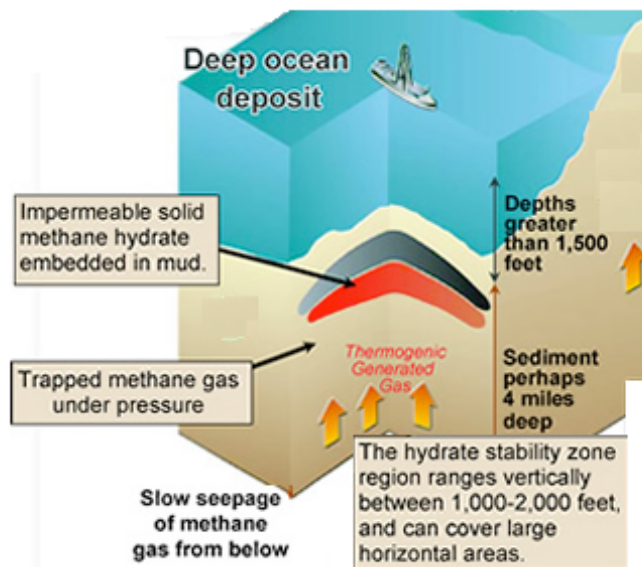


Could a Blown-Out Well  
 at the Base of the Gulf of Mexico Continental Shelf Edge  
 Release Enough Pressure at a Sub-Salt Methane Hydrate Layer  
 to cause an Explosively Expanding Methane Gas Bubble  
 that Sinks all Ships and Rigs in the area,  
 causes a Primary Tsunami,  
 and triggers a Continental Shelf Edge Landslide and another Huge Tsunami  
 which Landslide then triggers even more Explosive Release of Methane  
 and yet another Tsunami and more, larger, Landslides and Tsunamis ?



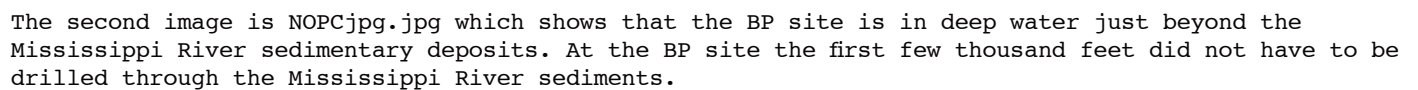
(above image adapted from samadhisoft.com web page)

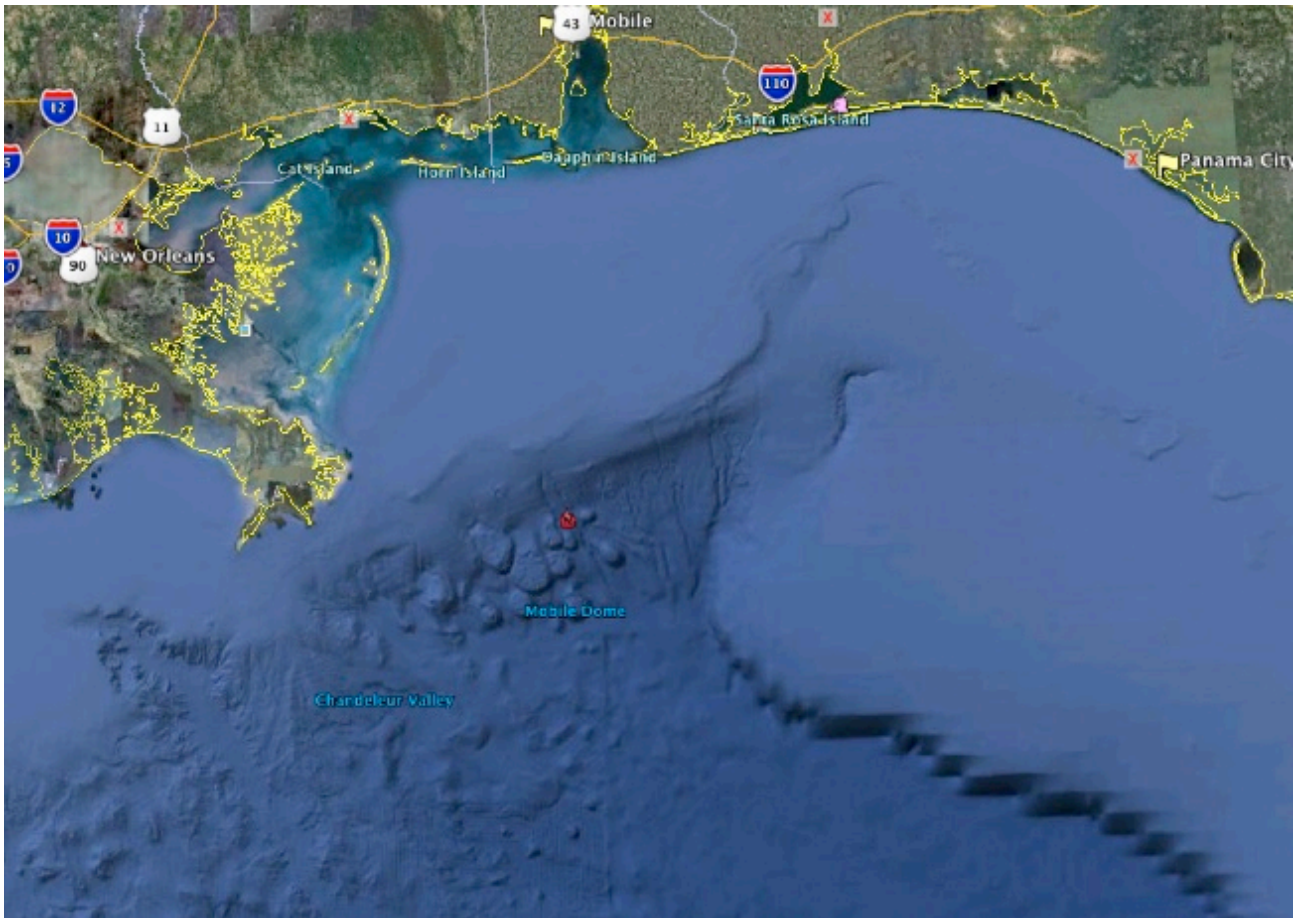
An ethomas.web.wesleyan.edu web page says "... gas hydrates are found on the outer continental margins ... gas hydrates are stable at low temperatures and/or high pressures ...[and]... are not stable when the temperature rises or the pressure falls. ...[if]... hydrates ... become so deeply buried that the temperature will increase according to the regional geothermal gradient ... the hydrates will ... no longer be stable, and will disintegrate into a liquid water and gas mixture ... leading to the development of a zone with low shear strength where failure could be triggered and massive landslides occur. With the landslides, more gas could escape. Several examples of possibly gas-hydrate linked extremely large slumps [undersea landslides] have been described, e.g., on the Norwegian continental margin ... One of the Storegga [Norwegian] slides caused a tsunami to deposit sediment up to 4 m above the high water line in Scotland. ...".

With respect to the April 2010 blowout of a BP well at the base of the Gulf of Mexico continental shelf edge, dougr said in a 13 June 2010 blog comment "... what we had was BP running out of 50,000 barrels of mud in a very short period of time ... a lot of the "kill mud" was leaking out instead of going down into the well ... The well pipes below the sea floor are broken and leaking ... BP ... shifted from stopping or restricting the gusher to opening it up and catching it ...these things lead to ... a fully wide open well bore directly to the oil deposit ...".

WILL A FULLY WIDE OPEN WELL BORE DIRECTLY TO THE METHANE HYDRATE  
 RAISE ITS TEMPERATURE (WITH RELATIVELY WARM SEA WATER)  
 AND  
 LOWER ITS PRESSURE (AS IN OPENING A SHAKEN BOTTLE OF CHAMPAGNE)  
 thus causing  
 A METHANE EXPLOSION,  
 CONTINENTAL EDGE UNDERSEA LANDSLIDE,  
 and  
 TSUNAMIS ?

The first image is GulfMexico.jpg.jpg and it shows that the BP well site (shown as a red fire symbol) is pretty much due north of Chicxulub, Mexico, which is the site of the impact about 65 million years ago that killed the dinosaurs:





The third image is WellSite.jpg which shows that the BP well site is in an area with a lot of domes and north-south lines some of which may be related to fractures from the Chicxulub impact 65 million years ago.

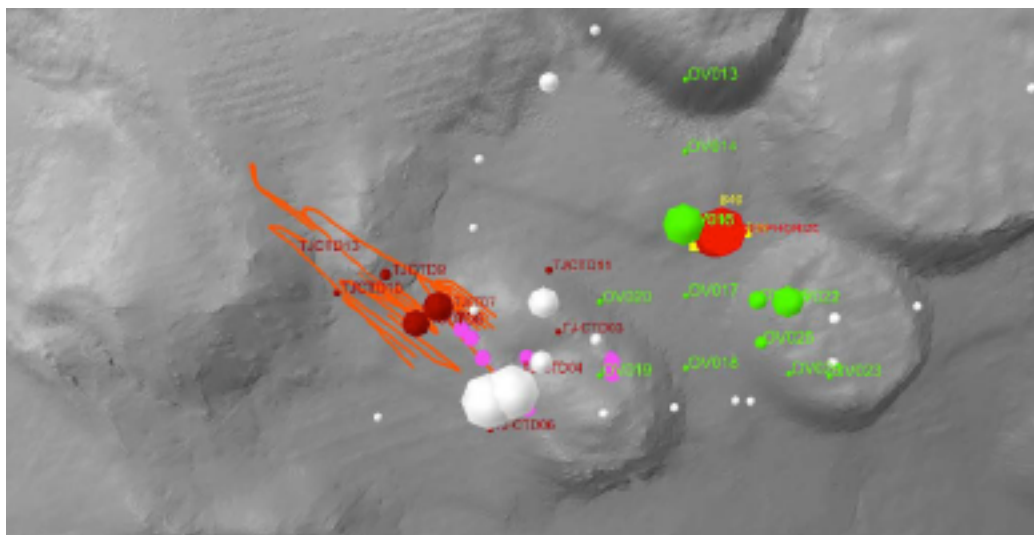




According to the

## NOAA Ship Thomas Jefferson Deepwater Horizon Response Mission Report, Interim Project Report - Leg 2, June 3-11, 2010:

“... A primary objective of the *Thomas Jefferson* program has been to test the feasibility of using surface-ship borne, acoustic sensors to locate submerged oil (if present) at depth. ... the chemist on board (from ASA Associates) had been involved in earlier CTD ... an acronym for Conductivity (salinity), Temperature and Depth ... operations and reported that anomalous CTD measurements had been discovered southwest of the well-head. ... During the course of this survey, we noted an acoustic signature at that depth (particularly at 38 kHz) that did not seem to follow the pattern of biological scatters. This signature was a sloped reflector ... Bottom Following Reflectors ... BFR ... that appeared to follow the bottom topography and was distinct from the base of the scattering layer ... A CTD cast at this site (CTD 07) resulted in our first indication of high fluorescence, high optical backscatter and low dissolved oxygen. The depth of this anomaly coincided with the top of the BFR ... The geographic distribution of the Bottom Following Reflectors may offer some insight into what we are seeing (Fig 19). ...

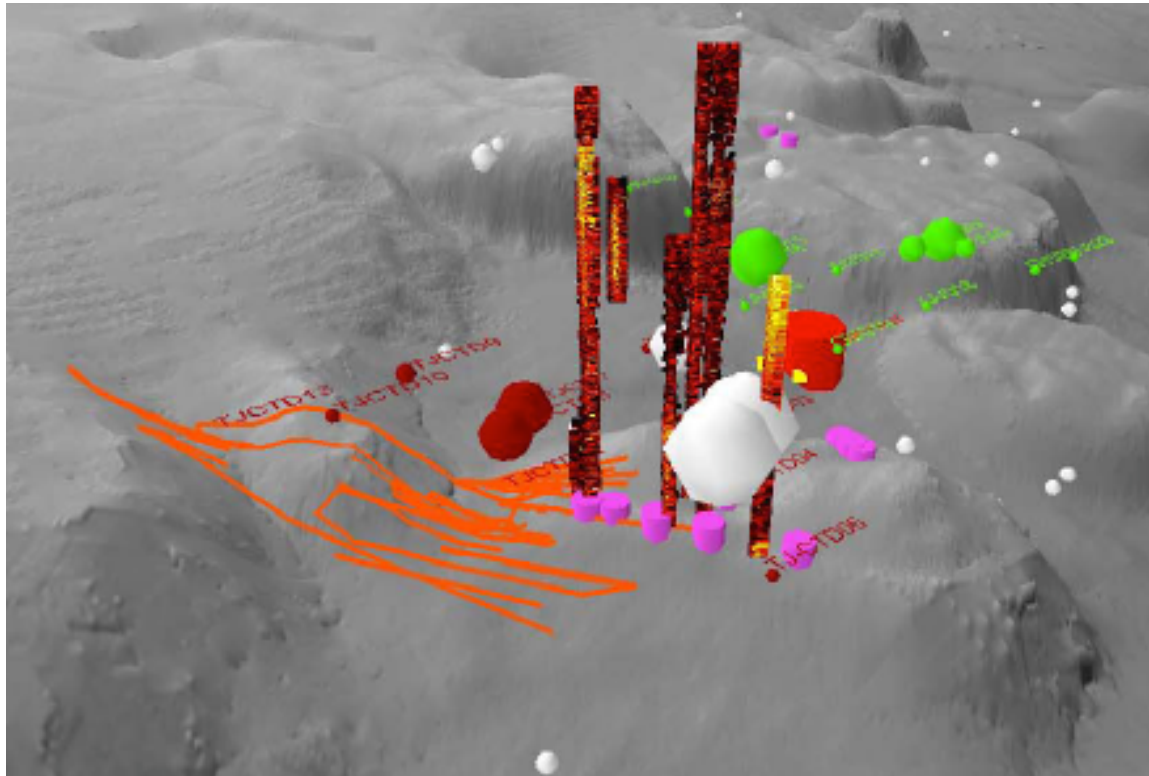


**Figure 19. Geographic distribution of BFR's (orange lines).  
Note that they are clustered in along the western slope of the passage between  
two bathymetric highs that surround the well site (red cylinder).**

... The occurrence of BFR's seems to be concentrated along the western slope of a passage between two bathymetric highs to the southwest of the well-site. ADCP data from rigs at the wellhead imply that bottom currents



flow in this direction and the sloping nature of the BFR and the fact that it appears to follow the topography implies that what we may be seeing acoustically is a water-mass boundary that has become the locus for concentration of oil particles. The highest values of fluorescence on both our leg and on the *Gordon Gunter* mission were found in proximity to this passage. It is important to note though that this same area is also the locus of a large number of ... **seeps** (Figure 20) that may also be contributing oil to the bottom waters. ...



... **seeps** (red and yellow columns) mapped by Thomas Jefferson, and by Gordon Gunter (purple cylinders) along with CTD stations showing high fluorescence (brown, green and white spheres). Deepwater Horizon well site is in background (red cylinder) and distribution of Bottom Following Reflectors is represented by orange lines. ...”.

If the volumes of the indicators (columns, cylinders, spheres) are even roughly correlated with the associated volumes, then it may be that the volume of oil/methane released by the **seeps** may be at least as great as the volume of oil/methane released by the Deepwater Horizon well site, so:

## **What caused the seeps?**

The NOAA report calls them “natural seeps”, but, as Alexander Higgins said on 28 June 2010 on his blog ( <http://blog.alexanderhiggins.com/> ):

“... NOAA has said that the leaks on the sea floor ...”appear to be pre-existing seeps that occur naturally and are unrelated to the spill” and have labeled leaks as such in the Thomas Jefferson report. ...

It is ... questionable why NOAA would label such seeps as “appear to be natural or pre-existing” while saying that the other anomalies found floating in the water column beneath the sea surface need further testing to verify that they are indeed oil and need to be confirmed as coming from the blown BP well. ...

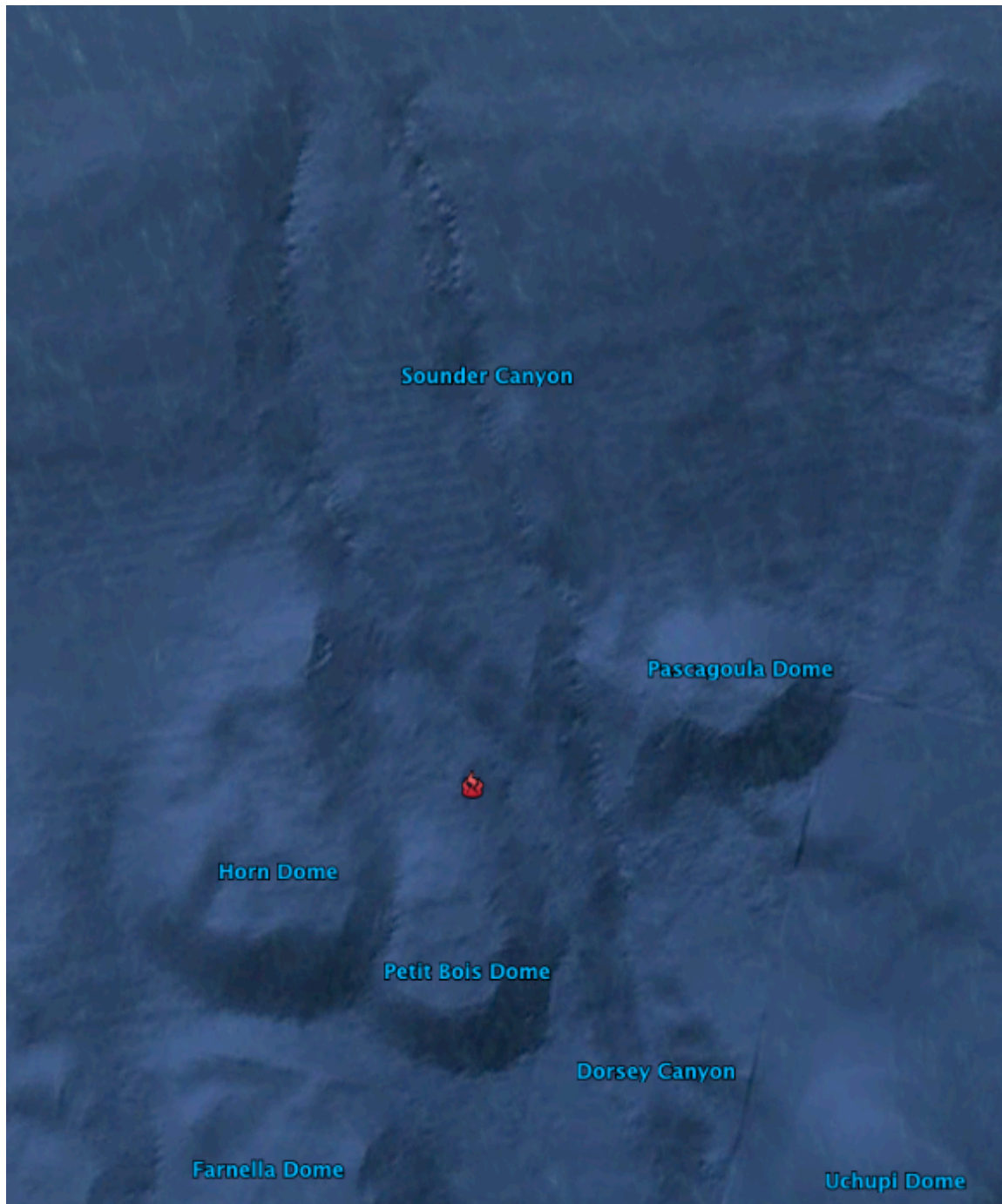
... Whether or not the leaks mapped by the Thomas Jefferson has found on the sea floor are natural or have been caused by the BP well blowout ... there still exists additional concerns that the oil and gas leaking from the BP well could be finding a path into those leaks, natural or not ...

As Matt Simmons stated the ship logs reveal that the Thomas Jefferson located was denied permission to investigate near the well, first being denied permission to get closer than 5 nautical miles and finally being granted permission to come within 3 nautical miles. ...”.

Since the Thomas Jefferson was not permitted to survey the entire region of the Deepwater Horizon well site, it may well be that there are many more seeps and BFRs than those shown in figure 20 of the NOAA report.

## **What are the BFRs?**

If you look at the BFRs (orange lines in figure 20 of the NOAA report) and compare a detailed Google Earth map (well site as red marker) of the sea floor, you see

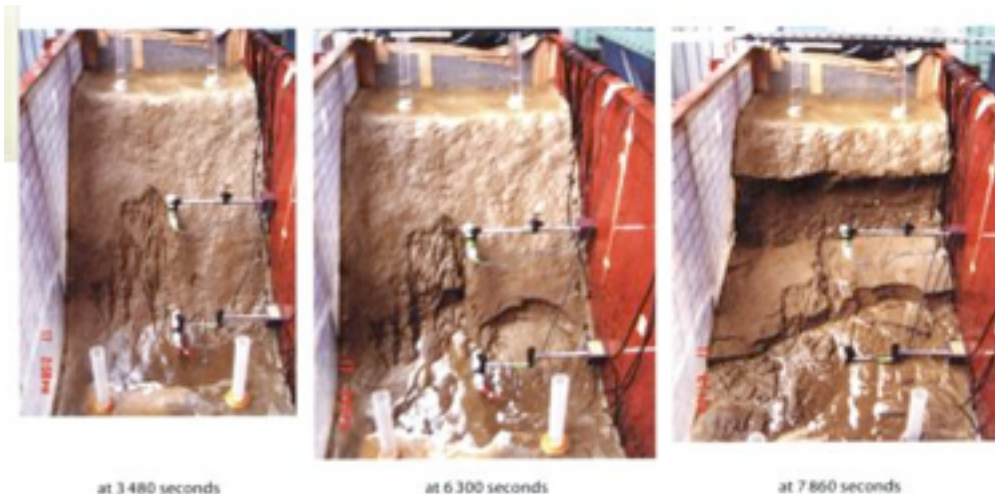


that they follow Sounder Canyon which leads from the high seafloor of the Gulf of Mexico Continental Shelf down to the low deep seafloor of the Gulf, which is consistent with the statement of the NOAA report “... the fact that ... the BFR ... appears to follow the topography implies that what we may be seeing ... is a water-mass boundary ...”.



## Could the BFRs be Precursor Events of a major Submarine Landslide?

The book Landslides (ed. by Sassa, Fukuoka, Wang, and Wang, Springer 2005) says: “... In the past, probably a series of ... landslides scraped a part of the mountain ridge of Machu Picchu slope along a shear band ... Inca people ... constructed a citadel on ... [t]he flat area ... formed ... on the mountain ridge ... When undercutting by river erosion reached the level of another shear band ... another series of ... landslides have proceeded along the shear band near or a little bit higher than the present river bed. ... The slope deformation affecting the citadel part ... is a precursor stage of landslides ... it can become ... a real landslide as a result of retrogressive development of landslides from the Urubamba River ... [undercutting erosion by the river has some similarity to rainfall erosion in the lower part of a slope, so]... It was ... attempted ... to investigate the relationship between rainfall-induced displacement and ... slope failure ... lateral displacement may be good precursors ... minor displacement started around 2 500 s ...

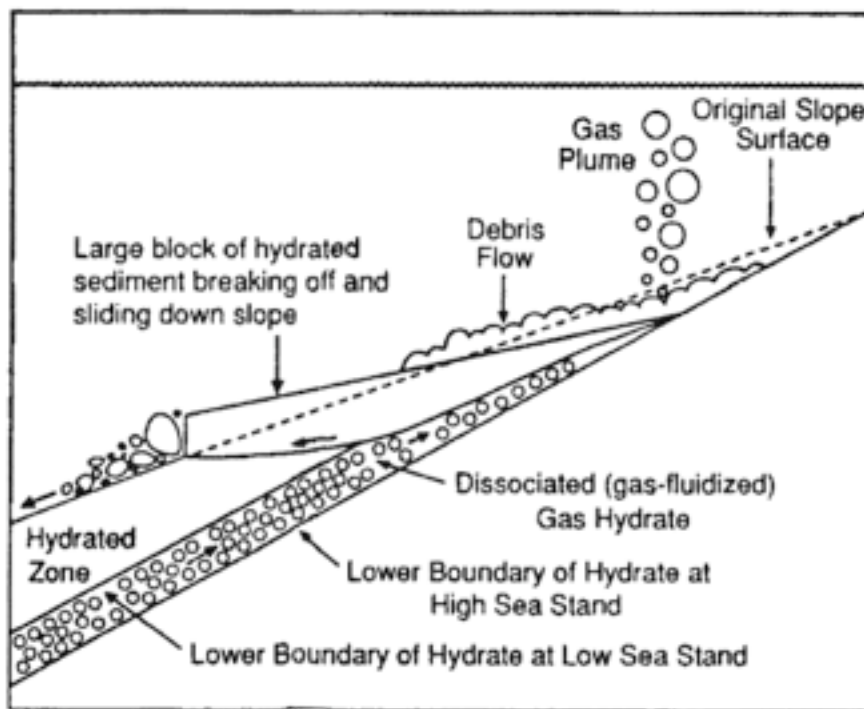


... some instability occurred at 3 480 s. ...”. It seems to me that small flows like those seen at 3480 seconds resemble the BFR flows so that the Gulf of Mexico Deepwater Horizon well site

**BFRs may indeed be precursors of major Submarine Landslides that look like the experiment at 7 860 seconds.**

**Could Methane Release in the area of the Deepwater Horizon well site undermine the base of the Gulf of Mexico Continental Shelf and so cause a major Submarine Landslide and Tsunami?**

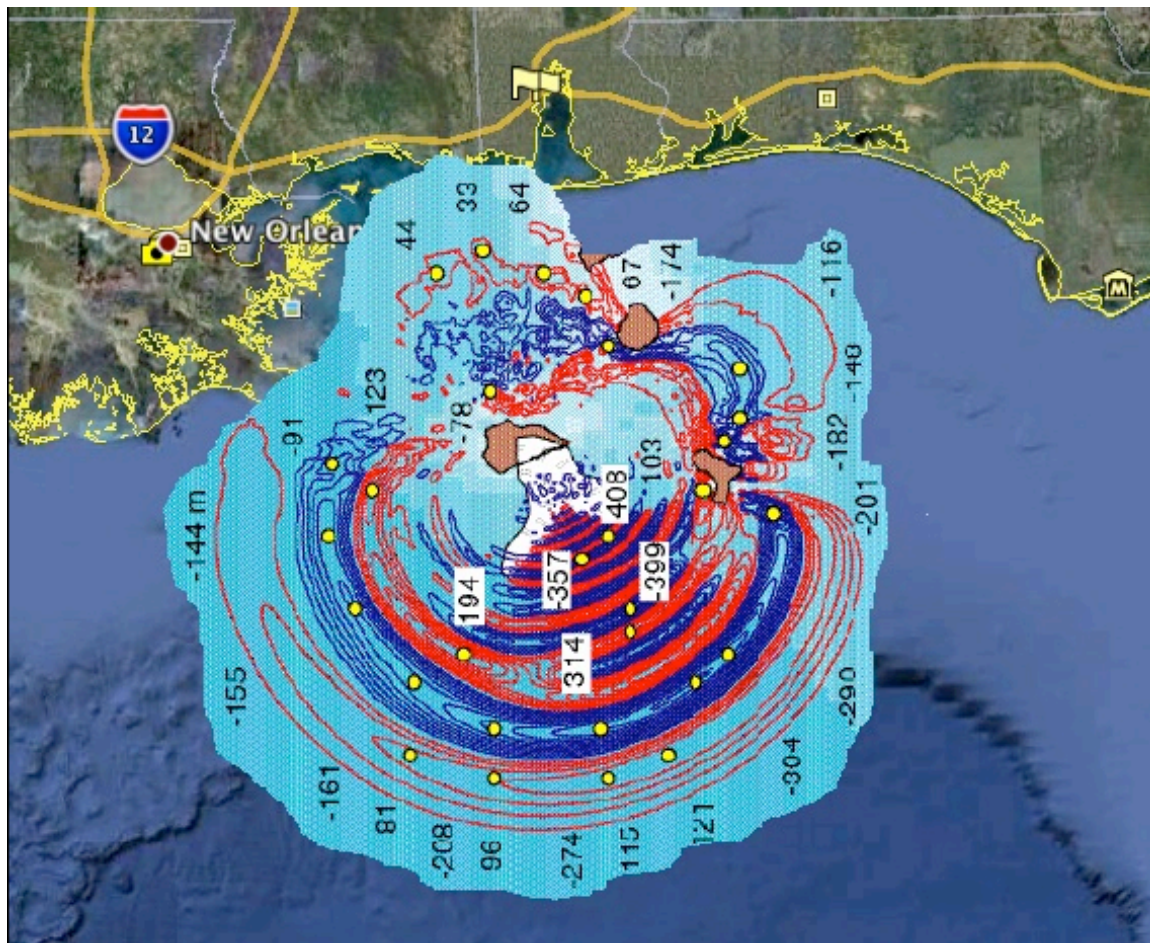
The book *Submarine Landslides and Tsunamis* (ed. by Yalciner, Pelinovsky, Okal and Synolakis, Kluwer 2003) says: "... gas hydrates are metastrable, changes of pressure and temperature affect their stability. Destabilized gas hydrates beneath the seafloor lead to ... submarine slumps and slides ... One cubic meter of methane hydrate ...[can]... yield 164 m<sup>3</sup> of gas of 0.8 m<sup>3</sup> of water at standard temperature and pressure ... Stable methane hydrates are found at the conditions that exist near and just below the sea floor where water depth exceeds 300 to 500 meters. ... Hydrates can exist up to depths of about 3100 m below the sea floor. Below that level heat tends to keep the methane free in the form of gas. ... Hydrates ...[can]... form when faults permit natural gas (or other gases) to migrate from deeper inside the Earth's crust ... Areas with hydrates appear to be less stable than other areas of the seafloor. ... Hydrates can cement loose sediments in the surface layer several hundred meters thick ...[but]... If the hydrate dissociates, the rock formation becomes unconsolidated and loses its strength ... there is a link between hydrates and the occurrence of landslides on the continental margin. ...



... Landslides may begin when hydrates at the base of the hydrate layer break down, so that the bottom of the hydrate deposits is no longer semi-cemented by is instead full of free methane. ... The result may be cascading slides, which could result in even further breakdown of hydrate and release of methane ... One of the largest pre-historical submarine landslides with the estimated volume of mass flow of  $1,700 \text{ km}^3$  occurred ca. 7000 BC in the Northern Sea at the edge of the continental shelf of Norway (the Storegga slide). The resulted tsunami hit a large part of the Scottish coast with heights up to 6-8 meters. ...”.

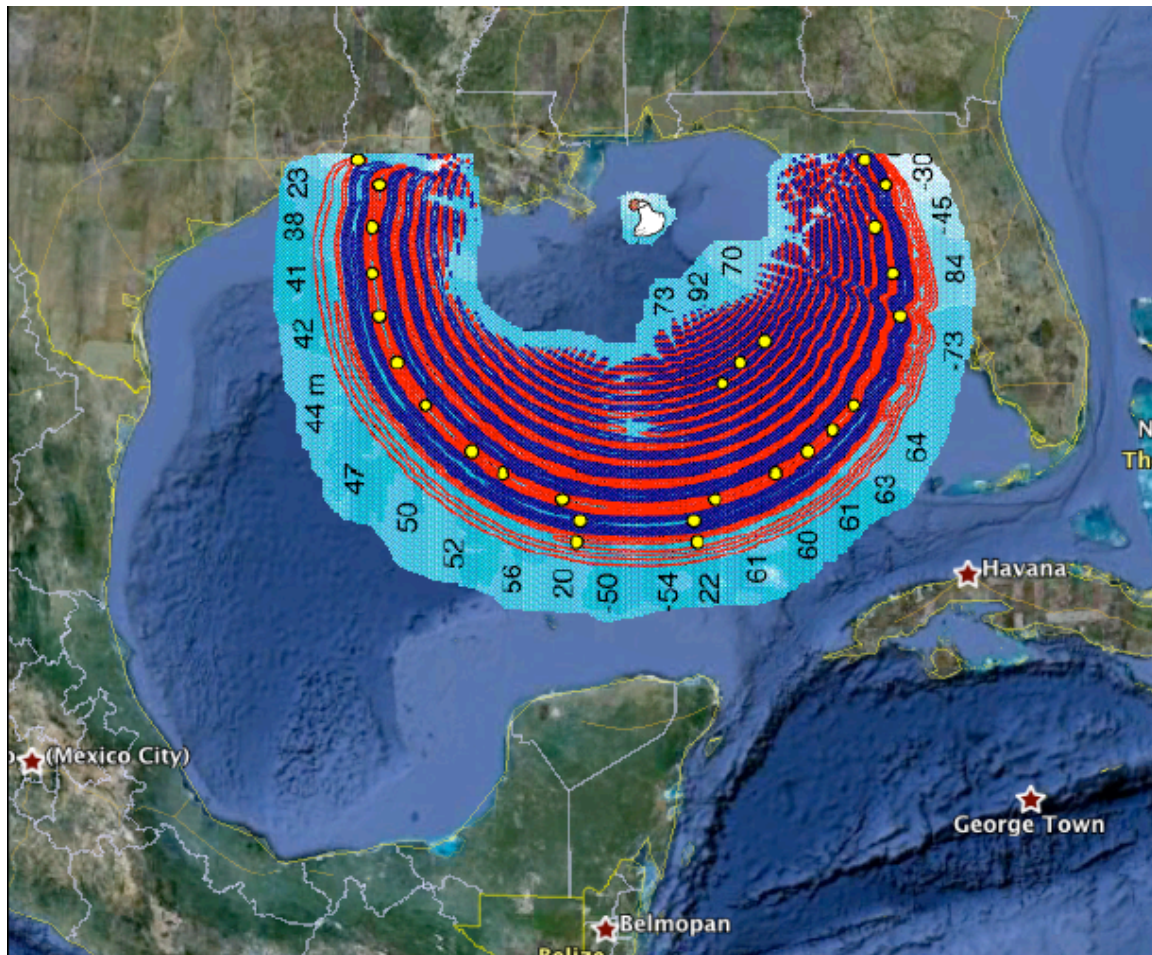
As to how a Gulf of Mexico tsunami might look, a study was done by Steven N. Ward and Simon Day entitled Cumbre Vieja Volcano - Potential collapse and tsunami at La Palma, Canary Islands, so I overlaid some of the images in the Ward and Day paper onto Google Earth images of the Gulf of Mexico (with wave heights and troughs in meters).

15 minutes after landslide:





One hour after landslide:



Obviously the images have not taken into account detailed comparison of a Gulf Methane Hydrate shelf undersea landslide with a Canary Island volcano undersea landslide, etc., and you can argue about details of mathematical models used by Ward and Day and their applicability to the Gulf of Mexico, however,

IT IS CLEAR THAT

IF A GULF TSUNAMI OCCURS THE WARNING TIME WILL BE ON THE  
ORDER OF ONLY AN HOUR

and

THE MAGNITUDE OF THE TSUNAMI WILL PROBABLY BE ON THE  
ORDER OF TENS OF METERS

and

THE THREAT IS TO THE ENTIRE GULF COAST,  
NOT ONLY USA TEXAS-LOUISIANA-MISSISSIPPI-ALABAMA-FLORIDA  
BUT ALSO MEXICO AND CUBA.

## Could the Submarine Landslide/Tsunami Destabilize Metastable Methane in the deep waters of the Gulf of Mexico?

“... Scientists, including those working on ... the U. S. Geological Survey’s “flow team” ... estimate that methane makes up between 40 percent and 70 percent of what is spilling into the Gulf [ from the Deepwater Horizon well site ] ... In early June [ 2010 ] a research team led by Samantha Joyce of ... the University of Georgia investigated a 15-mile long plume drifting southwest from the leak site [ i.e., down into the deep water basin of the Gulf of Mexico ]. They ... found methane concentrations up to 10,000 times higher than normal ...” according to an 18 June 2010 AP article by Matthew Brown and Ramit Plushnick-Masti.

“... Texas A&M University oceanography professor John Kessler ... took measurements of both surface and deep water within a 5-mile ... radius of BP’s broken wellhead ... the crew ... found ... some ... methane ... concentrations that were 100,000 times higher than normal ...” according to a 22 June 2010 Reuters article by Julie Steenhuysen.

“... The normal methane amount that escapes from a compromised well is about 5 percent. ... John Kessler of Texas A&M ... has calculated that the ruptured well is spewing ... 40 percent methane. ... A huge ... rift ... on the ocean floor ... hemorrhaging oil and methane ... has been reported by the NOAA research ship, Thomas Jefferson. Before the ... government enforced news blackout ... scientists aboard the ship voiced their concerns that the widening rift may go down miles into the earth. ... It ...[is]... 10 miles away from the BP epicenter. Other, new fissures, have been spotted as far as 30 miles distant. ...” according to a helium.com web article by Terrence Aym.

The 2007 History Channel TV program "Mega Disasters - Methane Explosion" interviewed Gregory Ryskin, author of “Methane-driven oceanic eruptions and mass extinctions (Geology, September 2003; v. 31; no. 9; p. 741-744). The following quoted material is of Ryskin from those sources [ I have modified calculations about methane explosion to more closely represent the case of the Gulf of Mexico ]:

"... In stagnant water masses ... such as deep-water masses isolated by topography .. the oxidation potential of the water column will be ... overwhelmed by ... the flux of methane bubbles from the seafloor ... it may take a million years for turbulent mixing to penetrate vertically ... accumulation of dissolved methane ... can accumulate to high concentrations ...

The solubility of methane in seawater ... is nearly proportional to pressure ... and ... increases as temperature drops ...

when the concentration of the dissolved gas is only slightly below saturation throughout ... locally there is no tendency for the dissolved gas to exsolve (to form bubbles) ... Thus, the system is in a metastable state ... this state is not an equilibrium one, even locally ... the continuous supply of methane ... from the seafloor ensures that the concentration profile will remain nonuniform

...

A very fast transition from this metastable state can be triggered by disturbances that displace fluid a finite distance in the vertical direction [ think of a submarine landslide ]... a parcel of fluid that is displaced upward ... is ... subjected to lower hydrostatic pressure, to which corresponds a lower solubility value. As a result, the fluid is ... supersaturated, exsolution will begin ... volume ... increases due to the formation of bubbles .... The result is a violent eruption ...



From the initial eruption site, hydrodynamic disturbances propagate in all directions ... triggering eruptions at other sites ... the eruption should spread quickly throughout the region ... the erupting region “boils over”,



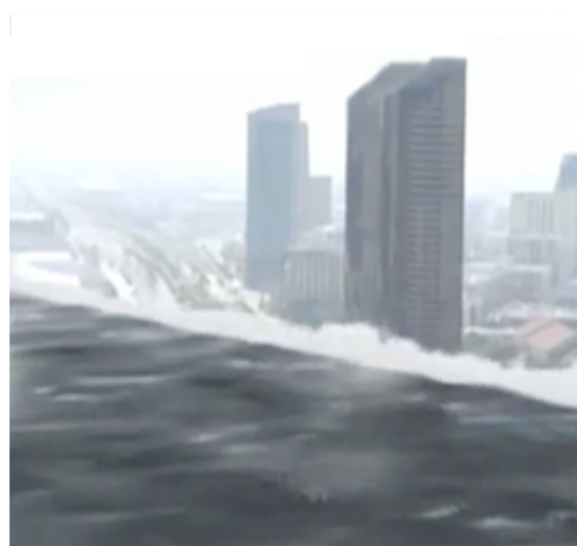
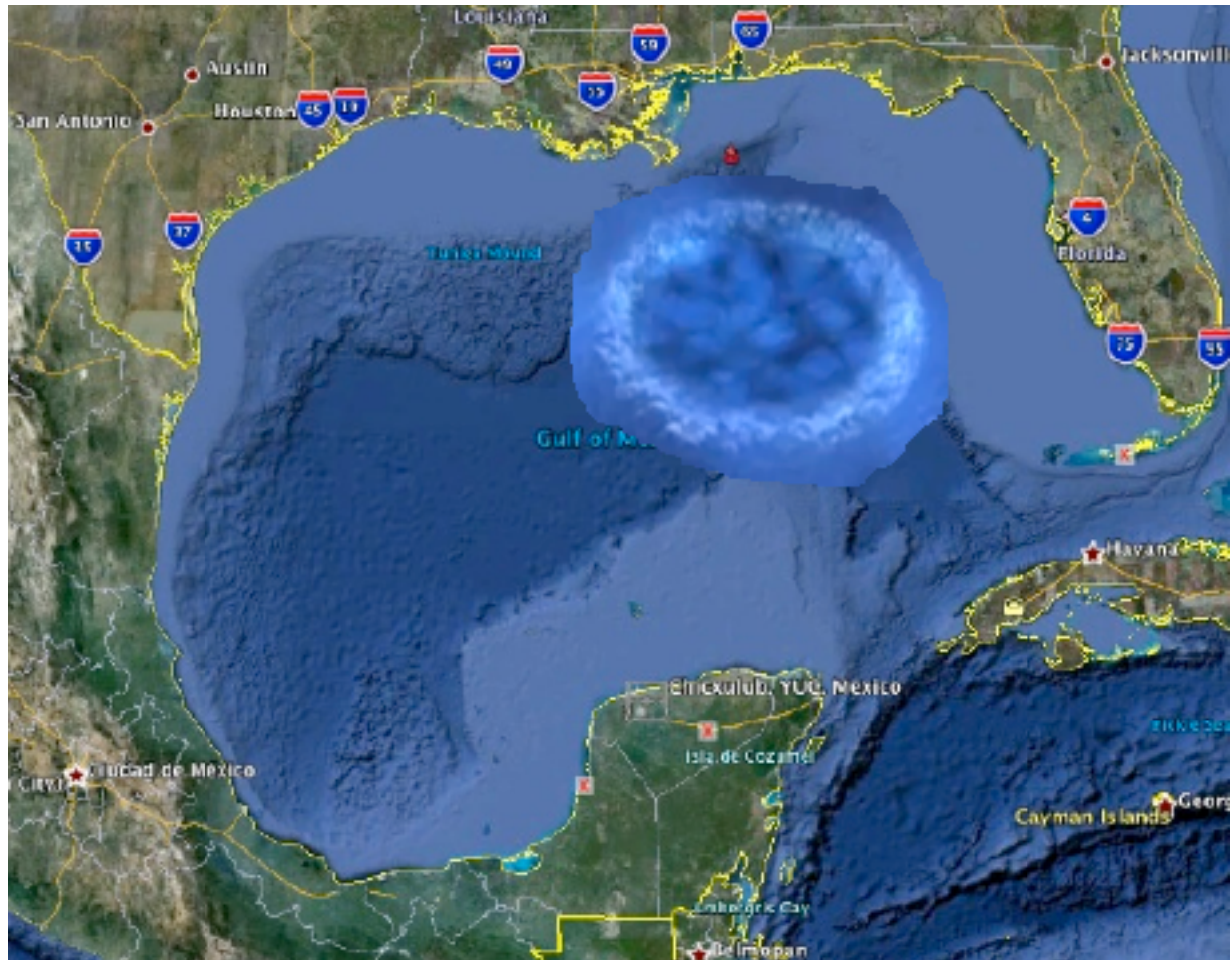


ejecting a large amount of methane ... into the atmosphere and flooding large areas of land ... methane loaded with water droplets ... is ... heavier ... than air ... and thus spreads over the land, mixing with air in the process (and losing water as rain). The air-methane mixture is explosive at methane concentrations between 5% and 15%; as such mixtures ... are ignited by lightning, explosions and conflagrations destroy ... life ... and ... carry smoke and dust into the upper atmosphere, where they may remain for several years ... resulting ...[ in ]... darkness and ... cooling ... In detonation, the combustion zone is preceded by a shock wave, moving with velocity about 2 km / sec ; pressures of about 30 bar can be produced ... The likelihood of the ... detonation transition increases with the size of the gas cloud ...[ which ]... can be very large in the case of oceanic eruption

...

the Black Sea alone [ which is comparable in size to the eastern part of the deep water basin of the Gulf of Mexico into which methane is being released due to the Deepwater Horizon event ] (volume about  $0.4 \times 10^{(-3)}$  of the ocean total; maximum depth ... 2.2 km) could hold, at saturation, about  $0.5 \times 10^{18}$  g ... of dissolved methane ...

Combustion and explosion of  $0.75 \times 10^{18}$  g of methane would liberate energy equivalent of  $10^7$  Mt of TNT, about 1,000 times greater than the world's stockpile of nuclear weapons ...



it is possible to estimate that the flood waters may reach a height of 100 meters in a large eruption ... I estimated that even in a reasonably small oceanic eruption this

explosive mixture will be able to cover the whole surface of the earth with a layer of about 50 meters thick ...".

Perhaps an indicator of the seriousness of the situation is the fact that, according to a 12 July 2010 Business Insider article by Gus Lubin:

“... Scientist Denies He Ever Predicted BP Oil Spill Would Cause Extinction Of Mankind

... Gregory Ryskin ... who Northwestern University says is out of his office until September ... gave ... the real story by email:

‘I also want to emphasize that in my theory, methane hydrates (clathrates) do not play any role.’ ...”.

However,  
in his 2003 Geology paper discussed above, Ryskin said

“... For the present purposes, it is immaterial whether some part of this methane flux results from dissociation of methane hydrates. ...

The consequence of a methane-driven oceanic eruption for marine and terrestrial life are likely to be catastrophic.

...

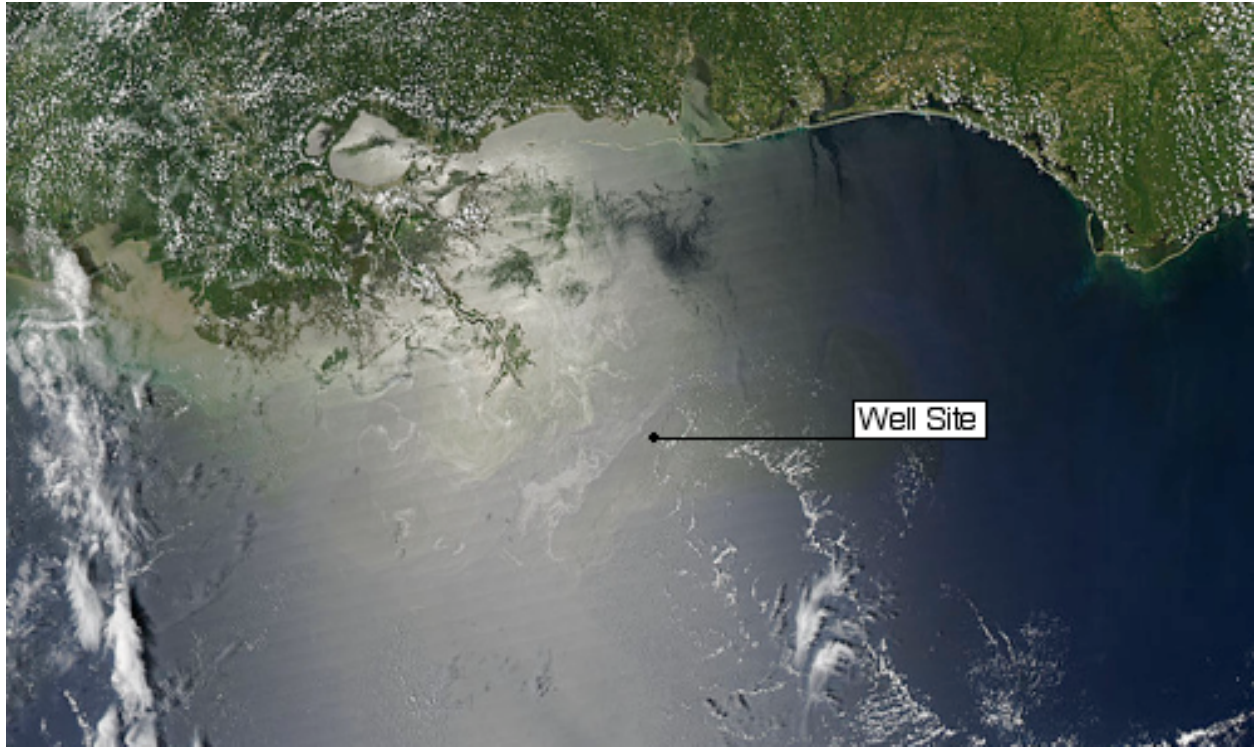
The effect of a methane-driven eruption on climate could be drastic. ... global cooling could result ... if a large eruption produced a global cloud of smoke and dust particles in the upper atmosphere. Some versions of the nuclear-winter scenario predict cooling so strong that continental glaciation could be triggered. ... subsequent eruptions, with no smoke or dust coming from the ice-covered land, would be more likely to result in global warming due to the greenhouse effect, and could terminate the glaciation. ...”

so it seems to me that Ryskin’s current statement is not only untrue, but is an indicator of the lengths to which USA/UK government/business is going to try to hide the terrible truth from the general population.



## Did the 15 July 2010 BP Cap Stop the Release of Oil/Methane ?

A 28 July 2010 satellite image from [rapidfire.sci.gsfc.nasa.gov/subsets/?subset=AERONET\\_Stennis.2010209&altdates](http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=AERONET_Stennis.2010209&altdates) that I saw on the blog of Andrew Higgins showed oil as varying shades of Gray, lighter shades for more oil:



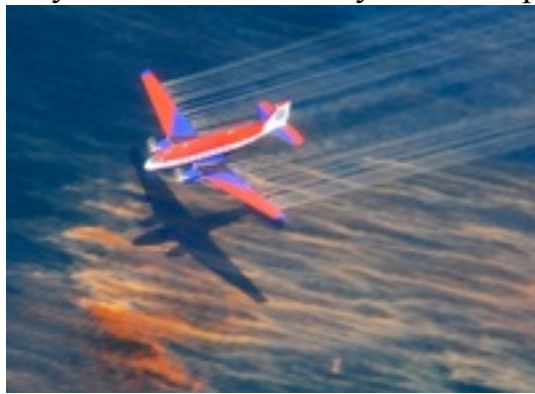
Comparison with a similar 11 July 2010 satellite image from NASA



shows that the Well Site was the Brightest Gray sea surface oil on 11 July but was relatively dark gray on 28 July after BP put a Cap on the Well Top on 15 July, so the Cap obviously blocks Oil/Methane from coming out of the Well itself.

However, on 28 July there were Bright Gray areas Westerly of the Well Site in the area of possible cracks in the sea floor that may have been caused by the Well Site blowout, so it may be that Oil/Methane is still being released through sea floor cracks.

The marked decrease in sea surface oil East of Mobile Bay from 11 July to 28 July may have been due to systematic spraying of Corexit over the Gulf of Mexico



as in this Coast Guard image from Reuters.

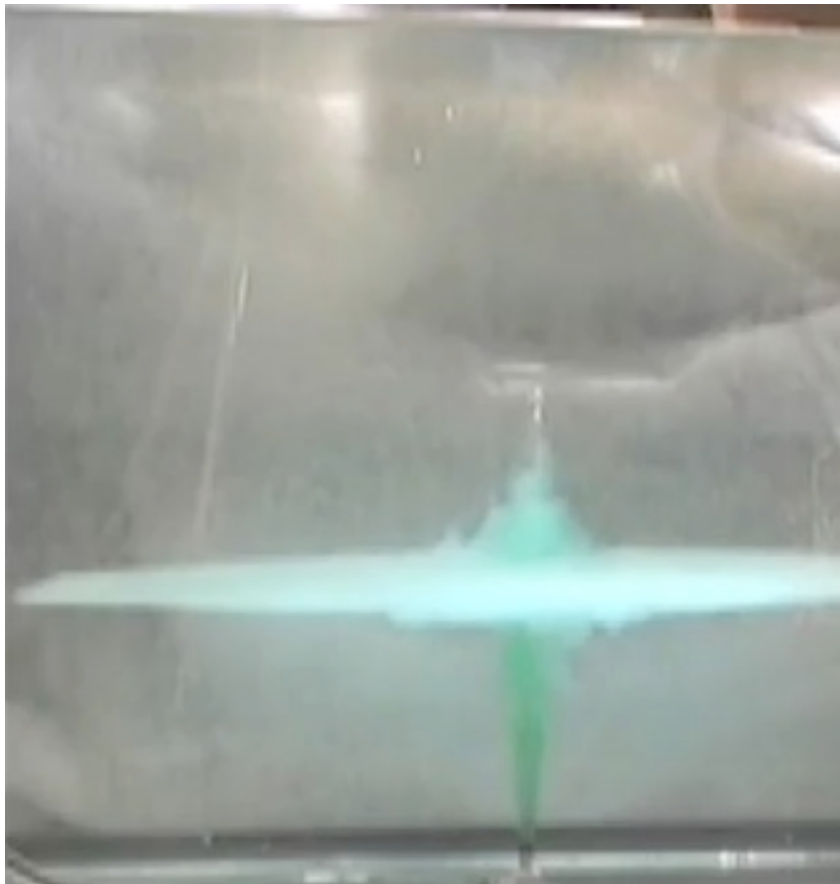
Unfortunately, not only is the Corexit highly toxic, it does not get rid of the Oil, rather,

Corexit combines with the Oil and forms small droplets that go into an emulsion with the water below the surface of the sea,

which raises the question:

## Sea Surface Oil: Only Small Part of Released Oil/Methane ?

Back on 20 May 2010, one month after the Well Site explosion and fire killed 11 workers, a web article at [uncnews.unc.edu](http://uncnews.unc.edu) described "... experiments ... conducted by Richard McLaughlin, Ph.D., and Roberto Camassa, Ph.D., fluid dynamics experts in the mathematics department at the University of North Carolina at Chapel Hill ... a green-colored alcohol/water mixture being released into the tank a green-colored alcohol/water mixture ... the tank contains salt water that's denser at the bottom than at the top (bottom 1.06 g/cc, top 1.015g/cc) ... being released ... at the ... rate ... about 0.8 gallons/minute ... into ... [a] tank contain[ing] salt water that's denser at the bottom than at the top (bottom 1.06 g/cc, top 1.015g/cc) ...



... the ... turbulent [alcohol] jet is trapped underwater in a horizontal plume when it reaches the level where the surrounding water density changes ...[ and very little gets to the top water surface ]... McLaughlin said ... "In videos of the actual oil leak in the Gulf, the turbulent oil jet looks quite similar to our alcohol jet." ...

Camassa said ... "We estimated the flow rate [ at the BP Well Site ] to be about 56,000 barrels per day, quite a bit higher than BP's estimate of 5,000 barrels per day, and closer to the estimate recently in the news of 70,000 barrels per day," ...".

## What Can Be Done?

Rob Kall said, in an OpEdNews.com article on 17 June 2010: "... from my contact inside BP: ... Size of reservoir – estimated by BP and its partner, Andarko to be between 2.5B and 10B bbl. ... the well casing is compromised (broken). ... The casing was undoubtedly broken apart by the natural gas 'explosion' at the bottom of the well, which was the result of methane coming out of solution (ie. the methane hydrates melting and expanding dramatically). ... If ... the explosion rupture[d] the casing for its entire length ... then a relief well will be unable to plug the hole. TEN relief wells would be unable to plug the hole. The consensus seems to be, among oil people ... that this is exactly the case. If that's so, then

**the well will run until Obama nukes it.**

That is the only thing that could close it. ...".

If, as seems likely from the Thomas Jefferson results, the Methane Release is not just at one hole at the Deepwater Horizon well site, but also through a lot of cracks (seeps) in the area, nuke demolition will take a coordinated effort of a number of nukes to seal all the cracks.

Of course, closing it with nukes has a risk of setting off a Gulf continental shelf edge undersea landslide and a consequent tsunami,

but not closing it with nukes has the (much greater in my opinion) risk of depressurizing the massive methane hydrate deposits leading to methane explosion and even larger undersea landslides and tsunamis.

What is needed is

**A CAREFULLY COORDINATED SET OF NUKES - DONE BY REAL  
DEMOLITION EXPERTS IN THE MILITARY**

who know how to focus energy where it is needed (like bringing down a building without damaging adjoining buildings) and who are given

**COMPLETE FREEDOM TO DO IT RIGHT.**

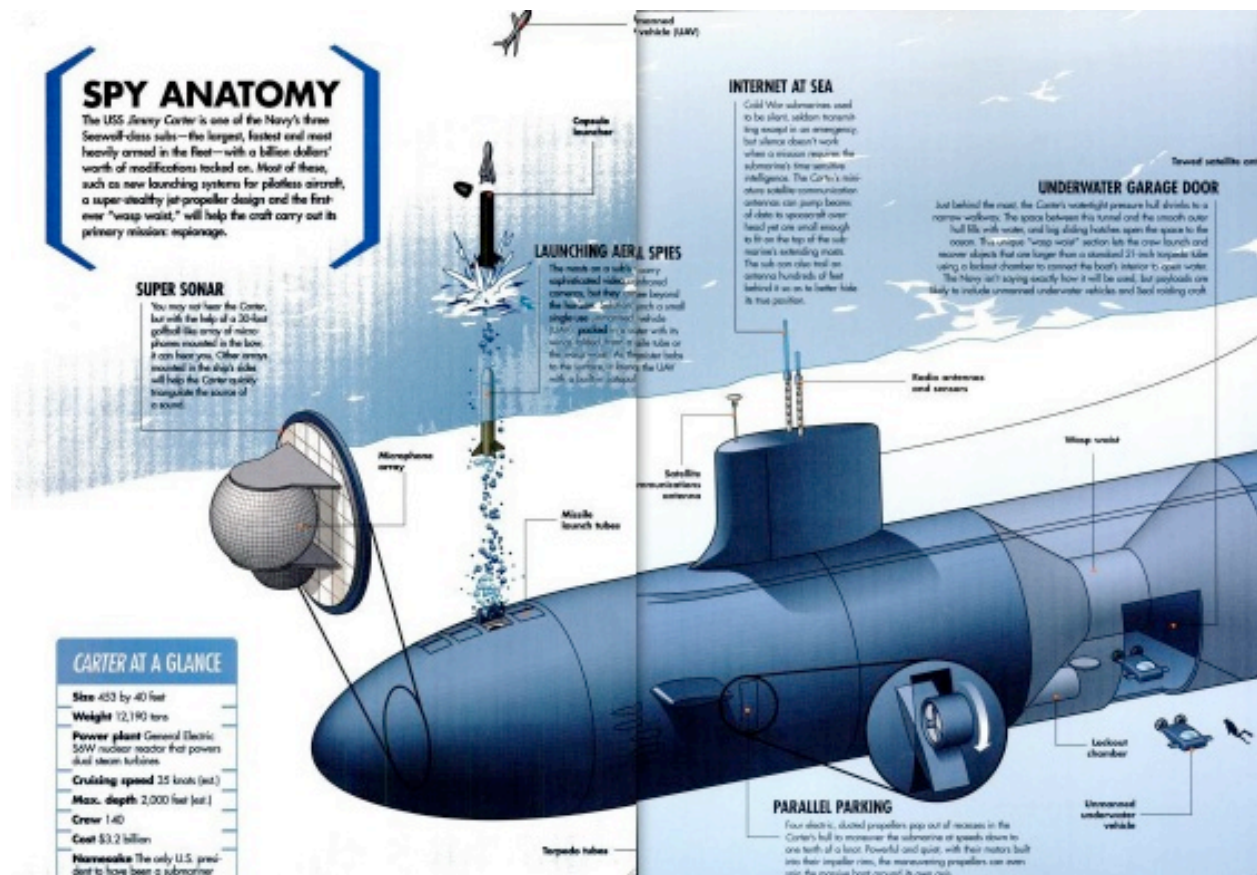


# How can the Navy Nuke the Sea Floor Cracks / Well Site ?

The Seawolf Class USS Jimmy Carter(SSN23):

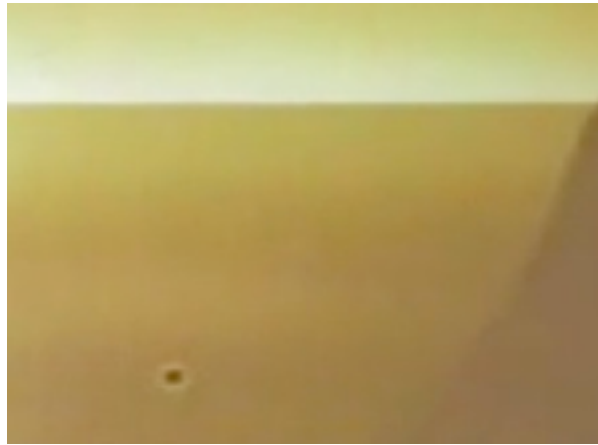
Displacement - 12,139 tons  
Length - 453 feet  
Hull Diameter - 40 feet  
Draft - 35 feet

is capable of going to the Sea Floor Cracks / Well Site and delivering personnel and nukes for Sealing the Sea Floor, as this Popular Science image shows:



As to the effects of tactical nuke detonation at depth,

in 1958 the WAHOO test detonated a 10 kiloton nuke at 3,000 foot depth



producing a luminous glow in the ocean from the nuke explosion



subsequent to which there emerged an initial 900 foot plume of sea water



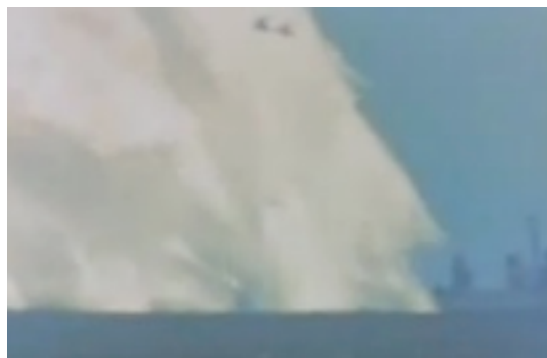
followed by a ball of erupting gas about 1750 feet or so high



which spread out as sea-water/gas maybe a mile or two wide



covering a test ship in the area with radioactive fallout



and hitting a nearby (within a couple of miles) island with a 12-foot wave



It seems clear to me that a 4-meter (12 foot) wave at a distance within 2 miles of the detonation is much better than Submarine Landslide / Methane Explosion Tsunamis on the order of tens of meters at distances of hundreds of miles, and

I suspect that present-day tactical nukes are far cleaner with respect to radiation than was the 10-kiloton nuke used in the WAHOO test in 1958, so

my opinion, balancing the risks, is that it is clear What Should Be Done:

Use the USS Jimmy Carter to Save Lives  
by delivering a Carefully Coordinated set of Nukes  
to Seal the Sea Floor.



---

In his book "The Deep Hot Biosphere" (Copernicus Books 2001) Thomas Gold had a couple of figures relevant to the Deepwater Horizon well site:

Gold's Fig. 4.3 clearly shows not only how "helium produced by radioactive decay" is associated with the methane in structures similar to the Gulf of Mexico BP blowout with deep underlying "METHANE DOMAIN".

Gold's Fig. 8.3 shows how upwelling fluids (such as BP blowout methane) can be a primary cause of earthquakes which in turn can trigger secondary phenomena such as undersea landslides thus causing large primary and even larger secondary tsunamis.

In the text of his book, Gold discusses the New Madrid earthquake of the winter of 1811–1812, saying: "... conventional theory ... that earthquakes are of purely tectonic origin ... offers no good explanation ... for ... a powerful ... series of major and many minor quakes ... that struck ... New Madrid, along the west bank of the Mississippi River in the southeastern corner of Missouri

...

I think that upwelling fluids from deep in the earth, from regions of greater pressure than that exerted by the rock overburden weight, will have ... earthquake-related effects

...

What would happen if a burst of high-pressure gas from a depth of many kilometers, and therefore with a pressure of thousands of atmospheres, were suddenly released through fissures in the bedrock into a region beneath a relatively impervious layer of soil that is not brittle enough to develop fissures?

...

After the puff of fluid passes into the atmosphere, the pore spaces that had been created in transit may collapse; such a collapse offers a sound explanation for the vertical displacements of chunks of crust during earthquakes and for the volumetric changes in sea floor or continental shelf that would be needed to induce tsunamis ...".

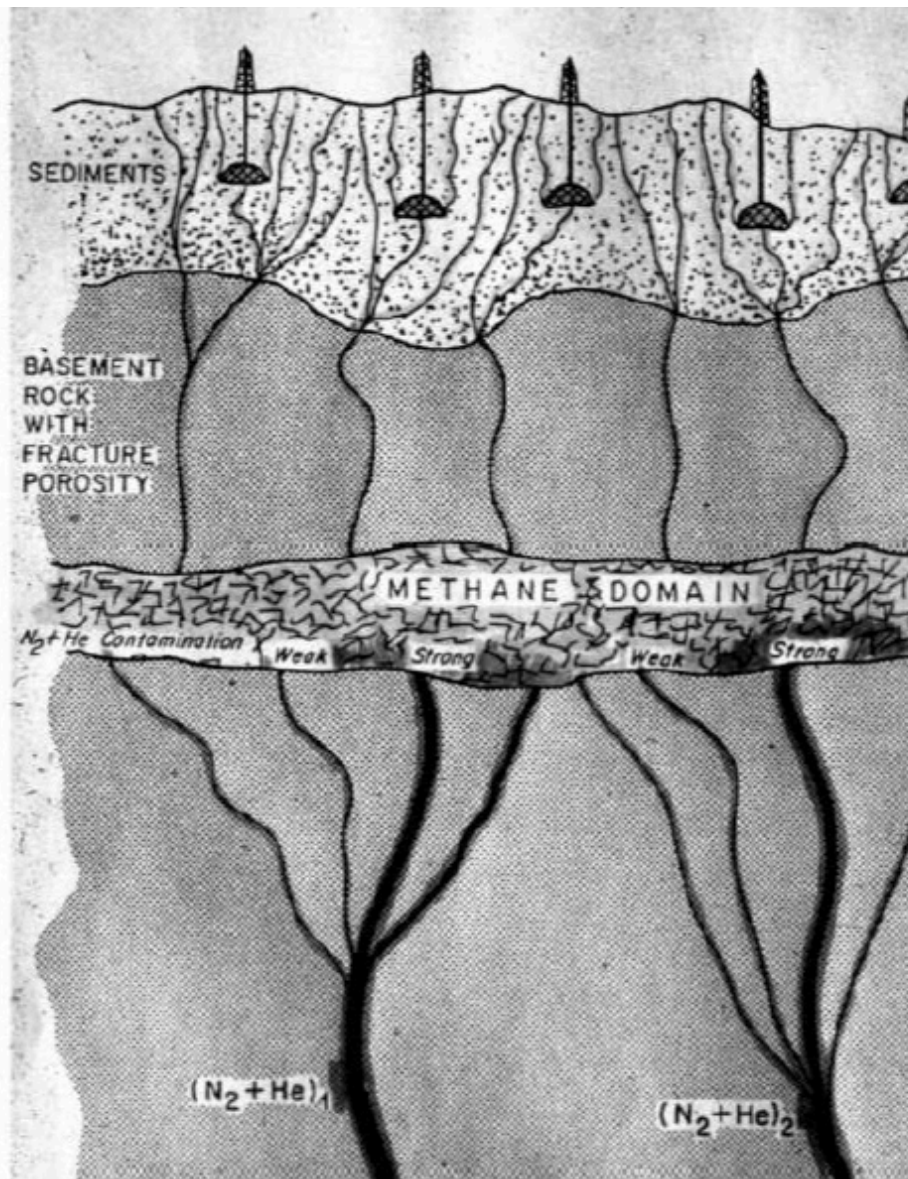
Gold not only describes the circumstances of the Deepwater Horizon well site, including deep methane below "layer ... not brittle" like the Gulf salt layer, but

also clearly states the tsunami risk that I have been trying to illustrate in the images I sent to you recently

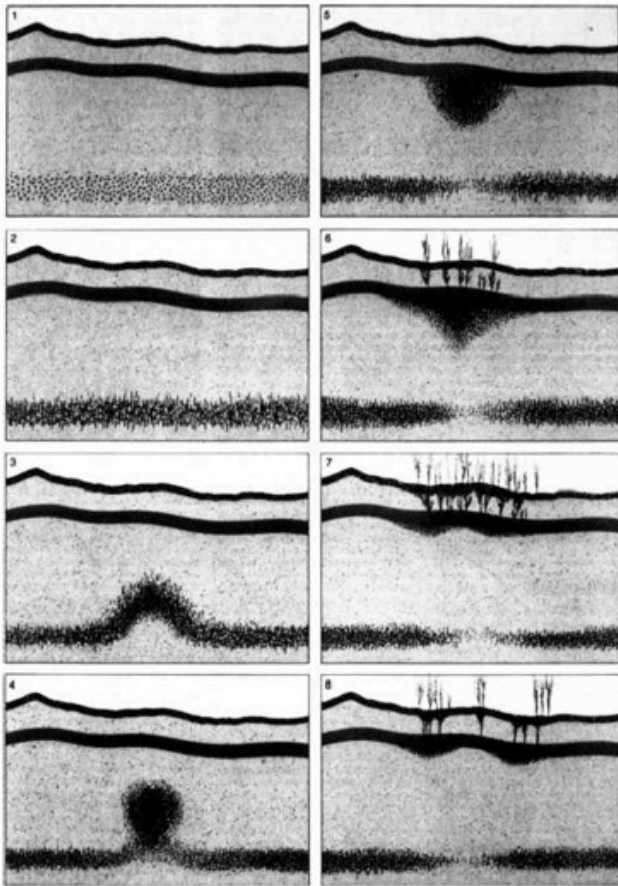
and

even further, explicitly associates such structure with the New Madrid earthquake (located about 500 miles North of the BP blowout site, along the course of the Mississippi River).

A USGS web page describes the New Madrid earthquakes: "... the Mississippi River valley earthquakes of 1811–1812 rank as some of the largest in the United States since its settlement by Europeans. The area of strong shaking associated with these shocks is two to three times larger than that of the 1964 Alaska earthquake and 10 times larger than that of the 1906 San Francisco earthquake. ...".



**Figure 4.3** Helium transport in upwelling volatiles. This schematic shows how the deep-earth gas theory would account for the helium association with methane. From the deepest levels (perhaps about 300 kilometers), helium produced by radioactive decay is swept into the stream of upwelling nitrogen. At a depth of perhaps 100 kilometers, designated here as the methane domain, nitrogen and helium mix with methane, and all three continue their journey upward. These gases then arrive in the final fields with mixing ratios already determined. The nitrogen–helium ratio is constant over a much larger area, whereas the mixing ratios with methane display individual smaller areas within the first.



**Figure 8.3** Upwelling fluids as the cause of earthquakes. Fluids liberated from the earth's original store of gases, including hydrocarbons at a depth of perhaps 150 kilometers, create pore spaces in the surrounding matrix of hot rock (1). Because the rock at such depths is hot enough to deform plastically, pore spaces distend, often gradually and without sending out the shocks of an earthquake (2). But the instability of the light fluids in the denser rocks is not

relieved (3, 4), and the fluids are driven farther upward. At shallower levels where the rock is harder and no longer plastic (dark band in 5), the fluids cause brittle fracture of the rock. Small cracks induced by fluid pressure develop and grow, weakening the rock. As its ultimate strength decreases, the rock eventually reaches the failure point, and this causes the earthquake. It was not any critical rise in the stress of the rock

that was the immediate cause of the quake; rather, rapid weakening of the strength of the rock initiated the quake (7). Gas that is present in a wider region around the epicenter, and that did not escape at the time of the event, continues to weaken other rocks until they also give way. This explains the usual widening area of aftershocks. SOURCE: After Thomas Gold and Steven Soter, 1980. "The deep-earth gas hypothesis," *Scientific American* 242: 154-61.

## WHAT ARE SALT DOMES ?

Brian D. Hoyle and E. Julius Dasch wrote a [waterencyclopedia.com](http://waterencyclopedia.com) article in which they said:

"... Salt Domes.

... A salt dome is a geological structure where very deep deposits of relatively "plastic" salt flowed upward through the bedrock owing to the great pressure of this overlying rock and sediment. The salt may break through the rock and sediment layer, protruding with a dome-like shape, thus giving the structure its name.

Salt domes are a distinctive feature of the Gulf of Mexico, in particular the central region of the gulf ... The solution at the bottom 150 meters (492 feet) ... is not sea water but a highly concentrated brine with little or no free oxygen. ...".

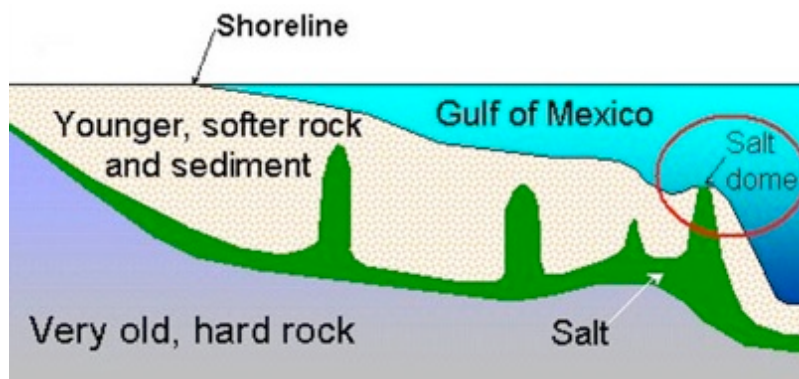
## WHERE DID THE SALT DOMES COME FROM ?

On an [oceanexplorer.noaa.gov](http://oceanexplorer.noaa.gov) Ocean Explorer web page dated 23 September 2003, John Bratton of the U.S. Geological Survey, Woods Hole, MA, said:

"... the formation of the Gulf of Mexico ... began ... over 100 million years ago ... during the Jurassic Period when the granite core of the North American tectonic plate began to separate from South America and Africa ... big valleys ... start to fill as salt deposits form, like those found in the Dead Sea in Israel and Jordan ... These deposits are called the Louann Salt in the area of the Gulf of Mexico. ...

As the big crack at the bottom of North America widened, the ocean filled the big valley permanently ... sediment began washing into the widening hole from the Mississippi, and other rivers ... burying a width of more than 500 km of salt ...

Over millions of years, plumes of the light salt began to float up through the heavier sediment that covered it, like the colored liquid in a lava lamp. ...



... As the salt made it very close to the surface, sometimes having traveled through more than 10 km of rock and sediment, it pushed up the sea floor above it to form a mound or dome. ...".

## HOW DID BP GET INVOLVED IN GULF OF MEXICO DEEP-SEA OIL ?

According to an [aapg.org/explorer/](http://aapg.org/explorer/) article by Kathy Shirley dated 3 March 2002:

"... BP did ... some comparative analysis of the shelf's producing region and the deepwater ... BP ... came to the conclusion that the deepwater could ultimately deliver at least 40 billion barrels of oil ...

A couple of new developments occurred simultaneously with BP's research:

Drilling contractors were developing a new generation of rigs that could drill in much deeper water depths. At that time the upper limit of the deepwater play was 5,000 feet and these new rigs could drill in 10,000 feet of water.

The new generation rigs could drill to 30,000 feet subsea. The subsea limit at that time had been around 20,000 feet ...

BP started looking at the possibility of deeper plays where the ... targets were subsalt ... larger, potentially simpler traps under the salt ... versus adjacent to salt. ...".

So, while other oil companies were looking along the sides of the salt domes (above the salt layer)



BP was smart enough to look under the salt layer, but as the image above shows, the salt was deposited over "very old, hard rock", so the question arises:

HOW DID THE OIL GET UNDER THE SALT ?

According to a humanevents.com article by Jerome R. Corsi dated 21 March 2006:

"... Mexico's richest oil field complex was created 65 million years ago, when the huge Chicxulub meteor impacted the Earth at the end of the Mesozoic Era. Scientists now believe that the Chicxulub meteor impact was the catastrophe that killed the dinosaurs, as well as the cause for creating the Cantarell oil field ... The seismic shock of the meteor fractured the bedrock below the Gulf ... Geologists have documented that the bedrock underlying the crater shows "melt rock veinlets pointing to large megablock structures as well as a long thermal and fluid transport" as part of the post-impact history.

In other words, the bedrock at Cantarell did suffer sufficiently severe fracturing to open the bedrock to flows of liquids and gases from the deep earth below. ...".

Thomas Gold said, in his book "The Deep Hot Biosphere" (Copernicus Books 2001):

"... Earth's massive reserves of hydrocarbons ... were part of the primordial "soup" from which our planet was created ... to this day they exist in abundance deep within our planet and continue to upwell toward the surface. ... Methane hydrate ... covers very large areas of ocean floor ... [there]... are sudden outbursts of gas from the ocean floor ... as in the eruption that caused a devastating tsunami on the coast of Papua, New Guinea, in July 1998 ...".

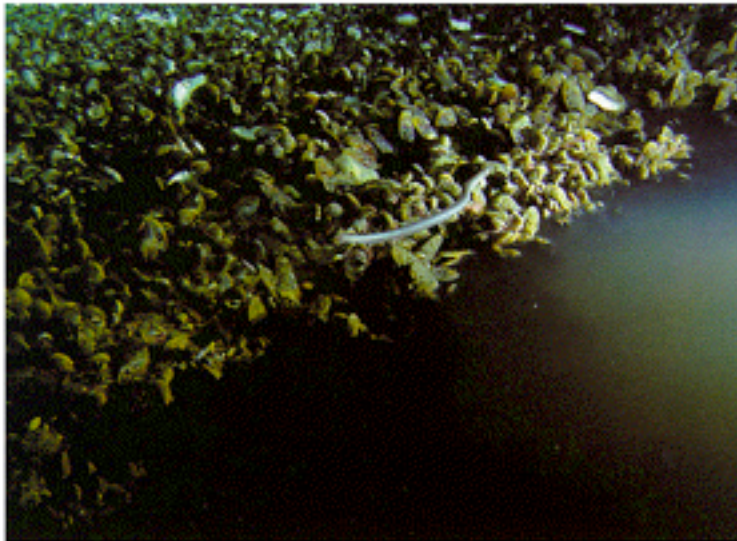
So, oil and methane were originally BELOW the "very old, hard rock", and when the Chicxulub impact hit the Gulf of Mexico 65 million years ago, it fractured the "very old, hard rock" and allowed the oil and methane to come up to the surface and form pools under the salt layer.

from the book *The Blue Planet*, by Byatt, Fothergill, and Holmes for BBC and Discovery Channel (DK 2001):

"... in 1984 deep-sea biologists working at the bottom of

### the Gulf of Mexico

... came across ... cold seeps ...[where]... at the bottom of the Gulf ... rocks ... seep out ...hydrocarbons ... through the sediment and ... into the water column. ... One of the sites ...



... was ... a beautiful, calm lake on the bottom of the ocean ...[that]... lapped against what looked like a golden sandy shore ....[that]... turned out to be thousands of mussels ... living among them was a rich community of different animals not dissimilar to those found at a hot vent. The cold seeps are too deep to receive any sunlight ... methane was continually bubbling up from the rocks below. Inside the mussels, in an extraordinary parallel with the hot vents, they found chemosynthetic bacteria that ... were fixing methane rather than hydrogen sulfide. ... In places the combination of **high pressure and low temperatures had frozen the methane into a solid, ice-like material.** ...". According to the DVD video version of *The Blue Planet*, the cold seep was over 20 meters long and at a depth of about half a mile (and the date of 1990 was mentioned for its discovery).

The Gulf of Mexico has been the home of many beautiful ecosystems including but not limited to the cold methane-based life forms shown on the preceding page. How has the Deepwater Horizon Oil/Methane Release affected the Environment ?

Alexander Higgins says in his blog ( <http://blog.alexanderhiggins.com/> ):

“... July 12, 2010 ...

Huge Area of the Gulf Has Been Turned into a Massive Dead Zone By The BP Gulf Oil Spill ...



... most animals that can swim away have left the area. Plankton in the zone have died. The researchers measured low oxygen levels along the entire 40-mile stretch they sampled around Dauphin Island, Ala., from about 40 miles offshore to within a mile or two of the shoreline. The bottom layer of water was oxygen-depleted at depths of about 30 feet close to shore to 100 feet further out, along the

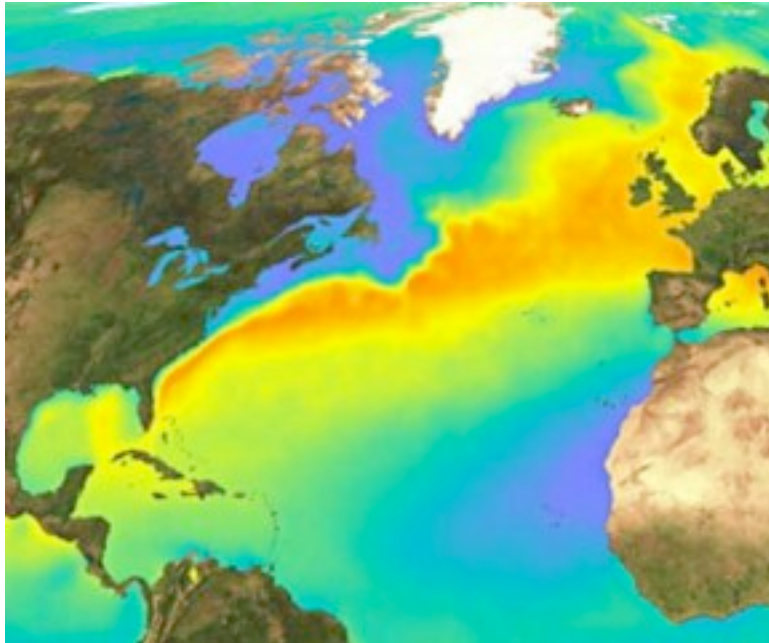
continental shelf ... “It’s not little local pockets,” said Monty Graham of the Dauphin Island Sea Lab ... “It’s over a regional scale. It wouldn’t surprise me if there were a band of low oxygen over that entire area between the Mississippi River and Apalachicola, Florida.” ... Based on the description ... I [Alexander Higgins] marked off the confirmed dead zone on the map below in red. The area in purple is where Monty Graham ... says the current dead zone could possibly extend. ...

University of Miami CSTARS, July 12, 2010 ... satellite images [show]...





... Oil ... up Florida's east coast, as far north as Cape Canaveral & NASA ...[and is]... likely to hit the loop current ...



... and travel up the US East Coast through the Gulf Stream ...”.

An 11 July 2010 satellite image from NASA



showed oil extending from the Mississippi River to Appalachicola, and far into the offshore Gulf of Mexico, according to an Athens Banner-Herald web page.



Alexander Higgins in his blog ( <http://blog.alexanderhiggins.com/> ) shows images of some of the consequences of the oil release:

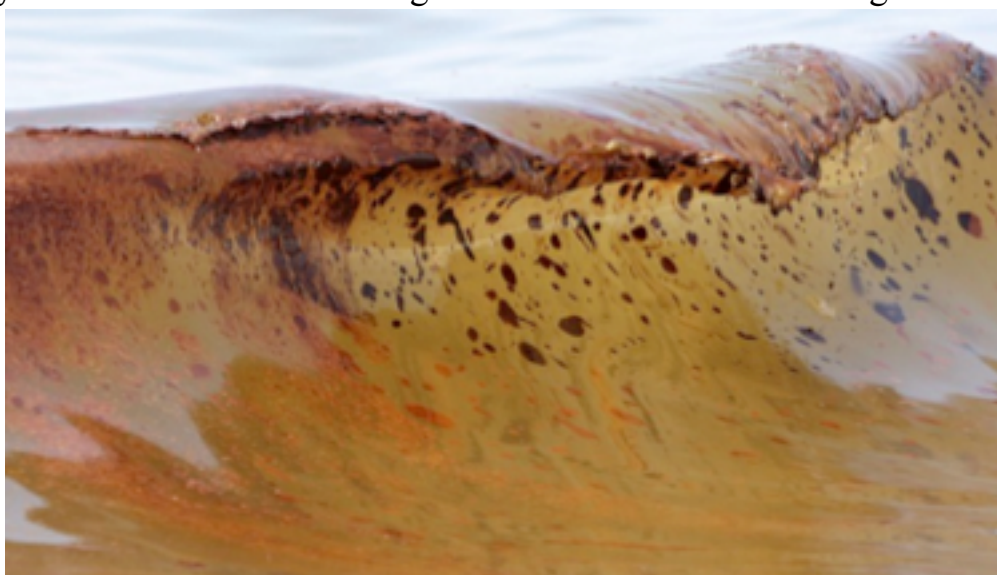


No that's not asphalt... it's millions of dead fish.





A Daily Mail 2010/06/14 web image shows a Gulf beach breaking wave with oil:





## Earthquake Hazards Program

# Magnitude 3.5 - OFFSHORE ALABAMA

2011 February 18 23:15:34 UTC

[Details](#)  
[Summary](#)  
[Maps](#)  
[Scientific & Technical](#)

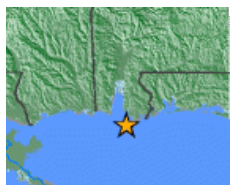
## Earthquake Details

This event has been reviewed by a seismologist.

<b><u>Magnitude</u></b>	<b>3.5</b>
<b><u>Date-Time</u></b>	<b>Friday, February 18, 2011 at 23:15:34 UTC</b> Friday, February 18, 2011 at 05:15:34 PM at epicenter <a href="#">Time of Earthquake in other Time Zones</a>
<b><u>Location</u></b>	30.180°N, 87.848°W
<b><u>Depth</u></b>	5 km (3.1 miles) set by location program
<b><u>Region</u></b>	OFFSHORE ALABAMA
<b><u>Distances</u></b>	60 km (35 miles) SSE of <b>Mobile, Alabama</b> 65 km (40 miles) WSW of <b>Pensacola, Florida</b> 70 km (45 miles) ESE of <b>Pascagoula, Mississippi</b> 285 km (175 miles) SSW of <b>MONTGOMERY, Alabama</b>
<b><u>Location Uncertainty</u></b>	horizontal +/- 15 km (9.3 miles); depth fixed by location program
<b><u>Parameters</u></b>	NST= 25, Nph= 25, Dmin=326.9 km, Rmss=1.33 sec, Gp=176°, M-type="Nuttli" surface wave magnitude (mbLg), Version=6
<b><u>Source</u></b>	USGS NEIC (WDCS-D)
<b><u>Event ID</u></b>	us2011hmbx

**[Did you feel it?](#)** Report shaking and damage at your location. You can also view a map displaying accumulated data from your report and others.

## Earthquake Summary



### Tectonic Summary

#### EARTHQUAKES IN THE STABLE CONTINENTAL REGION

Most of North America east of the Rocky Mountains has infrequent earthquakes. Here and there earthquakes are more numerous, for example in the New Madrid seismic zone centered on southeastern Missouri, in the Charlevoix-Kamouraska seismic zone of eastern Quebec, in New England, in the New York - Philadelphia - Wilmington urban corridor, and elsewhere. However, most of the enormous region from the Rockies to the Atlantic can go years without an earthquake large enough to be felt, and several U.S. states have never reported a damaging earthquake. The earthquakes that do occur strike anywhere at irregular intervals.

Earthquakes east of the Rocky Mountains, although less frequent than in the West, are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 100 km (60 mi) from where it occurred, and it infrequently





causes damage near its source. A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 500 km (300 mi) from where it occurred, and sometimes causes damage as far away as 40 km (25 mi).

### FAULTS

Earthquakes everywhere occur on faults within bedrock, usually miles deep. Most of the region's bedrock was formed as several generations of mountains rose and were eroded down again over the last billion or so years.

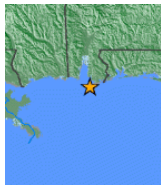
At well-studied plate boundaries like the San Andreas fault system in California, often scientists can determine the name of the specific fault that is responsible for an earthquake. In contrast, east of the Rocky Mountains this is rarely the case. All parts of this vast region are far from the nearest plate boundaries, which, for the U.S., are to the east in the center of the Atlantic Ocean, to the south in the Caribbean Sea, and to the west in California and offshore from Washington and Oregon. The region is laced with known faults but numerous smaller or deeply buried faults remain undetected. Even most of the known faults are poorly located at earthquake depths. Accordingly, few earthquakes east of the Rockies can be linked to named faults. It is difficult to determine if a known fault is still active and could slip and cause an earthquake. In most areas east of the Rockies, the best guide to earthquake hazards is the earthquakes themselves.

### [Earthquake Information for Florida](#)

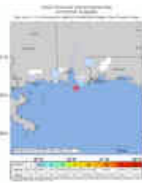
## Earthquake Maps



Earthquake Location



Location Maps



Did You Feel It? Tell Us



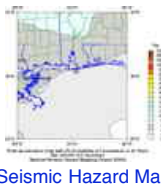
ShakeMap



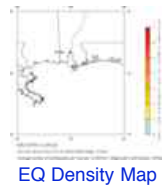
PAGER Earthquake Impact



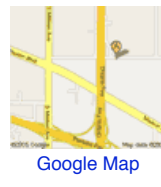
Historical Seismicity



Seismic Hazard Map



EQ Density Map



Google Map



Google Earth KML  
(Requires Google Earth)

## Scientific & Technical Information

[Phase Data](#)

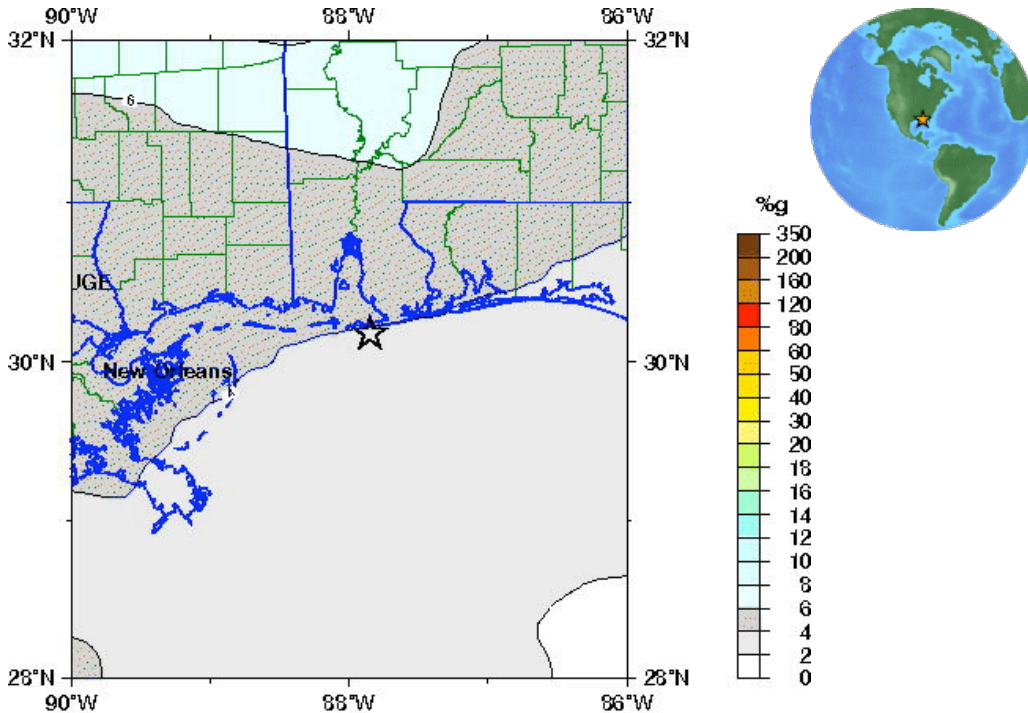
[Theoretical P-Wave Travel Times](#)

### Preliminary Earthquake Report

[U.S. Geological Survey, National Earthquake Information Center:](#)

[World Data Center](#) for Seismology, Denver



**Earthquake Hazards Program****Seismic Hazard Map****Magnitude 3.5 WESTERN FLORIDA****Friday, February 18, 2011 at 23:15:34 UTC**

**Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years**  
**site: NEHRP B-C boundary**

**National Seismic Hazard Mapping Project (2008)**

Major Tectonic Boundaries: Subduction Zones -purple, Ridges -red and Transform Faults -green

State boundaries in blue; county boundaries in green.



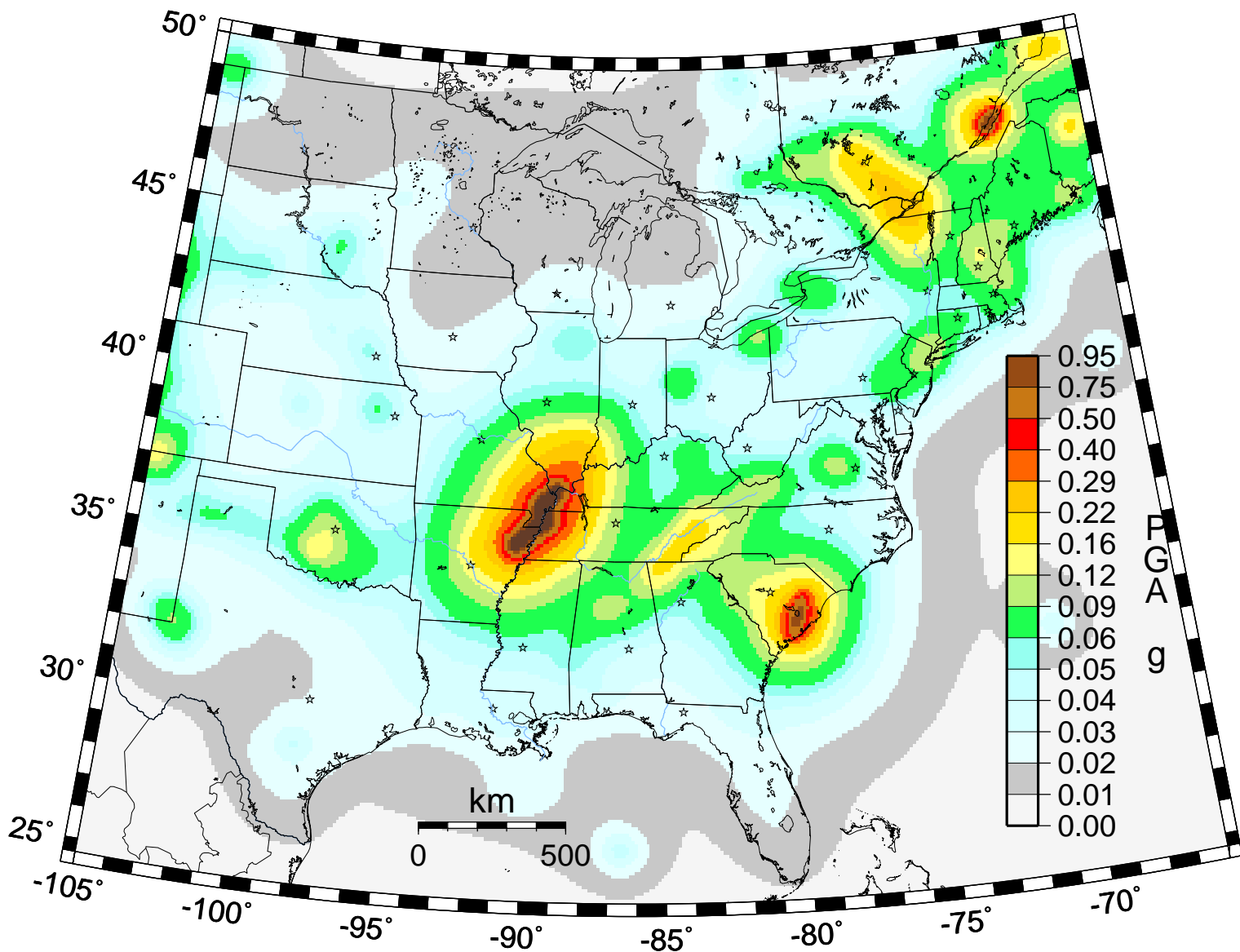
[USGS National Seismic Hazard Mapping Project](http://neic.usgs.gov/neis/bulletin/neic_hmbx_z.html)

**Preliminary Earthquake Report**

U.S. Geological Survey, National Earthquake Information Center

World Data Center for Seismology, Denver

## Hard Rock PGA 2%/50 year PE





## Earthquake Rattles Dauphin Island



by [Rose Ann Haven](#)

Published: Fri, February 18, 2011 - 10:41 pm CST

Last Updated: Sat, February 19, 2011 - 12:37 pm CST

### 3.5 Magnitude Quake Shakes Residents for 10 to 20 Seconds

DAUPHIN ISLAND, Alabama - "It was not much of the ground shaking. It was the walls of the building that were shaking", said Cameron Moore. Moore is the Assistant Manager of the Isle of Dauphine Golf Club on Dauphin Island. What Moore thought was a sonic boom, was a 3.5 magnitude earthquake.

"I noticed the golf balls..the boxes of golf balls were shaking..and I was thinking..I knew I didn't slam the door that hard", said Moore. Dauphin Island Mayor Jeff Collier felt the quake too from inside his home.

"All of a sudden, I noticed the mirror on my dresser was kind of moving around rather violently quite frankly, and I'm like golly something's happening so..and by the time I figured out that something was going on it was over. I'd say the whole incident probably lasted at least 10 , 15, possibly 20 seconds", said Collier.

Collier, a life long resident of Dauphin Island has never felt anything like it in his 50 years.

Mayor Collier says he doesn't think residents should stay up all night worrying about the earthquake but he says obviously if it happened once, it can happen again.

Residents on Dauphin island wonder what caused it. Some speculate somehow it could be related to the oil spill.

others wonder, could this be the beginning of something more devastating.

"I think if anything it just reminds us that we live here on the coast, and mother nature has all kind of ways that we deal with. I guess this is just one other thing we'll have to add to the list", says Collier.

There are no reported damages or injuries from the quake.

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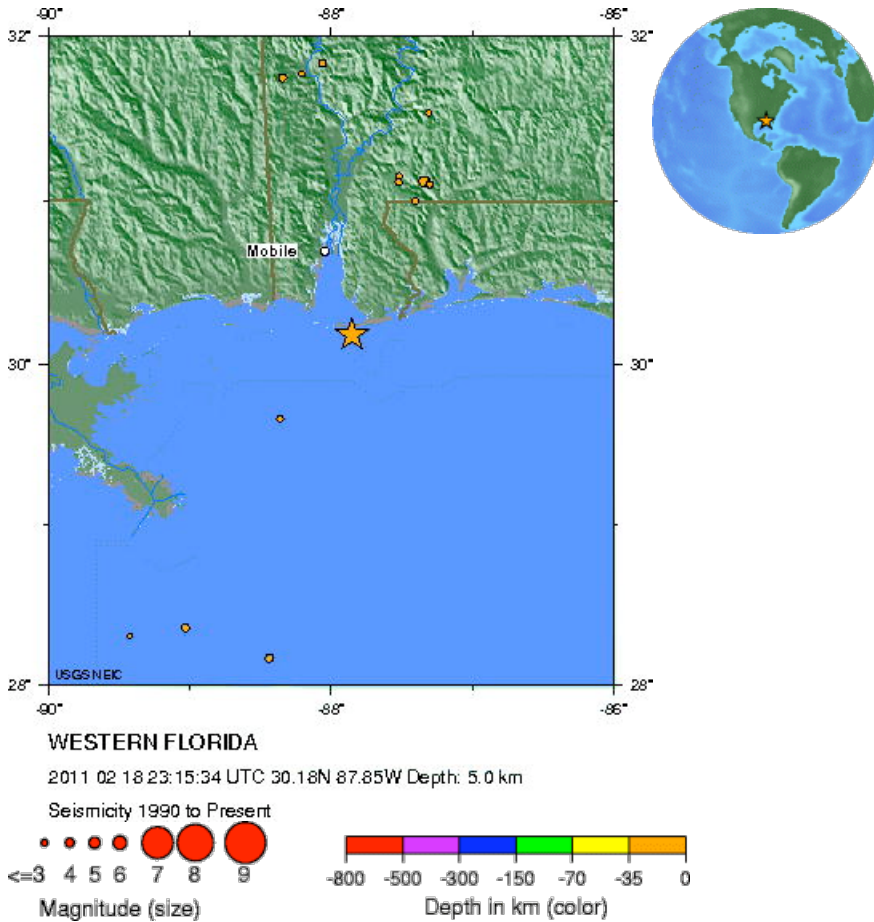
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[3.5 Magnitude Earthquake Off the Coast of Alabama](#)

Fri, Feb 18 2011

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Fri, Feb 18 2011

**Earthquake Hazards Program****Historic Seismicity****Magnitude 3.5 WESTERN FLORIDA****Friday, February 18, 2011 at 23:15:34 UTC**

Major Tectonic Boundaries: Subduction Zones -purple, Ridges -red and Transform Faults -green



**CURRENT MOON PHASE**



**Waning Gibbous**  
**98% of Full**  
**Sat 19 Feb, 2011**  
**5:02 AM**

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