

Ishijima, K., K. Tsuboi, H. Matsueda, T. Y. Tanaka, T. Maki, T. Nakamura, Y. Niwa, and S. Hirao, 2022: Understanding temporal variations of atmospheric radon-222 around Japan using model simulations. *J. Meteor. Soc. Japan*, **100**, 343-359.

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**Plain Language Summary:** Temporal variations of atmospheric radon-222 ( $^{222}\text{Rn}$ ) concentrations observed at four stations in Japan were analyzed for the monthly and diurnal variations, and a series of synoptic scale high- $^{222}\text{Rn}$  events using an on-line transport model. A new calculation approach using hourly  $^{222}\text{Rn}$  values normalized to daily means enabled to extract diurnal cycles from highly variable  $^{222}\text{Rn}$  values in winter due to sporadic continental  $^{222}\text{Rn}$  outflows.

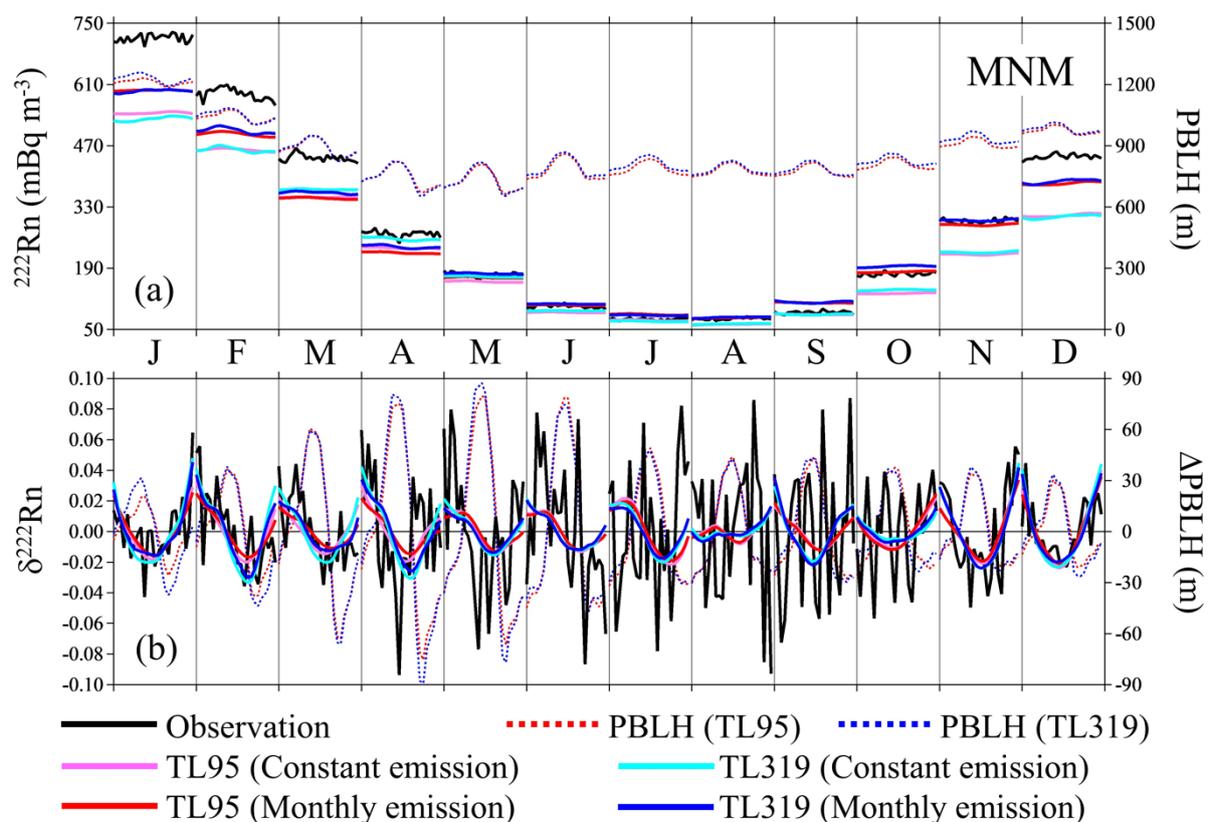


Figure 1. Observed and simulated monthly mean diurnal  $^{222}\text{Rn}$  cycles, and simulated planetary boundary layer height (PBLH) cycles at Minamitorishima station (MNM;  $24^{\circ}\text{N}$ ,  $154^{\circ}\text{E}$ ).  $\delta$  is value normalized by daily mean, and  $\Delta$  is deviation from monthly mean.

- Diurnal cycles of absolute  $^{222}\text{Rn}$  concentrations observed and simulated are negligible or unclear, whereas  $\delta^{222}\text{Rn}$  in November–March indicate clear diurnal cycles with notable daytime minima, mostly corresponding to PBLH maxima. At MNM, local  $^{222}\text{Rn}$  sources are not significant, and in model emissions around the station are also negligibly small.
- These results suggest that variations of  $^{222}\text{Rn}$  concentrations in the near-surface atmosphere over the stations, which has been transported from the continental sources, are controlled by diurnal variations of the local PBLH.