We thank the editor for his questions. Our replies are in blue text.

There are two questions for which I did not find the answer in the manuscript:

1- What is the effect of the model resolution, i.e. would you get better agreement (or not?) with a 0.1°x0.1° horizontal resolution?

As stated in our response to Review#1, we do think a higher resolution would improve the simulation of transport (i.e., minimizing lost vertical transport due to the regridding of meteorological fields) in the model. In the context of Rn-222 modeling, we doubt that model simulations with very fine resolutions can improve the scientific results of this work, largely due to the uncertainties and coarse resolution associated with Rn-222 emission maps. Studies of Rn-222 emission fluxes so far do not provide sufficient data required to produce fine-resolution emission maps, except for Europe. On the other hand, the classic version of the GEOS-Chem model is not available for conducting global simulations at a resolution higher than $2° \times 2.5°$. In future studies, Rn-222/Pb-210 simulations will be tested with GCHP, the High-Performance version of GEOS-Chem that can be run at high resolution with a cubed sphere geometry.

2- What is the effect of the geographical position of the 222Rn station in the model grid box when the station is on the coast such as for Fuzhou? Have you thought what would change in your simulated concentration if the model box was 80% marine / 20% continental versus 80% continental / 20% marine?

We appreciate Editor's insight that the observations and sampled model results may represent different air masses at coastal regions due to the nonuniform surface type in the model grid box. For coastal sites such as Fuzhou, the Rn-222 observations could be largely affected by local emissions and thus more typical of those at inland sites. Coastal sites are usually positioned within model gridboxes that are partly land and partly water. Some of these gridboxes may be dominated by water whereas the sites could be located near the edges of the gridboxes and not close to the water. In such cases, while the land area fractions (excluding sea and lake areas) are taken into account in the model calculation of Rn-222 emission fluxes for these gridboxes, the model-simulated concentrations may not represent the observed at the sites due to the subgrid nature of the latter.

We thus tried sampling the model results at adjacent gridboxes and found that the model results for the gridbox to the west of the original (moving away from coast) are much more comparable to the observed magnitude and seasonality of surface Rn-222 concentrations at Fuzhou. This suggests that the observations are significantly affected by local Rn-222 emissions. We also found a similar improvement at the site of Hong Kong. We replaced model results in Figure 9(c,d) with these better comparisons and moved the original figure panels to the supplementary materials.

The following has been added in the text (Page 23 in the revised manuscript with track changes): "At two China coastal sites, Fuzhou and Hong Kong, the model results at the corresponding grid boxes are much lower than the observations (Fig. S4). We tried sampling the model results at

adjacent gridboxes and found that those for the gridbox to the west are much more comparable to the observed (Fig. 9c and 9d). This suggests that the observations at both sites are significantly affected by local ^{222}Rn emissions. The ^{222}Rn observations show a minimum in summer, reflecting the intrusion of low-^{222}Rn marine air associated with the Asian summer monsoon. Although the model successfully captures the observed seasonality, the simulation with ZKC (with enhanced emissions in China) shows a much better agreement compared to the large low bias in the simulation with JA97."
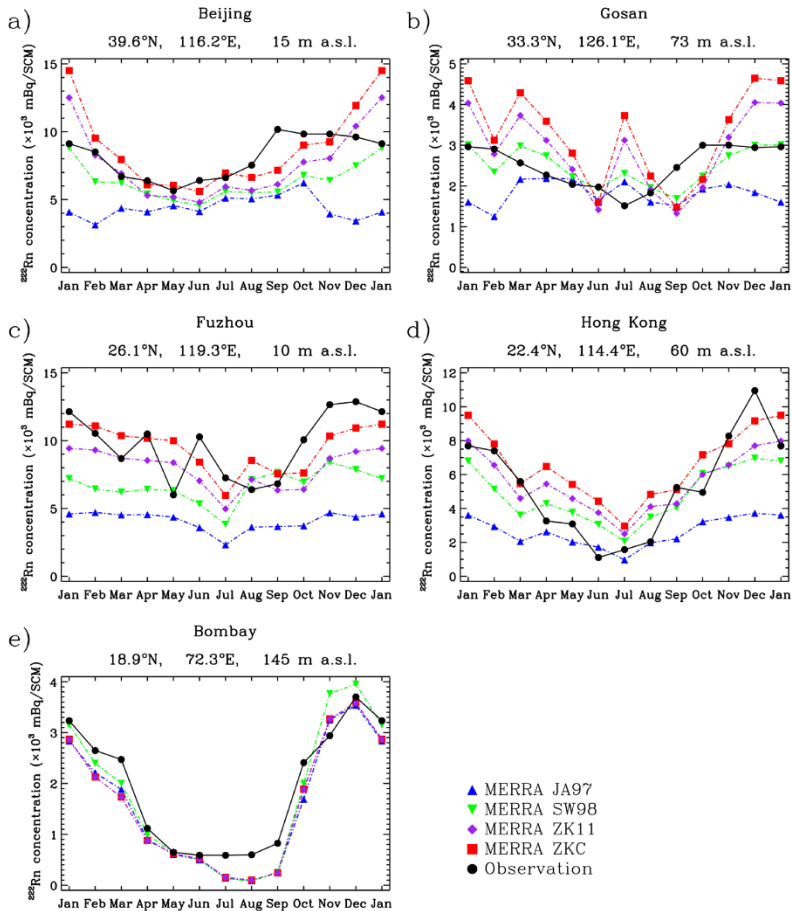
Revised Figure 9:

Figure 9. Same as Fig. 8, but for Asia. Note that the model results used in panel c) Fuzhou and d) Hong Kong are sampled at the gridboxes to the west of the ones where the sites are located to achieve a better agreement with the observations. See text for details.

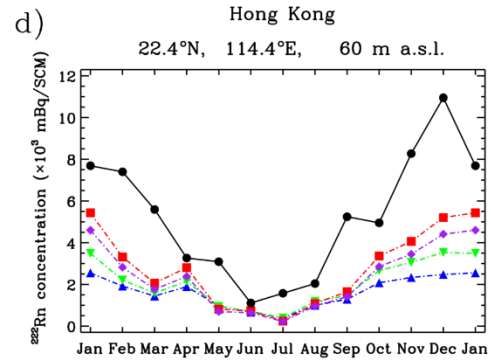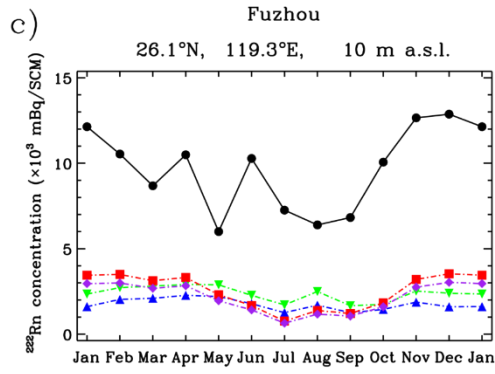In the supplementary materials, we added:

Figure S4. Same as Fig. 9 (c) and (d), but the simulated ^{222}Rn concentrations are sampled at the model gridboxes corresponding to the site locations.