



Supplementary Figure

To determine if the observation of anomalously deep BSRs in seismic line 80.A are widespread, we conducted a 2D heat flow analysis on other published, publicly available seismic lines in this area. Seismic line S1 is located ~55 km north of seismic line 80.A and seismic line S2 is located ~45 km north of seismic line 80.A. Both lines, originally analyzed by Carpenter 1981, were collected along the Carolina Rise. The raw data (a) show a clearly identifiable BSR located below the seafloor that Carpenter (1981) highlights in his original study. Running our hydrate stability model using present-day (Gulf Stream) ocean temperature conditions (b), the model-predicted base of the hydrate stability zone (i.e. the BSR) is consistently shallower than the observed BSR depth, implying that ocean temperatures recently warmed, and that gas hydrate is destabilizing in this region. Running the model using Atlantic Ocean temperatures outside the Gulf Stream (c), the model-predicted BSR depth closely matches observed BSR depths. Model results at seismic line S1 and S2 are virtually identical to those at seismic line 80.A, with all results implying recent ocean temperature warming at water depths shallower than 1,000-1,200 m below sea level along the Carolina Rise.