Modeling And Understanding Temporal Variability In Vapor Intrusion

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Long-term, high resolution studies of two vapor intrusion (VI) sites, ASU house in Utah and USEPA house in Indianapolis, has revealed significant temporal variability in indoor air contaminant concentrations. Understanding how much, and the causes of this variability, is crucial for determining human exposure at a VI site. This study uses statistical analysis and three-dimensional numerical models to investigate the conditions that give rise to the temporal variability in indoor air contaminant concentrations. VI is found to be the most significant during winter and fall, with the largest variability during these seasons. The significant seasonal differences in distributions of indoor/outdoor pressure difference, air exchange rate, and other factors, help to explain the seasonal differences in VI potential. In particular, changes in indoor/outdoor pressure difference are key drivers for the variability: independently affecting contaminant entry and air exchange rate, the combination of which gives rise to the observed variability. Using our numerical model, and the recorded seasonal mean diurnal pressure change, predicting potential maximum temporal variability.

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