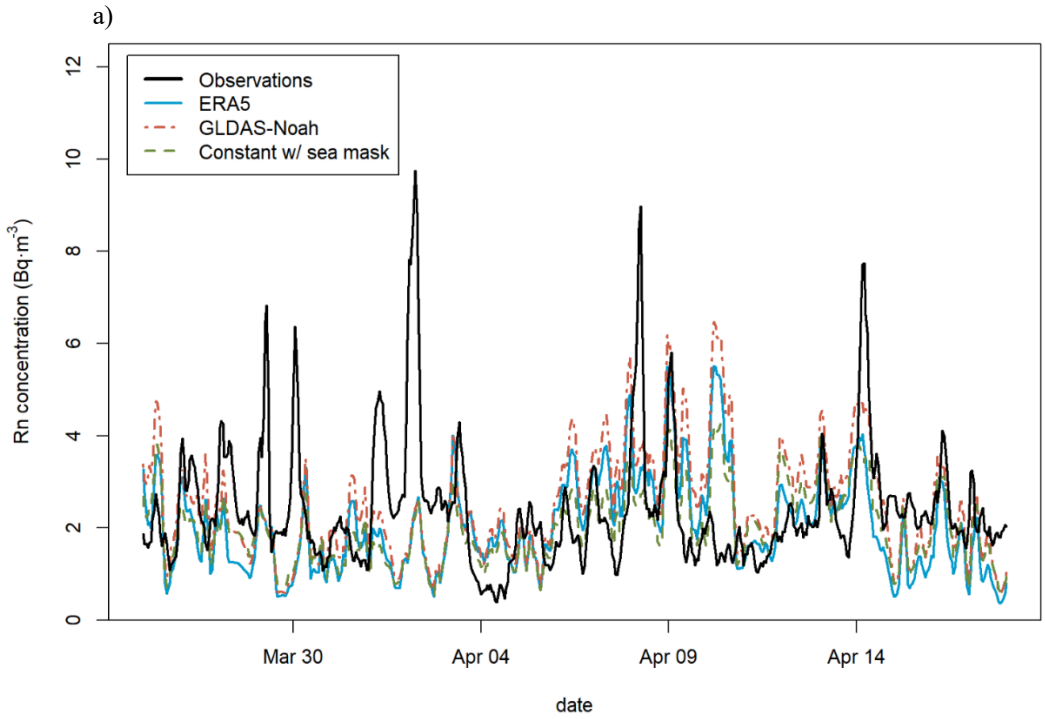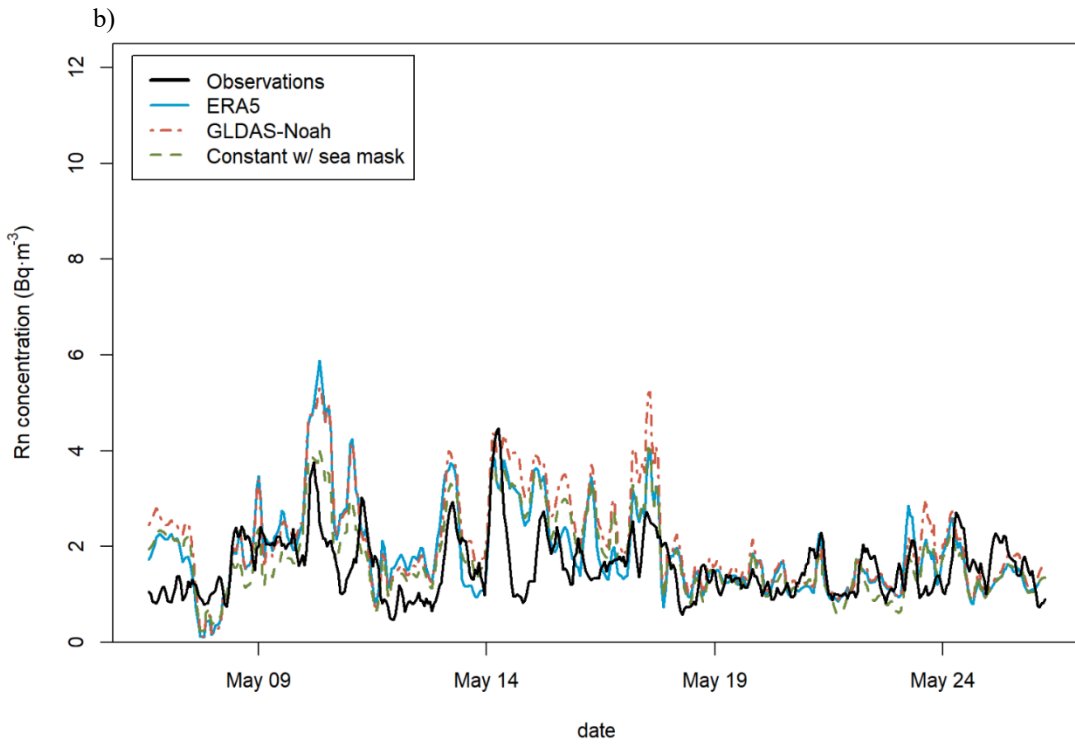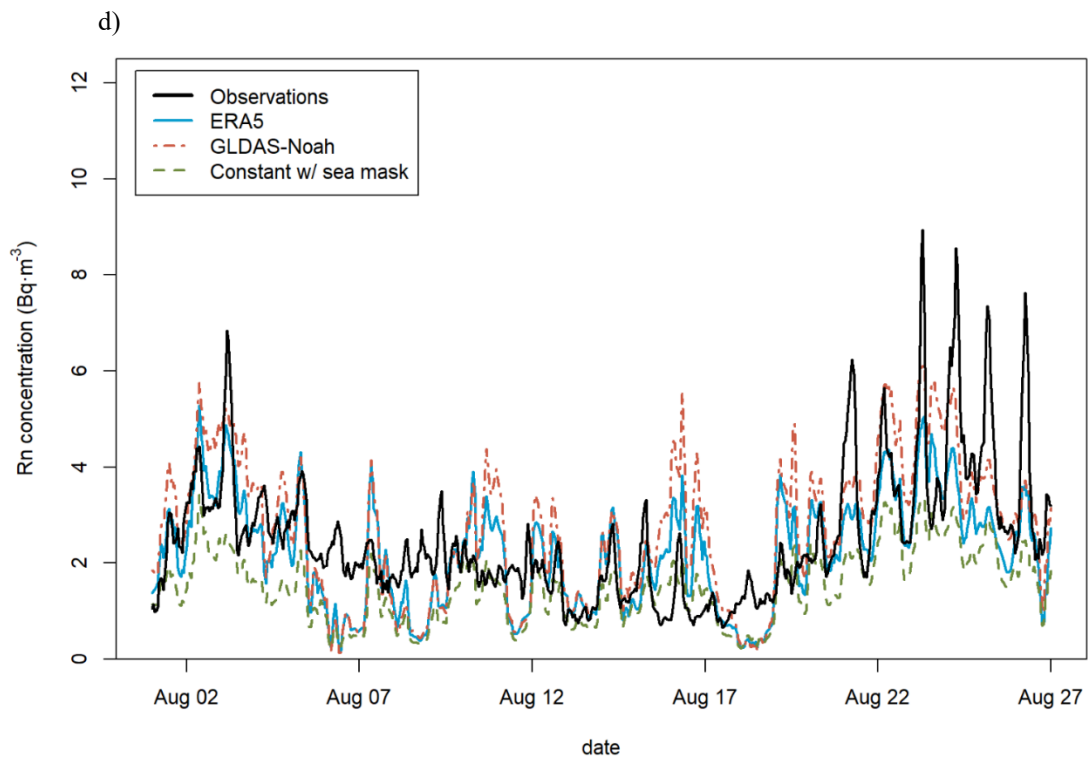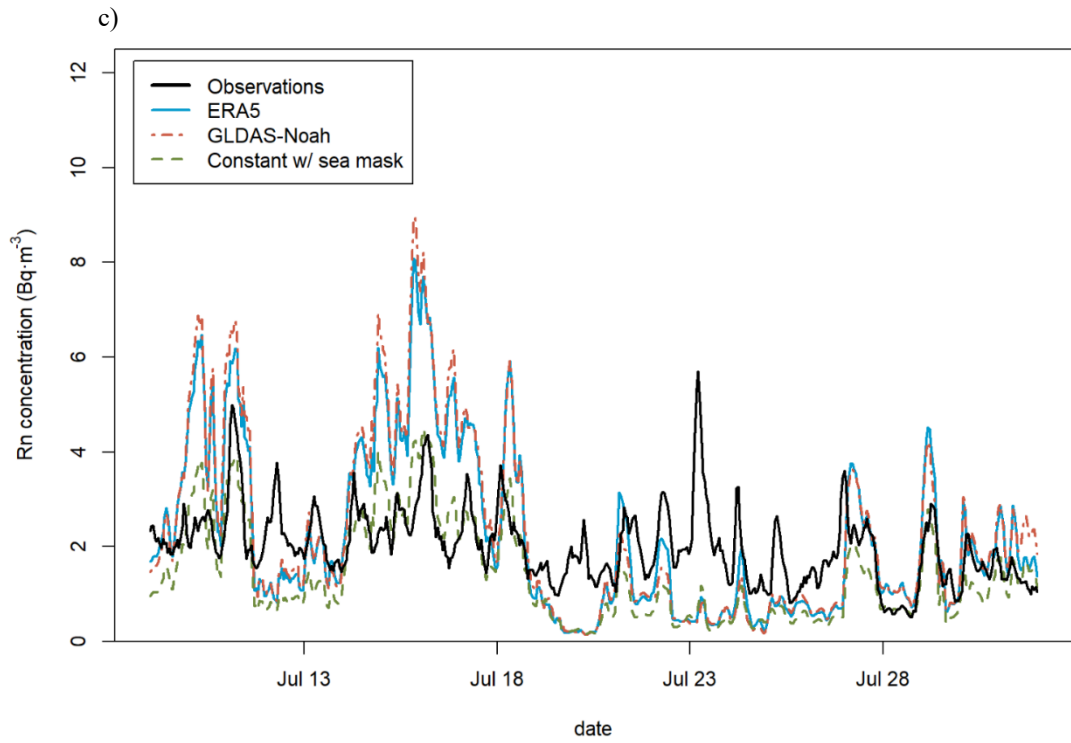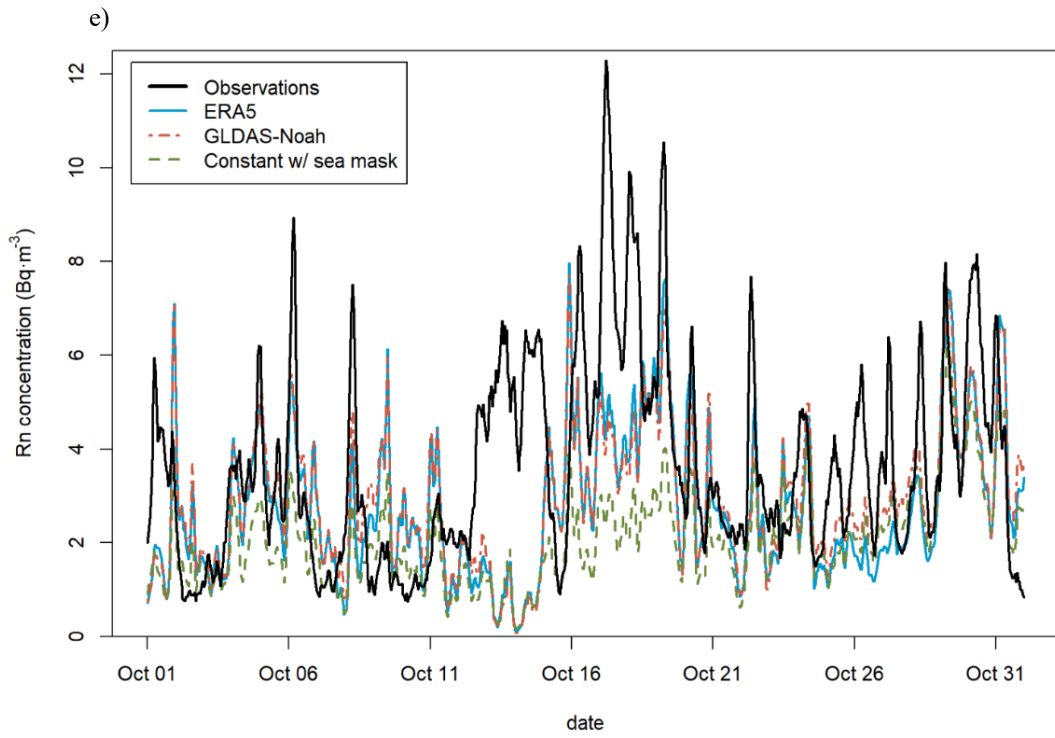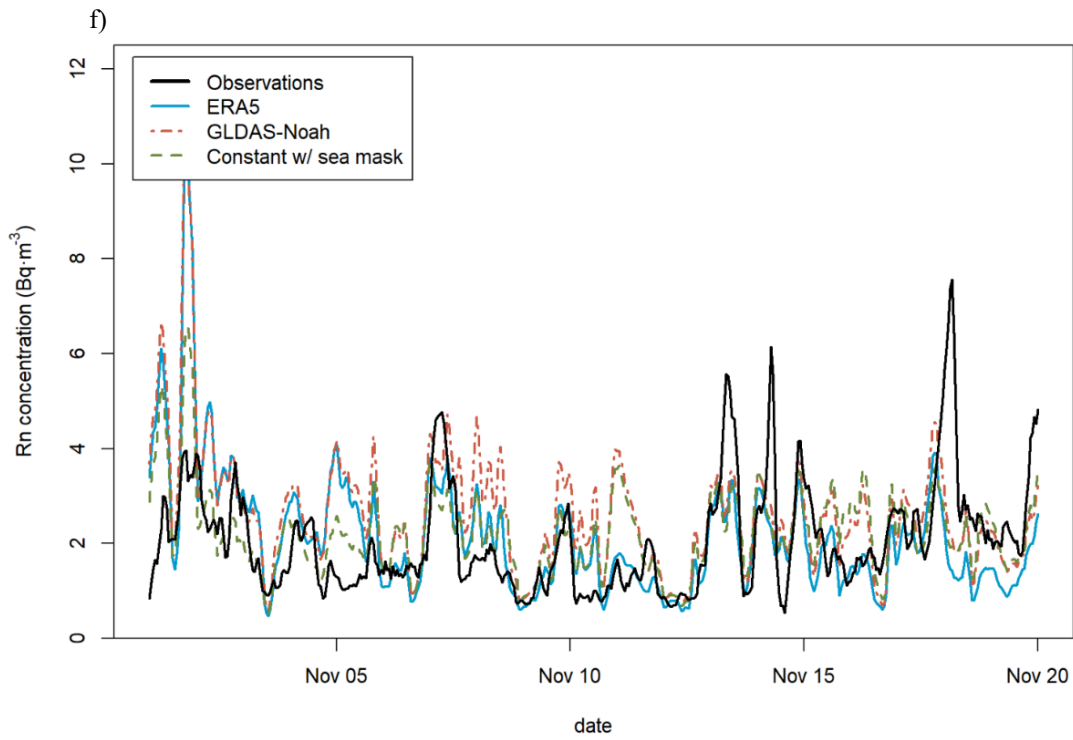
Figure S5. Measured (black) and simulated radon atmospheric concentrations at DEC using ERA5 radon exhalation maps (solid blue), GLDAS radon exhalation maps (dash-dotted red line) and a constant radon exhalation value with a land-sea mask (dashed green line) for different periods: a) March-April 2019, b) May 2019, c) July 2019, d) August 2019, e) October 2019, and f) November 2019.

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