

Parameters	Units or values	Estimated uncertainty (%)	Evaluation
Wind speed ( $\omega_{10}$ )	0.2-5.4 m s <sup>-1</sup>	n.a.	From Jiuzhi weather stations
Water–air temperature	11.2–15.6 °C	n.a.	Recorded with probe in the chamber; sensitive to temperature results
Molecular diffusion of <sup>222</sup> Rn in water ( $D_m$ )	$9.2 \times 10^{-6}$ – $1.0 \times 10^{-5}$ cm <sup>2</sup> s <sup>-1</sup>	n.a.	$1.16 \times 10^{-6}$ at 20 °C; adjustable for temperature
Molecular diffusion of <sup>222</sup> Rn in sediments ( $D_s$ )	$2.2 \times 10^{-6}$ – $2.5 \times 10^{-5}$ cm <sup>2</sup> s <sup>-1</sup>	n.a.	Adjusted for temperature, sediment porosity
Dynamic viscosity ( $\mu$ )	$1.1 \times 10^{-3}$ – $1.3 \times 10^{-3}$ cm <sup>2</sup> s <sup>-1</sup>	n.a.	Calculated based on water temperature, density, and salinity
Schmidt number ( $S_c$ )	1078.6–1371.6 (–)	n.a.	Calculated as the ratio of $\nu$ to $D_m$
Water depth ( $H$ )	4.4 m	n.a.	Epilimnion depth of Ximen Co Lake
Decay constant <sup>222</sup> Rn ( $\lambda_{222}$ )	0.186 d <sup>-1</sup>	n.a.	Constant
Groundwater endmember <sup>222</sup> Rn ( $C_{gw}$ )	$11\,200 \pm 1200$ Bq m <sup>-3</sup>	8 site dependent for Ximen Co Lake	Measured; final result for water flux inversely proportional to <sup>222</sup> Rn groundwater concentration
Lake water endmember <sup>222</sup> Rn ( $C_l$ )	21.6–418.8 Bq m <sup>-3</sup>	15 %–25 %	Measured with RAD 7 AQUA
Ambient air <sup>222</sup> Rn ( $C_{air}$ )	$1.51 \pm 0.97$ Bq m <sup>-3</sup>	15 %–25 %	Measured with RAD 7 under open-loop conditions
Atmospheric <sup>222</sup> Rn ( $C_a$ )	$1.5 \pm 1.0$ Bq m <sup>-3</sup>	20 %–25 %	Measured or assumed value, model not sensitive to radon in air variation
$K_{air/water}$	0.29–0.33 (–)	n.a.	Calculated based on temperature in the chamber and salinity in lake water
Porosity $n$	0.31	n.a.	Assumed based on the literature
Tortuosity $\theta$	2.05	n.a.	Calculated based on porosity
Piston velocity ( $\kappa$ )	0.004–1.11 m d <sup>-1</sup>	20 %–25 %	Calculated from Eq. (S3)
<sup>226</sup> Ra concentration in lake waters ( $C_{226Ra}$ )	0.01 Bq m <sup>-3</sup>	≈ 10 %	Measured with RAD7
Diffusive flux of <sup>222</sup> Rn ( $F_{diff}$ )	0.68–213.5 Bq m <sup>-2</sup> d <sup>-1</sup>	n.a.	Calculated from Eq. (S9)
Atmospheric flux of <sup>222</sup> Rn ( $F_{atm}$ )	0.7–213.5 Bq m <sup>-2</sup> d <sup>-1</sup>	n.a.	Calculated from Eq. (S1)
Groundwater flux of <sup>222</sup> Rn ( $F_{gw}$ )	14.7–349.8 Bq m <sup>-2</sup> d <sup>-1</sup>	n.a.	Calculated from Eq. (1)
Inventory of <sup>222</sup> Rn ( $I$ )	Bq m <sup>-2</sup>	n.a.	Measured with RAD7 AQUA
Groundwater discharge ( $Q_{gw}$ )	$10.3 \pm 8.2$ (3.5–38.6) mm d <sup>-1</sup>	n.a.	Calculated from Eq. (1)