

**Supplementary Table 1.** Proportions of methane (C<sub>1</sub>) to ethane (C<sub>2</sub>) and the stable isotope composition of methane ( $\delta^{13}\text{C}$ -CH<sub>4</sub>) of gas and oil collected by gas bubble sampler during cruise M 114 in the southern Gulf of Mexico.

Area	Site	ROV Dive No.	GeoB Sample No.	Latitude	Longitude	Depth	C <sub>1</sub> /C <sub>2</sub>	$\delta^{13}\text{C}$ -CH <sub>4</sub> (‰ V-PDB)	Comments
Tsanyao Yang	Near Site 3- Stream 1	358	19337-2	22°23.604'N	93°24.279'W	3374 m	14	-45.7	Oil-coated bubbles
Tsanyao Yang	Near Site 3 – Stream 2	358	19337-12	22°23.604'N	93°24.303'W	3370 m	17	-45.1	Clear bubbles
Mictlan Knoll	Marker M114-5	357	19336-5	22°01.341'N	93°14.951'W	3146 m	2	-56.4	Oil drops
Mictlan Knoll	Hydrate Hill	357	19336-8	22°01.489'N	93°14.776'W	3084 m	170	-48.8	Clear bubbles
Mictlan Knoll	Hydrate Hill	357	19336-15	22°01.490'N	93°14.773'W	3082 m	185	-49.3	Clear bubbles sampled 5 to 8 m above seafloor
Mictlan Knoll	Hydrate Hill	360	19346-8	22°01.484'N	93°14.768'W	3071 m	167	-49.8	Clear bubbles sampled 20 m above seafloor
Chapopote Knoll	Bubble Site	354	19325-13	21°53.9996'N	93°26.1149'W	2925 m	41	-46.5	Clear bubbles
UNAM Ridge	Depression	352	19318-9	19°55.8328'N	94°20.5644'W	1287 m	30	-46.1	Clear bubbles