

Offshore Energy Webinar

**ADVANCES IN
EARTH
SCIENCE**



***Offshore Energy –
Historical Perspective***





Agenda

- Historical Background
- Recent Developments
- Takeaways

Historical Background

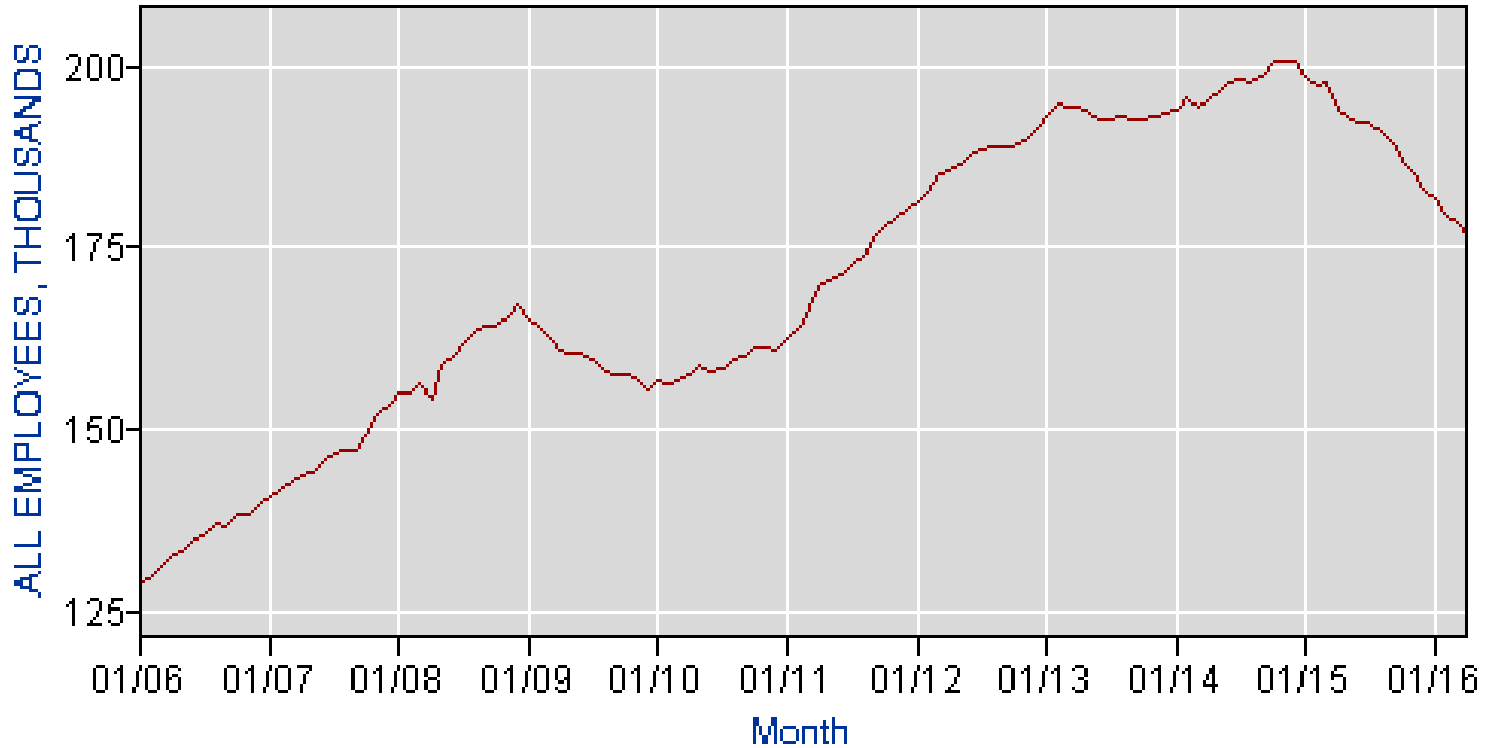
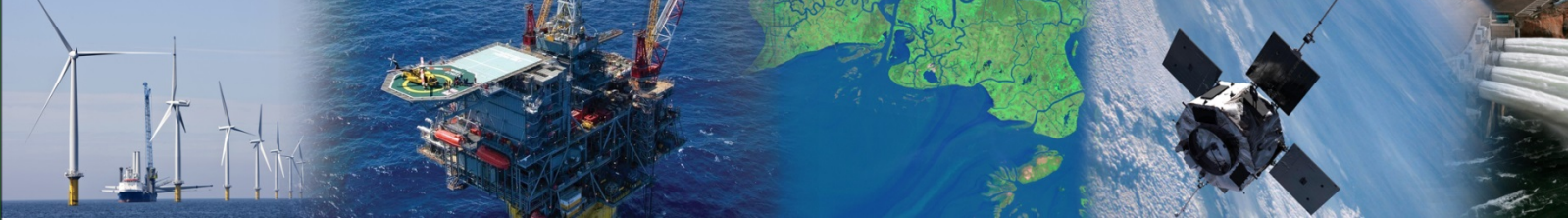
- 1821 - Fredonia, New York - William Hart - drilled into gas-bearing shale, natural gas piped and burned for illumination
- 1859 - Colonel Edwin Drake - Northwestern Pennsylvania - Drilling Rig
- Photo on right from the Drake Well Museum
- 1901 - Spindletop, TX - Drilling Mud
- 1938 - Offshore LA - Freestanding drilling platform in the Gulf of Mexico – Brown and Root built for Pure Oil and Superior Oil Company





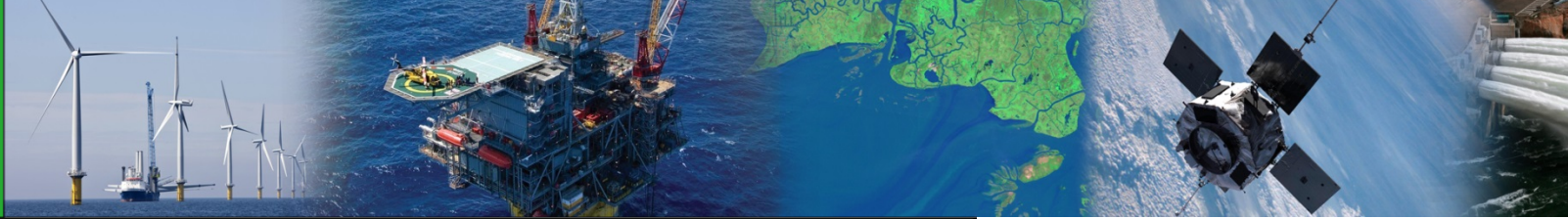
Historical Background

- 1947 - Brown & Root built for Kerr - McGee and its partners - first oil rig out of sight of land
- 1947 - Hugoton field of Kansas - hydraulic fracturing used to stimulate production
- 1967 - Oil discovery at Alaska's Prudhoe Bay
- 1973 - Arab oil embargo
- 2000's - U.S. oil & gas boom



US oil and gas extraction employees, seasonally adjusted

Source: <http://data.bls.gov/pdq/SurveyOutputServlet>



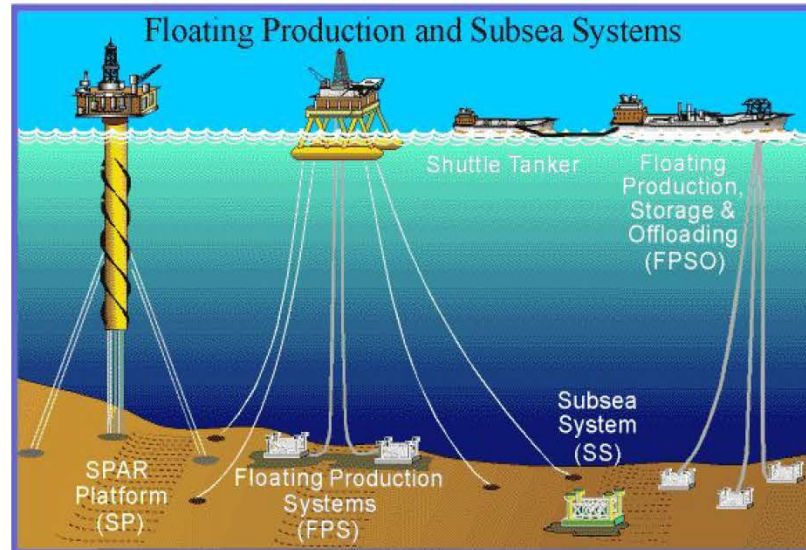
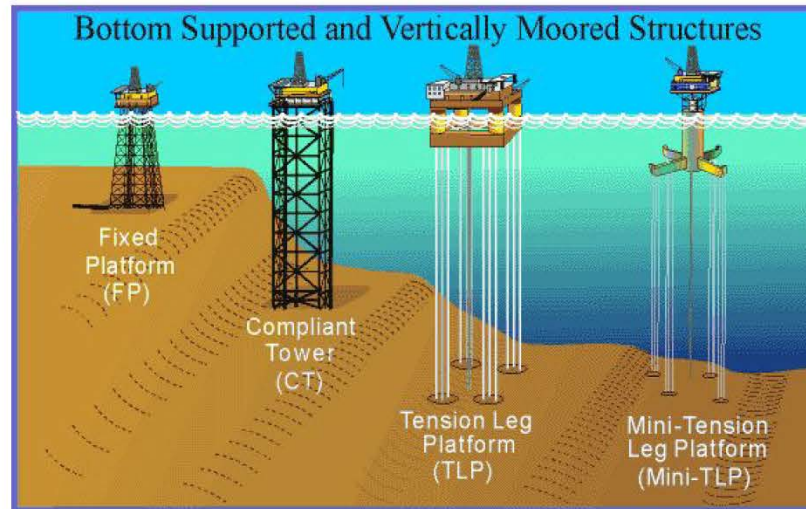
- *17% (2014) of USA Crude Oil production comes from offshore, almost all in Gulf of Mexico*
- *USA is a global leader in technology development for offshore exploration and production*

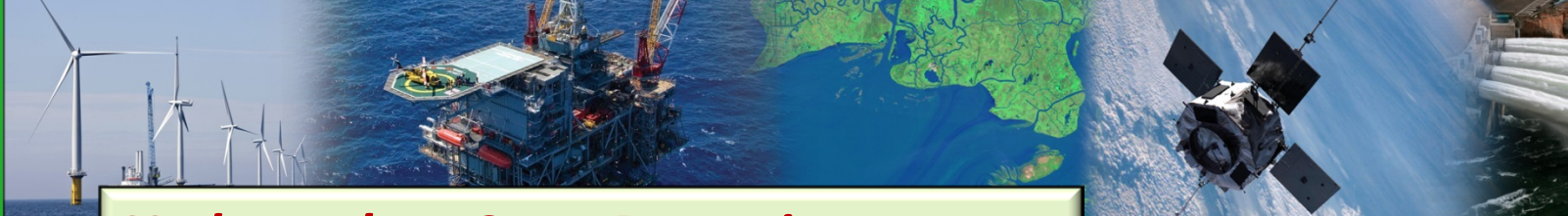


“How inappropriate to call this planet Earth, when it is quite clearly Ocean...” Arthur C. Clarke



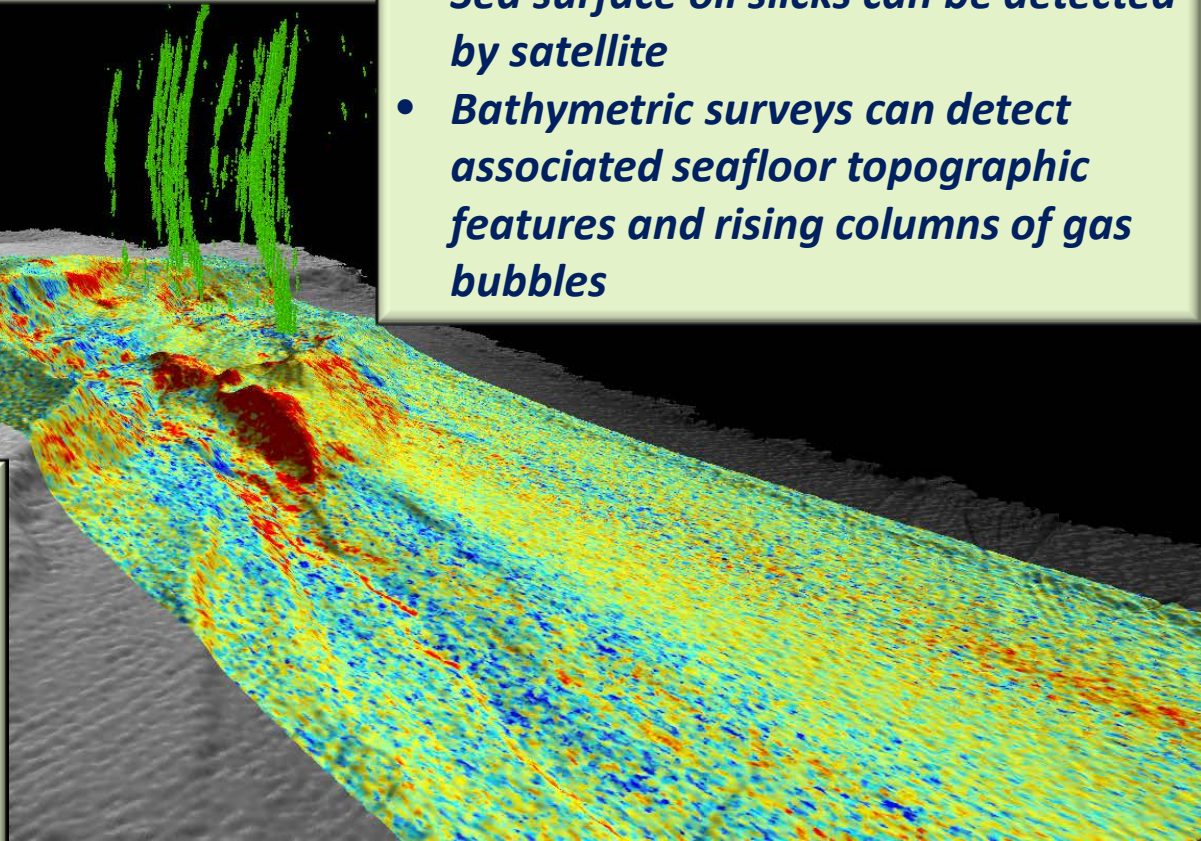
Deepwater Development Systems



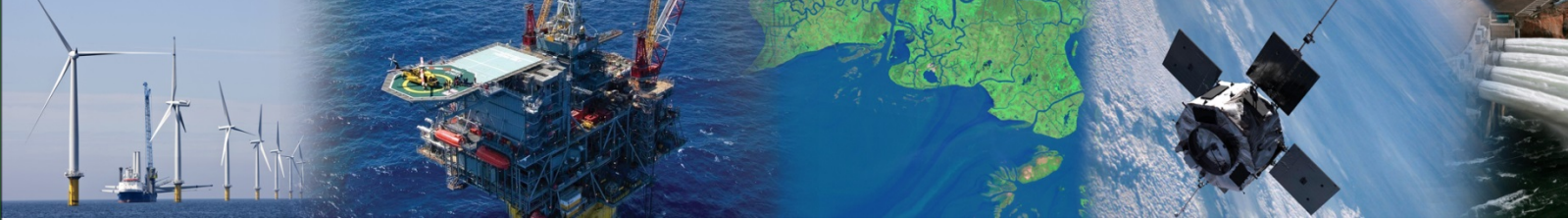


Hydrocarbon Seep Detection, a Cutting Edge Exploration Technology

- *Sea surface oil slicks can be detected by satellite*
- *Bathymetric surveys can detect associated seafloor topographic features and rising columns of gas bubbles*



- *Seepage from hydrocarbon reservoirs is common, both onshore and offshore*
- *Locations of seeps provide unique habitat for rare deep sea fauna*
- *Regional seafloor mapping provides valuable data for oceanographic research*



Wind Energy, a Clean, Renewable Energy Resource

- ***No operational offshore wind farms in USA, well established in other countries***
- ***Strong growth potential for USA technology and research***
- ***Current focus of commercial leasing is on the east coast***
- ***First project to commence operations offshore Rhode Island late 2016***



Takeaways

- What is next?
 - Technology
 - Regulatory (*e.g.* tax, competition/anti-trust, environmental, safety, etc.)
 - Geopolitical
- Key - Fostering innovative approaches