

Q & A: Oil Shock

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Science collided with catastrophe and controversy for researchers who worked on the Deepwater Horizon oil spill



q u e s t i o n a n d a n s w e r



In the aftermath of the largest offshore oil spill in U.S. history, the Deepwater Horizon accident in April, as oil and gas bubbled out of a ruptured well and into the Gulf of Mexico, UC Santa Barbara researchers mobilized to contribute their expertise to the response effort and to add to our understanding of the complex science of spills.

The prodigious hydrocarbon seeps off the coast of Santa Barbara, which deposit globs of tar on beaches below the UCSB campus, are a kind of natural lab for scientists

studying the fate and effects of oil and gas in the ocean.

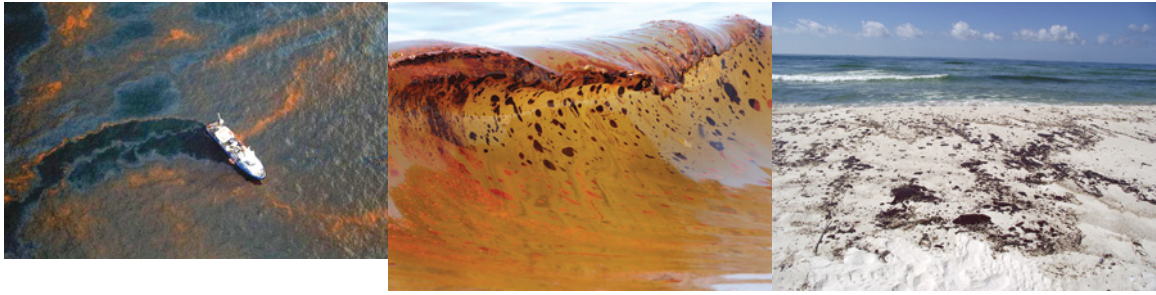
These predictable spills offer tremendous opportunities for research that's invaluable in the event of a disaster like the Deepwater Horizon accident.

Convergence spoke to three UCSB researchers who were involved in the spill response about their experiences on the scene, the lessons learned and the sleep lost.

David Valentine, a professor of earth science who has studied how microbes break down hydrocarbons released from natural seeps, investigated the fate of the gas and oil that bubbled out of the fractured well and offered insights into the magnitude of the spill and the resulting hydrocarbon plume. He led three research cruises in the gulf in the aftermath of the accident—never far from the epicenter of the spill—and was due to return late in 2010.

Mechanical Engineering Professor **Igor Mezic** specializes in fluid dynamics and is head of the Buildings & Design Solutions Group in UCSB's Institute for Energy Efficiency. When oil began chugging into the Gulf of Mexico, Mezic decided to turn his attention to predicting how it would spread. He figured out a new approach to the problem and was able to successfully forecast where and when spilled oil would wash ashore.

Ira Leifer, a researcher with the Marine Science Institute and the Department of Chemical Engineering, studies hydrocarbon seeps and is currently investigating remote sensing technologies for detecting methane—a potent greenhouse gas—released from natural seeps. After the Deepwater Horizon accident, Leifer was appointed to a government panel tasked with investigating the oil spill flow rate and became one of the media's go-to guys.



How did you first get involved?

Leifer: When I saw the news that there was an oil well platform on fire in the gulf I contacted my colleagues to see what we could do in terms of remote sensing. That was my first involvement.

Mezic: I also heard about it from the news. Then I started to do some analysis on the oil movement and a company that was working on the cleanup contacted me because they'd heard what I was doing. They flew me down there because they wanted to use those predictions. That was late June.

Valentine: I'd been in contact with a reporter from the *Los Angeles Times* quite a bit in the weeks preceding the Deepwater Horizon accident because we'd done some work on asphalt volcanoes (on the floor of the Santa Barbara Channel). As soon as this hit we started talking about it. Since I'd just been talking about emanations from the bottom of the sea, I started to get calls about the oil spill. I went down there early in June.

What did you find when you first arrived in the area? How did it compare to your expectations?

Mezic: It was worse, absolutely. I thought it was completely chaotic.

Valentine: It was industrial chaos on a grand scale. I'd talked to several people who'd been out there so I had a pretty good idea of what to expect, but still, out on scene it was pretty bad. We wore respirators for most of the sampling we did close in (to the epicenter). That's how unpleasant it was. I was never more than 20 miles from the epicenter and the closest I got was 1,500 feet away.

More than the thick scum of oil on the surface, it was the sheer amount of activity. When I got there, there were three rigs and then probably 50 to 60 large vessels milling about.

Some of them were running ROVs (remotely operated vehicles, used in underwater exploration), many of them had booms and were collecting oil and pulling it out and burning it, and there were others that did nothing but deliver water because nobody could make water out there. There were a number of research boats, there were crew boats bringing people in and out, just boats everywhere, so at night everything was lit up.

Leifer: It must have been quasi-apocalyptic.

Valentine: It was when they started doing some serious burning (some of the spilled oil was burned as part of the cleanup). We were there on some of the really heavy burn days. Those were the days when there were six, seven, eight burns going on at the same time. The flames were 30 or 40 feet high, just streaming up, and the entire sky got covered in smoke. Then it would rain and all that stuff came back down and your boat got covered in soot and ash.

There was a cloud that sat perpetually over the entire site because of that smoke. We'd have a clear day and there'd just be this one cloud. The funny thing was that it was a bright white cloud, not a dark cloud, so the metaphor failed on some level.

Leifer: I never got to the spill, per se, because it wasn't necessary. I did go down there but I was at Ellington Airport (in Houston, Texas), helping with the flight planning for the remote sensing work.

What comes to mind when you reflect on the spill?

Leifer: I think I had just about every emotion you can have. I'll throw in nausea as well, and not from the fumes.

Mezic: I got really angry about some of the things that were being said. After I started doing my analysis I found it increasingly upsetting that people were saying on the news that they'd been told that oil wasn't going to hit specific places, whereas our analysis was showing it was going to go exactly there.

?We have to be prepared in case something like this happens again. Get familiar with Brazil and the North Sea, because who knows where it's going to happen next? We need to be ready to respond.?

David Valentine

Speaking of frustration, was it difficult to get the information and resources you needed? How did you deal with that?

Leifer: Clearly the spill response could have been far better implemented. If it had, my life would have been easier, and you can also say the spill response would have been more effective.

Valentine: We knew BP (which leased the Deepwater Horizon) wasn't going to provide critical information, so our approach was to go and figure it out ourselves. We tried to measure absolutely everything we could, take samples for everything, so we could pull the story together with information that was meaningful. We knew that even the samples taken on the government side of the response wouldn't be available for a long, long time.

Leifer: BP was providing convenient information that may or may not have been accurate.

Valentine: I did have to push to get funding to do cruises and get people out there to do all the measurements that needed to be made and all the science that I thought was important. There were a lot of phone calls to D.C. to say, "Hey, we really need this, what about a boat? Can we get a boat?" There was pushing to get a ship out there under our direction instead of somebody else's so that we could go out there and make these measurements.

I did get funding from the National Science Foundation and the Department of Energy. Once we published our first *Science* paper, the National Oceanic and Atmospheric Administration recognized the importance of some of the things we were interested in so then they began to call us. That's where things stand now.

The media also started calling, didn't they?

Valentine: The media wanted a lot and I know Ira was in the same boat. They wanted to know what was going on and get some sort of informed opinion.

Leifer: Talking to the media takes up a lot more of your time than you'd imagine. Talking to four or five reporters can end up taking two or three hours. You want to communicate to the media for a whole bunch of different reasons and yet that interferes with what you actually need to do to help the spill.

Valentine: At the same time I found the media to be incredibly useful. If you develop a rapport with reporters, they provide you with information, you provide them with information.

There were a lot of press conferences and so on and there was information being relayed to them that didn't always get passed on to us. If I have reporters from the Los Angeles Times on speed dial, I can talk to them at 9 or 10 at night and ask them what happened and they'll say, "Oh they told us this, this and this." I learned a lot that way.

Related Spill Research



The oil skimming technology developed by Victoria Broje when she was a doctoral student at UCSB's Bren School of Environmental Science & Management was put to work in the gulf. Broje came up with a new design for skimmers that use rotating drums to collect floating oil. By adding grooves to the drum surfaces, Broje, who now works for Shell Projects and Technology, made them much more efficient at collecting oil.

A new book by environmental studies scholar William Freudenburg examines the spill and the decisions and policies that led up to it. In "Blowout in the Gulf: The BP Oil Spill Disaster and the Future of Energy in America," co-written with Robert Gramling of the University of Louisiana at Lafayette, Freudenburg argues that the blowout was an accident waiting to happen, the product of "an atrophy of vigilance." As well as highlighting the risks taken by the companies involved in offshore oil drilling, Freudenburg takes aim at the federal government, which he says has done a poor job of regulating the oil industry and managing the country's energy resources.

Link: es.ucsb.edu/freudenburg [2]

Was it worth it?

Leifer: From the point of view of helping with the response and the science of it?collecting data?I would have been happy to be even more involved, but it overlapped enormously with politics and I'm not a politician of that kind and that's the downside. The downside is really powerful people who may really dislike you.

Ask me this again after the Justice Department is done with its review. I don't worry

about hate letters, but I do worry about hateful lawyers. They have teams of people who will pore over everything you've done, one side to support you, the other to try to prove your incompetence.

Valentine: I didn't have the same level of frustration as Ira did. I wasn't involved in the political side nearly as much. There have been a lot of benefits.

There's been research money—four grants so far, and they'll be more—and we had grad students and postdocs involved in some of the expeditions and they got some really valuable science out of this.

The higher profile cuts both ways. I've had calls from people from high school who I hadn't seen for years. I used to explain what I did to people and I'd just get a glazed-over look. All of a sudden that changed. There were some frustrations, but it was satisfying to actually be contributing to a national priority, as grotesque as it was.

Mezic: I don't know if there was really a downside for me, although it did take us away from our daily jobs.

Leifer: It did take over my life, just like (former BP CEO) Tony Hayward's, although I didn't have a yacht to get back to, just a pile of work that I was supposed to have been doing. I've been trying to catch up on everything that was promised before there was an oil spill, work that didn't happen in those six months. You can tell people, "Oh, I've been working on the oil spill," but that excuse gets old after a while.

Would you do it all over again?

Mezic: Definitely. It was one of the most exciting things I've ever done. You don't often get a chance to test something you've been thinking about for a long time. It was an opportunity for me to test something that was brand new and that's what science is about.

Leifer: After four months of 18-hour days, 7 days a week, personally I'll be happy if there's never another mega-blowout.

Valentine: Absolutely, but at the same time, I think we have to be prepared in case something like this happens again. Get familiar with Brazil and the North Sea, because who knows where it's going to happen next? We need to be ready to respond.

Leifer: Fortunately it's infrequent, which also means that what happens is relatively unknown. It's relatively poorly understood on the science side. It's one of the most complex sciences there is, and it's pitifully funded.

Aside from planning the science that needs to be done, there also needs to be a plan for the scientists, because burnout is real. You need to have multiple teams, replacement people. It's an emergency, you get asked to do it, and you do it, but scientists are humans, not super-machines, not robots.

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