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**Role of heterogeneity for sound speed and attenuation in
unconsolidated ocean sediments**

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Although ocean sediments may have many types and degrees of heterogeneity, it has been determined that two-component models are tractable for poroelastic, thermoelastic, and thermoporoelastic studies. We have found in particular that a substantial part of the increased sound wave attenuation observed in both ocean sediments and laboratory glass-bead experiments above 50 kHz can be explained by such a two-component poroelastic model. Furthermore, the inclusion of thermal expansion and entropy effects into a generalized binary thermoporoelastic model provides an additional attenuation enhancement (though not as large — by itself — as the poroelastic enhancement) of a mathematically very similar type that is also relatively easy to model and understand. The paper will present this extended model as well as comparisons to available data.