Using Radon-222 to Test a Chemical Transport Model and Calculate Greenhouse Gas Fluxes

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A new high resolution radon-222 flux map for the United States has been developed by T. Szegvary (U. Basel, Switzerland). Based on the correlation between gamma dose and radon flux measurements, it has the potential to improve our ability to evaluate the accuracy of chemical transport models and calculate regional-scale greenhouse gas fluxes using only atmospheric measurements. In this poster, we use continuous boundary layer radon-222 measurements at the ARM-CART (Atmospheric Radiation Measurement – Cloud And Radiation Testbed) SGP (Southern Great Plains) site in Oklahoma to evaluate whether the new radon-222 flux map improves predictions of radon-222 concentrations relative to using previous estimates of the radon-222 flux. We then use the mismatch between observed and predicted radon-222 mixing ratios to evaluate the accuracy of the FLEXPART chemical transport model driven by NCEP winds during different synoptic conditions. Lastly, we use the radon-222 flux map and measurements of radon-222 and CO_2 mole fractions to calculate regional-scale CO_2 fluxes in the mid-West during the winter of 2006.

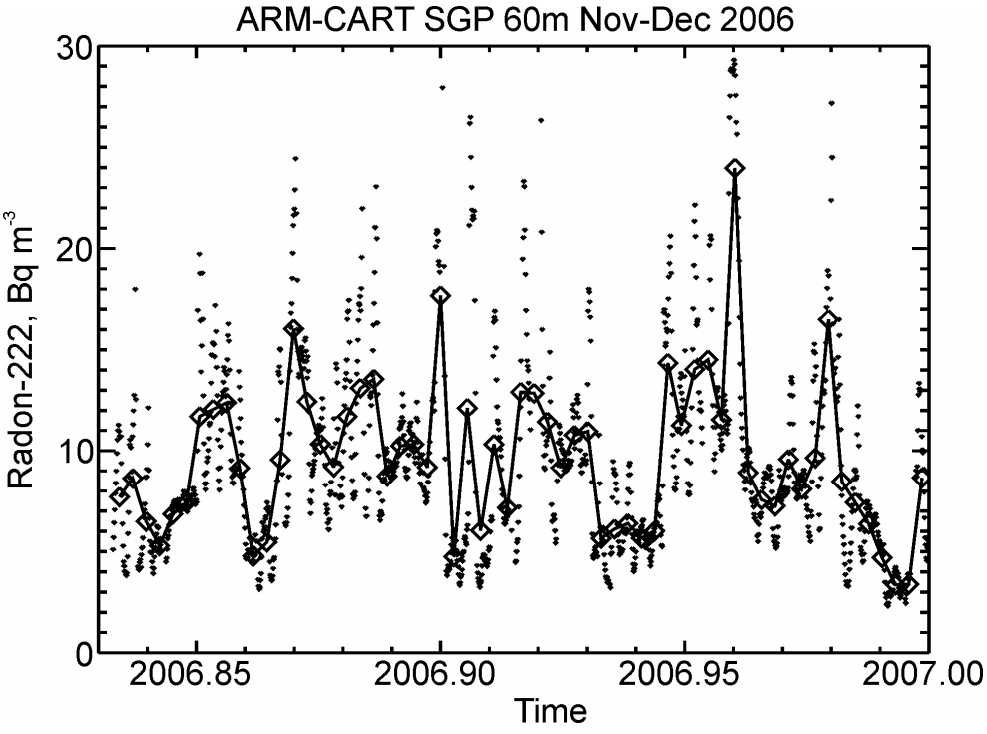

Figure 1. Hourly (points) measurements and daily averages (diamonds) of radon-222 sampled from 60 meters on the ARM-CART SGP Central Facility tower during November and December, 2006.