Natural Gas Leaks

Where there are organics in the subsurface gas is leaking

L. M. Cathles
Cornell University
Gas is leaking all over the GoM

Hydrocarbons maturing and migrating today, pouring out of ~10,000 seeps on the seafloor

Gas supports all kinds of life

Hydrate: the ice that burns

800 m diameter methane plume from Bush Hill GoM

Bush Hill Hydrate Mound and gas seep

Methane bubbles

Hydrate (frozen methane)

Ian MacDonald (TAMU)

Brine pool

Methanotrophic mussels

Worms grazing on bacteria growing on surface of methane ice

Cathles (2004)

Gas supports all kinds of life

http://oceanlink.island.net/ONEws/ONEws7/images/mud%20vol%20-%20FBGNMS.jpg

Mud Volcano

http://oceanlink.island.net/ONEws/ONEws7/images/methane%20gas.jpg

Gas
Small oil droplets adhering to hydrate

Mineral chimney and microbe mats
[Image: http://i.livescience.com/images/090407-deep-vent-02.jpg]

Ian MacDonald (TAMU)

Madrepora coral
Mississippi Canyon

Callogoria coral; cup coral

Oceanexplorer.noaa.gov
Gas escape pockmarks cover the continental shelves

Figure 2.16: Pockmarks in the northern part of the South Fladen Pockmark Study Area; MBES survey, 2001. The pipeline (Scott-Forties Unity pipeline; 24 inch, 61 cm, diameter) gives an idea of the scale. [Image acquired by the UK government (Department of Trade and Industry) as part of the Strategic Environmental Assessment process.]

Judd and Hovland, Seabed Fluid Flow (2007)
Azerbaijan is a spectacular example of natural gas and oil leakage.

In Azerbaijan mud volcanoes are literally inverting the stratigraphy.

**Gas pipe** - when gas can leave source

**Mud volcano** - when it can’t

14 km depth

Mud volcano 400-500 m high and 1-3.5 km diameter

Mud breccia outbursts with gaseous jets
Entrained fragments of rock 1-2 m diameter

Triad of oil, gas, and diapiric structures
10 to 13 year eruption cycle
Eternal methane fires (1000 yrs)

Other examples…

- Tar pit of Trinidad (extraction of Kerosene)
- Baku- eternal flames (Azerbaijan)
- “Flamable springs” in Ohio- Lima field
- Sumatra seepages used by natives
- California tar pits and seepages in La Brea
- Higgens (Spindletop) Sunday school outing gas springs
- Oils seeps in Persia- Maidan-i-Naftan ("plain of oil")
- Baba Gurgan in Iraq, burning furnaces of Nebuchandnessar
- Abu Naft (father of oil) Frank Holmes “smelled it”
- Louis Weeks (Tasman Straights Oil): oil on Australian beaches
Where there is gas, there are gas leaks

Shale Creek Preserve at Chestnut Ridge Park, NY

Well after methane explosion in Dimock, Pa

Shop owner noticed gas bubbling up into brook, dug a pit and diverted it into his and some of his neighbors stores.
References


