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Understanding thermoregulation and ventilation in termite mounds for eco-friendly building solutions

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Termite mounds are renowned for their ability to maintain self-sustained ventilation and thermoregulation irrespective of external climatic conditions. Although there has been significant interest in this topic, especially for designing energy-efficient buildings, it is still unclear how the mound properties are controlled. In this study, we combine X-ray tomography and numerical simulations to correlate structural properties and function in mounds constructed by *Trinervitmes geminatus*, *Cubitermes*, *Apicotermes* and *Thoracotermes* termites species. The results show a variation in flow and thermal properties in the different mounds. We find that the fluid flow in the mound is strongly controlled by the outer wall properties. We also observe that structural properties of the mound like macroporosity as well as microporosity play a crucial role in determining the diffusion of heat and CO₂ through the structure. These results will be integrated with findings from other species obtained from in-situ measurements and mounds scanned at microscale, allowing us to gain a deeper understanding of the processes governing self-sustained ventilation and thermoregulation in termite mounds.

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References

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