EDITORIAL

Exploration before exploitation

The current U.S. administration has proposed to open up 90% of the U.S. continental shelf to oil and gas drilling as part of a new Bureau of Ocean Energy Management (BOEM) Draft Proposed Program. Although there is a clear need to move beyond fossil fuels for America's energy needs and energy security, there are also a number of immediate existential threats posed by an increase in offshore drilling.

The sites that would be opened include vast areas of the ocean floor that remain unexplored, even unmapped. The maps that exist of our oceans, which make up about 70% of the surface of Earth, are at a resolution of about 5 kilometers. If Manhattan were under water, a map of it would be 4 pixels by 1 pixel across—easy enough to miss in a casual survey. Only about 5% of the ocean floor has been mapped in the level of detail equivalent to the high-resolution maps of the Moon and Mars. Of this, only about 0.01% has been seen by humans through photo or video surveys.

Sea corals dwell in the deep Caribbean Sea.

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This is noteworthy because the continental margins are not just featureless, muddy plains that could be drilled at any location with little disturbance. They contain submarine canyons, deep-water coral reefs and mounds, and natural hydrocarbon seep communities. All of these habitats interact with the surface ocean and provide services on which humans rely. As an example, many small fish that feed the larger fish that we rely on for food, migrate every day to the deep sea and interact with the unusual habitats there. The pharmaceutical industry spends untold funds on drug discovery, and many promising finds have come from deep-sea corals and sponges. At a global scale, the ocean absorbs one-third of the carbon that humans emit and more than 90% of the excess heat that has recently entered the atmosphere. Much of this ends up in the deep sea.

The BOEM has a long-running Environmental Studies Program that has made substantial contributions to the predictive capacity that underlies its management strategy in the Gulf of Mexico. These predictive models allow the designation of "mitigation areas" where drilling is excluded to avoid impact on the high-density and potentially sensitive communities that exist there. However, even in this relatively well-explored area, major impacts to four different deep-sea coral habitats were documented after the *Deepwater Horizon* oil spill—none of which had been observed before the spill.

The probability of an offshore drilling accident increases with the depth of the industrial activity, and a single isolated incident may require decades to centuries for recovery because of the slow growth and longevity of the deep-sea fauna. Even in well-studied areas, long-term observation and monitoring, both pre- and postdrilling, will be necessary to distinguish the impacts of drilling from the effects of climate change, pollutants, fishing, and other human disturbances.

The regions now considered for drilling have not been subject to the decades of deep-sea exploration and research that are essential to make sound decisions for siting of new drilling and the effective management of deep-sea resources. If existing maps are insufficient, or our understanding of the basic life-history traits of the fauna are incomplete, we could be losing the next generation of anticancer drugs or the recycling of nutrients essential to support fisheries while we exploit energy reserves that are best left in the ground. A clear national commitment to science-based management of offshore drilling would demonstrate the leadership of the United States on this issue, which has broad relevance globally as the industrialization of the open ocean proceeds.

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