Observations and coupled models of flow, salinity, and hydrate formation in deepwater Gulf of Mexico vents

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ABSTRACT

Natural vents in the Gulf of Mexico are actively expelling water and hydrocarbons. High salinities, temperatures, gas hydrate, and an uplifted bottom simulating reflector (BSR) have been observed at these vents. I focus on a seafloor vent in the Ursa Basin in lease blocks MC852/852. I show that upward flow of water from a fixed depth cannot explain temperature and salinity profiles. Transport from depth can explain salinities and temperatures if there is another fluid advecting heat but not salt.

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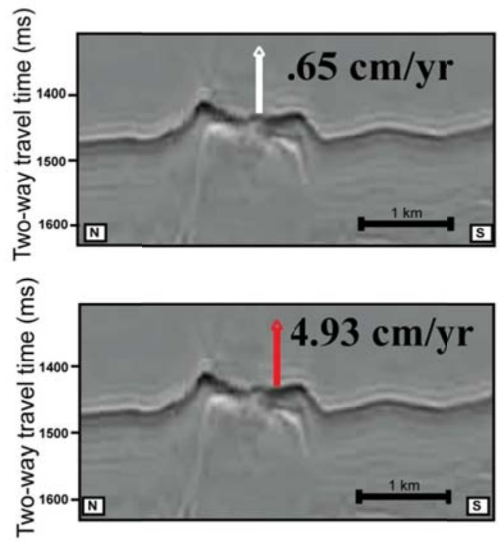

Fig. 1: Seismic cross sections of vent at MC852/853 are overlain by upward velocities correlative with locations of modeled salinity (top) and temperature (bottom) data.

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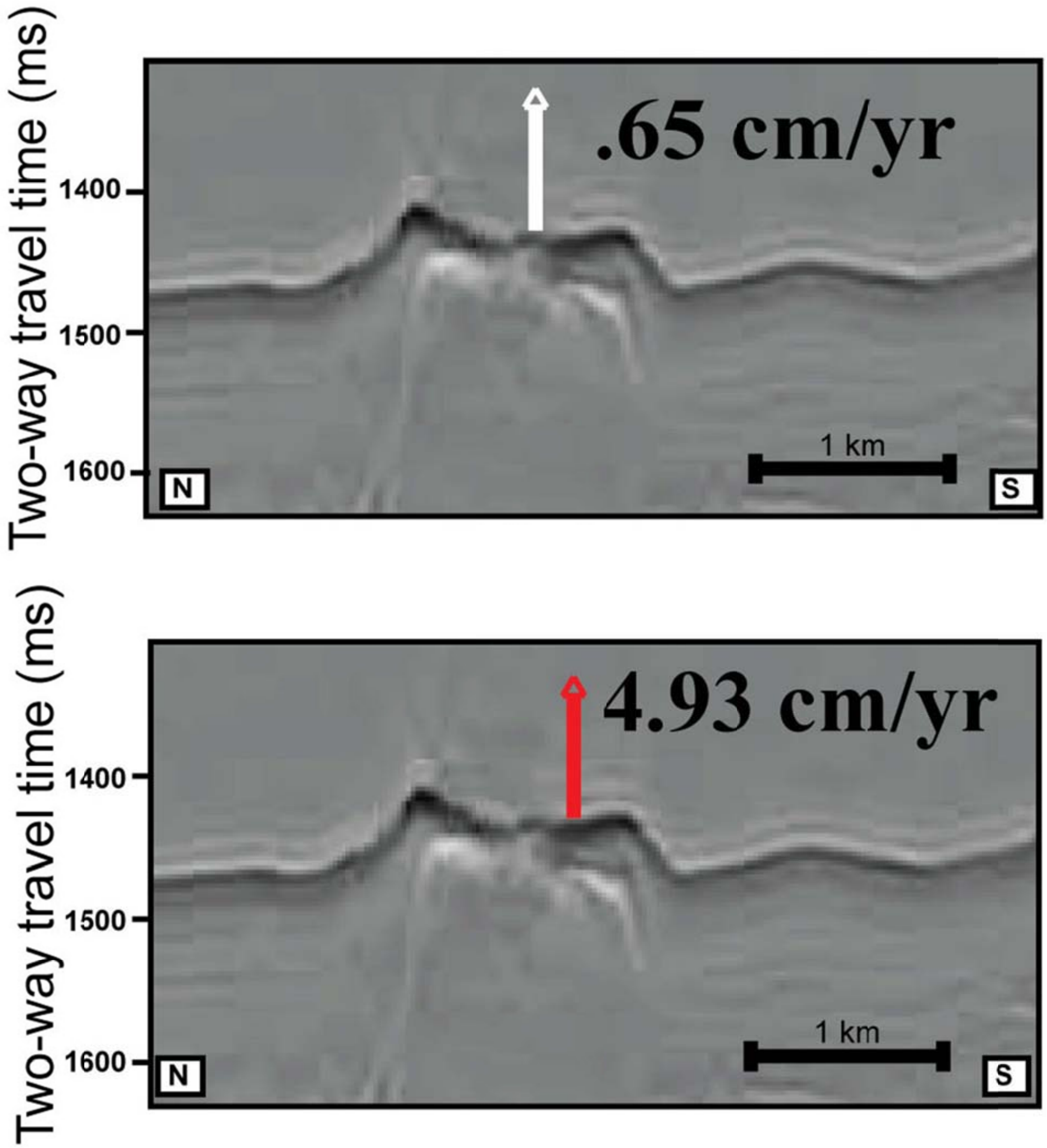

Fig. 1: Seismic cross sections of vent at MC852/853 are overlain by upward velocities correlative with locations of modeled salinity (top) and temperature (bottom) data. The vertical velocity necessary to create the observed temperature gradient at the surface is ~5 cm/yr. In contrast, an upward velocity of .7 cm/yr is necessary to explain the observed salinity gradient at the seafloor.

Back