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Discussions

Interactive comment on "Pipes to Earth's subsurface: The role of atmospheric conditions in controlling air transport through boreholes and shafts" *by* Elad Levintal et al.

Anonymous Referee #2

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Earth's atmosphere is extremely complex system oneself and its interaction with near-surface targets, deep dynamic geological-geophysical regularities, and some cosmic factors (e.g., tidal effects) increases the total complexness.

Without hesitation, Levintal et al. have arisen very important problem of interaction between the underground caves, boreholes and mines with the Earth's atmosphere. This publication obviously will trigger a series of new publications in this field.

For instance, in the world a lot (tens of millions) of comparatively deep (> 500 m) boreholes were drilled in different physical-geological environments. Many of them are open, semi-open or have indirect connection with the Earth's atmosphere. Calculation

of the total effect of air transport from these objects is a difficult physical-mathematical problem.

Some minor remarks are compiled below.

I believe that 'boreholes' and 'mines' cannot be included to the class of 'caves' since they are principally different targets. Besides this, most part of caves are the natural geological objects existing sufficiently long time, whereas boreholes and mines are the artificial targets which have been appeared mainly in 20th century.

Generally speaking, examination of two (three ?) targets only is insufficient one. I propose that general conclusions done in this MS for all types of underground objects is untimely one.

CO_2 concentrations in various underground targets strongly exceed the value of 2000 ppm (e.g., Guillon et al., 2015).

I can suggest that the role of viscosity in air transport (Finkelstein et al., 2006) may be more significant than presented in the MS.

The authors assumed some physical parameters as constant (for simplicity of calculations). It is a widely distributed approach and it is acceptable, for instance, for gravity acceleration and thermal expansion. However, accepting viscosity as constant is under question (Finkelstein et al., 2006). From numerous thermal measurements in wells follows that the behavior of dT/dz is not constant one (e.g., Huang et al., 2000; Eppelbaum et al., 2014). It should be taken into account in the further extension of this approach.

Obviously, an interaction between the near-surface targets and Earth's atmosphere has nonlinear character (e.g., Kardashov et al., 2000). It cannot be realized in the presented study, but can be reflected in future investigations.

I propose that after a small revision, this MS may be accepted for publication.

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