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## reconstruction: studies in contemporary culture

### **Reconstruction 6.3 (Summer 2006)**

#### **Time and the Tsunami / Stefan Helmreich**

**Abstract:** In this article, Stefan Helmreich delivers an ethnographic report on an international academic conference of physical and biological oceanographers held in Goa, India, shortly after the Indian Ocean tsunami of December 26, 2004. Juxtaposing scientific discussions of the tsunami with novelist and anthropologist Amitav Ghosh's early 2005 visit to the hard-hit Andaman Islands, Helmreich examines various styles of narrating time in circulation in the wake of the disaster. Centering his attention on marine scientists, Helmreich discusses a tension between *geological time* and what he calls *oscillating ocean time*, a genre of time that takes in such *long durée* processes as ocean circulation as well as such rapid changes as tides and waves, which he argues are densely entwined with the turbulent temporality of human activity and sociality.

<1> On January 4, 2005, marine scientists on board the *Sagar Kanya*, the flagship research vessel of India's National Institute of Oceanography, set out for the Andaman Islands to survey the damage wrought by the Indian Ocean tsunami of December 26, 2004. Embarking on a voyage quickly mandated by the Indian Department of Science and Technology on December 29, these researchers planned to assess the undersea movement of the Indian tectonic plate towards the Burma plate and to assay the geological and geographic transformations visited upon the landscape of the archipelago. This rapid scientific response was more or less simultaneous with the speedy travel to the Andamans of Amitav Ghosh, one of India's most noted writers and anthropologists. Ghosh had just published *The Hungry Tide*, a novel set in another out-of-the-way archipelago in the Bay of Bengal, the Sundarbans. The book's story – in what, in retrospect, seems an eerie prescience – culminates with the disastrous arrival in a small village of a massive cyclone-generated wave, a narrative element that gave Ghosh's Andaman visit a powerful resonance and relevance. By January 1, Ghosh had arrived in Port Blair, the Andaman's capital, to see how people were managing in the aftermath of the disaster. On January 11, in the first installment of a three-part newspaper feature in *The Hindu*, he wrote of the recent history of the Andamans as a site to which the dispossessed of Bengal, Orissa, Punjab, Andhra Pradesh, and Uttar Pradesh had migrated in search of land and a chance at middle-class lives. He lamented the awful coincidence in which these settlers were caught, reflecting on the cultural and natural temporalities locked together in the calamity: "it is as if the hurried history of an emergent nation had collided here

with the deep time of geology" (Ghosh 2005a: 11). We might add to these two temporalities the unpredictable time of the sea, that oscillating body of water imagined to contain the immensities of primeval time as well as the more immediate intensities of everyday time, with its flows, fluxes, and calamities.

<2> Traveling through the Indian states of Tamil Nadu and Kerala a couple of weeks after the tsunami (away, it must be said, from the areas worst hit by the wave), I followed these parallel oceanographic and anthropological stories with interest. I was *en route* to Goa, where I was registered for a scientific conference on deep-sea, mid-ocean ridges to be held at India's National Institute of Oceanography. I had registered for the late January meeting – a convocation of an international group of scientists devoted to understanding the geology and biology of the undersea fault lines that circle the planet – well before the tsunami, planning to listen in as part of anthropological research I was completing about contemporary marine biology.[1] Ridge sites are famous for hosting the ecologies of deep-sea hydrothermal and volcanic vents, and I hoped at the meeting of "InterRidge" scientists not only to hear comparisons between Atlantic, Pacific, and Indian Ocean sites and science, but also to learn how international groups of researchers managed access to these sites, many of which sit outside national Exclusive Economic Zones, in the so-called "high seas," or what the UN also calls "the Area." By early 2005, however, I already suspected that questions of mining, genetic bioprospecting, and research access to vent ecologies would be eclipsed at the conference by talk of the tsunami, which, after all, had been caused by a quake epicentered at a ridge in the Indian Ocean.

<3> Ghosh's observation about the collision of political and geological time prepared me to listen for how the temporality of the tsunami as well as the timeliness of oceanographic inquiry might be handled at the meeting. I came to discern parsings of time and history as pertaining variously to nature, to scientific inquiry, to bureaucracy, and to emergency. At a higher level of generality, I detected an implicit distinction in play among scientists between *geological time* (which pertained to deep "nature" and which was considered the object of steady scientific inquiry) and what I will call *oscillating ocean time*: a more watery genre of time, one that takes in such *long durée* processes as ocean circulation as well as such rapid changes as tides and waves. Oscillating ocean time can be a bit more slippery to handle both methodologically and theoretically than geological time, especially since human activity (e.g. fishing, coastal construction, greenhouse gas emissions) can be so thickly stirred into this turbulent temporality. An uneasy wavering between discourses on geological time and oscillating ocean time at the conference, I argue, signaled a tension among scientists about how to think about the nature of tsunami and their professional and personal relationship to it. In the reflections that follow, I arrive at this argument by first cataloguing a variety of *other* kinds of time – news time, political response time, computer simulation time, Internet time, the time of the Other – all genres of time that coursed through newspaper and Internet narratives of the tsunami and its aftermath. These various species of time might be understood as sorts of cultural flotsam and jetsam – effects washed up – on the tide of that uncertain discourse pertaining to oscillating ocean time. That discourse – and note that "discourse," appropriately enough, has its earliest meaning as "to run, move, or travel over a space, region" (OED) – found a tremulous articulation, in tension with

talk of geological time, as scientists at the Goa conference grappled with how to comprehend the tsunami in time and, indeed, with how to position their structures of feeling with respect to the human disaster the wave brought in its wake.

<4> Before I had departed from Massachusetts for India on January 5, I had already noticed that attention to time eddied through much news coverage of the catastrophe. There was the speed of the tsunami itself: "as fast as airliners" (Smith 2004). There was the time the tsunami took to hit the shores of countries around the Indian Ocean: "an hour to reach the coast of Indonesia and two Indian islands, another hour to hit Thailand and Sri Lanka and a full six hours to reach Africa" (Hoge 2004). There was the slow response time of many scientists, particularly those at the Pacific Tsunami Warning Center in Honolulu who notoriously complained about not having had contact numbers for colleagues in the Indian Ocean. And there were stories about how the speediest of intentions did not always lead to timely warnings. On December 31, *The New York Times* offered a breathless account of a scientist who feverishly tried to simulate the disaster before its full impact was realized:

It was 7 p.m. Seattle time on Dec. 25 when Vasily V. Titov raced to his office, sat down at his computer and prepared to simulate an earthquake and tsunami that was already sweeping across the Indian Ocean. ... Two hours had already passed since the quake, and there was no established model of what a tsunami might do in the Indian Ocean. ... The pulse of energy transferred from seabed to water, traveling at jetliner speed, was already most of the way across the Bay of Bengal ... In the end, Dr. Titov could not get ahead of that wave with his numbers. ... With an eerie time lag, his data would reveal the dimensions of the catastrophe that was unfolding across eight brutal hours on Sunday (Revkin 2004).

Then there was the whiplash of discussion about whether scientists and politicians had been adequately prepared, whether they had done enough to predict and detect tsunamis and to put warning systems in place: "human foresight could, and should, have mitigated the resulting tragedy... [the] death toll could have been cut at least in half if the affected region had had the same kind of international warning network the United States has set up to protect the adjacent Pacific basin" (*New York Times* editorial, December 28, 2004). One read, too, of how the rapidity of Internet connections could not overtake the momentum of the wave: "The sequence of events as knowledge of the earthquake, the tsunami and the destruction unfolded suggest the speed and precision of science and modern communication, as well as their limits" (Kayal and Wald 2004). In this context, however, bloggers who sent quick bulletins of disaster were held up as examples of individuals overcoming widespread institutional and international confusion and inertia: "Bloggers at worldchanging.com, some of them living in the affected nations, began chattering immediately after the waves hit and began discussions of ways to help" (Schwartz 2004).

<5> Finally, there was the time of international and national response. *The New York Times* editorial page took U.S. President George Bush to task for his delay in recognizing the magnitude of the disaster, writing on December 30 about how "President Bush finally roused himself yesterday from his vacation in Crawford, Tex., to telephone his sympathy to the leaders of India, Sri Lanka, Thailand and Indonesia and

to speak publicly about the devastation of Sunday's tsunamis in Asia." In India, after the country had declared that it would not accept international aid – staking an implicit claim, against China and Indonesia, that India counted as the primary regional power in the Indian Ocean – there was public outcry about delays in getting aid to the Andaman and Nicobar islands, some of the very worst hit areas in the Indian polity. In his second installment in *The Hindu*, Ghosh observed, "Most of the refugees had to wait several days before they were evacuated. Forgotten in their far-flung islands, they listened to radio broadcasts that told them their nation was rushing aid to Sri Lanka and had refused all outside help as unnecessary: for the thirsty and hungry there was little consolation in the thought that these measures might help their country establish itself as a superpower" (2005b: 11). The *time of the Other* so famously analyzed by the anthropologist Johannes Fabian (1983) – in which metropolitans translate spatial and colonial remoteness into distance backward in historical, cultural, developmental, and sometimes evolutionary, time – was here more mundanely translated into a time lag. Ghosh pointed out that the Union Territories of the Andamans and Nicobars – so often associated with "an administrative conception of 'the primitive' that dates back to the British Raj" (2005a: 11) – do not have representation in India's congress, one reason, he argued, that aid was slow in coming.[2] Indeed, islands themselves often feature, in national, colonial, and anthropological imaginations as kinds of time capsules, cultural throwbacks separated by water from the contemporaneity of metropolitan life. In this vision, an expanse of ocean equals an expanse of time.

<6> We might discuss the interval between metropolitan aid and its receipt at the margins as an instantiation of *real time and the other* – where "real time" is that temporality created through just-in-time bureaucratic responses that move through already smoothed channels of financial, legislative, and political connection and therefore leave in place and render invisible existing social and infrastructural relations of wealth, location, and inequality (see Weston 2002, Riles 2004). In her history of the penal colony sited in the Andamans in the nineteenth and twentieth centuries, Kath Weston (in preparation) demonstrates how the Andamans – geographically far closer to Burma than the subcontinent – were constructed in relation to British and independent India as its "back of the beyond." Ajantha Subramanian, in her recent reflections (2005) on the aftermath of the tsunami in Tamil Nadu, points out that aid was often funneled to fishers while farmers whose land was disastrously salinated were ignored, and argues, too, that class and caste inequalities were sometimes exacerbated by the disaster, as many sanitation workers, cleaning up bodies and fish, were Dalits, not always provided with gloves, shoes, or masks in these potentially infectious environments.[3]

<7> As the days of the InterRidge conference drew near, I regularly visited Internet cafés to check in on the National Institute of Oceanography's website and see whether and how marine and earth scientists were tracking the tsunami's aftereffects. The first account posted to the site was a dry, scientific explanation of tsunamis; it struck me as a little clinical, even slightly stunned. To be sure, the site was trying to provide a reasoned account of the event, making the important point that tsunamis are rare and that people did not have to worry about an imminent return of the waters.

<8> Clicking around a bit, though, I found that, like scientific institutions elsewhere, the Institute had been held up to withering public scrutiny. *The Times of India* had this to say:

The country's premier National Institute of Oceanography (NIO) under the Council for Scientific and Industrial Research is clearly at a sea of loss to explain why it failed to alert the nation before the killer Tsunami waves took the highest ever around 150,000 toll of human life. This is what the NIO director, S R Shetye had to say: "The Bay of Bengal has a low probability of 0.8 per cent of being affected by Tsunamis caused by earthquakes with no recorded evidence of any such episode over the last 60 years" (Banerjee 2005).

The reporter reproduced his follow-up question to Shetye along with an acerbic rendering of Shetye's reply: "'Would you have done better had you not adhered to the low probability factor in this zone?' 'Well! You have the data and the facts. I cannot answer,' was his trite reply" (Banerjee 2005). Shortly after the publication of this somewhat intemperate piece, the Institute decided to reply to their critics. I had a sense, later confirmed, that, after the tsunami, the NIO had never received so much attention – "a lot of hate mail" one scientist told me. The next text to go up on the site was the following:

Since 26 December 2004, considerable attention has been focused on that day's tsunami in particular and on ocean research in India in general. We at NIO have also been asked about the tsunami and NIO's role. ... Tsunamis are rare in the Indian Ocean. During 1881-2004, 4 tsunamis have been recorded in this region, besides the last of which was on 26 December 2004. In comparison, about 5 tsunamis are recorded in the Pacific Ocean each year. ... A research organisation (in this case, NIO and the oceanographic research community in India) has to prioritise its research programmes. Focus on recurring events like storm surges, the ocean's role in India's climate, and exploration for living and mineral and fuel resources led to tsunamis being ignored. ... The decrease in deaths in India's coastal areas owing to storm surges over the last few decades shows that we can make progress if we make the collective effort. This progress was possible because of the longer period of incubation in research in laboratories, leading to robust, reproducible science, and because of the longer period over which the results of such research was disseminated to the concerned officials and the affected people. It takes time to do both: achieve a level of understanding or knowledge and translate this knowledge into a practical system that benefits many.

Time features in several ways in this text. First is the reminder of geological time, and of previous disastrous events, even within recorded history, that have been forgotten. (In the United States, the *New York Times* was full of stories of larger volcanic and seismic events that had happened in the last few hundred years; Krakatoa was a frequent mention). NIO's text carries as well the reminder of the relative rarity of tsunamis, even across large stretches of time. This long-term (if stochastic) temporality is offered as requiring the patient attention of painstaking and deliberate science – what the site glosses as "the longer period of incubation in research in laboratories, leading to robust, reproducible science." Stepping outside this frame, the text suggests, will likely lead to wasted time for scientists and lost money for India. Undue attention to

probabilistically rare events (the "hundred-year flood" [see Jasanoff 2001]) will generate neither the sort of reproducible science that prudence demands nor the proper priorities for Indian oceanography. In this framing, science operates in calibration with the extended time of measurable, predictable nature itself, understood as ultimately anchored in geological time. Such science responds not to crises but to questions. Insofar as oscillating ocean time *does* appear in NIO's text – in the figure of the "storm surge" – this temporality is still set within the frame of reproducibility, secured by its "recurring" quality.

<9> By the time I arrived in Goa, the *Sagar Kanya* was well on its way to the Andamans, stopping first in Kerala and Tamil Nadu to test for water contamination and to pick up more scientists.[4] There was as yet no word on its research, and the InterRidge conference opened with an echo of the NIO website. Satish Shetye, director of NIO, welcomed the assembled:

We are meeting at a time when nature sends us a reminder. The reminder came on December 26 in the form of a tsunami. Nature follows its own agenda and doesn't care what society thinks. The last tsunami happened in the Indian Ocean sixty years ago. The new one was not on our radar.

Shetye emphasized that the event was something that required the time frame of geology to comprehend and the pace of slow scientific work to understand. He continued,

Sixty years ago, a tsunami would have been examined from only one point of view in seismology. Today, you cannot look at the tsunami without looking at subduction zones, spreading centers, and mid-ocean ridges. Nature is complex; you have to take a more holistic view of what nature does.

The holistic, long view of earthquakes and tsunamis soberly enunciated on the website, however, constantly bumped into a sense among conferees that *something should be done*. Social, political, and bureaucratic time as well as oscillating ocean time kept interrupting geological time and the time of steady long-term science. Indeed, the head of the Indian government's Department of Ocean Development, Dr. Harsh Gupta, had been invited to inaugurate the conference with the announcement of a national plan to build a tsunami warning system. A local Goan paper reported his speech concisely:

India is going to develop early warning systems for tsunamis, cyclones and storms with an initial fund of Rs 30 crore, Dr Harsh Gupta, the secretary to the department of ocean development said here today. Making this announcement at the inaugural session of the three-day InterRidge workshop on 'Tectonic and Oceanic Processes along the Indian Ocean Ridge System' at the National Institute of Oceanography, Dr Gupta said that the decision to set up a project with central assistance was taken during a recent meeting convened by the department and participated by the space, technological as well as scientific agencies of the government (NT Staff Reporter 2005:1).

Here was still another temporality – a future tense substituting for a turning back of the clock to an ideal initial response, a

hypercorrection to compensate for past oversights with future foresight.

<10> A last-minute addition to the conference schedule, a talk on "the Recent Seismic Event off Sumatra," delivered by Satish Singh, a geoscientist from the Institut de Physique du Globe in Paris, stood in contrast to the more measured pronouncements of the NIO website. Singh was one of the few speakers at the conference who seemed shaken by the tsunami, and he opened his talk with an acknowledgement of the human dimension of the disaster that had been scarce in the earlier lectures. Those presentations had been characterized by slide after slide of the Indian Ocean as seen from satellites, as rendered by computer simulation as an ocean basin spookily empty of water, and as a collection of graphs and charts. There were no traces of people – running, struggling, drowning – in these representations. And time did not flow in these dry presentations. Rather, the images in the talks looked like snapshots, or glacially still time exposures. Even when computer simulations were put in motion, the presenters controlled them, moving them stepwise to explain what was happening, pointing to phase transitions, rewinding earthquakes. This was the scientific capture of rationally flowing time, not a grappling with the fluxional time of changeable water, with oscillating ocean time – much less with the time of human emergency. It was a Newtonian, quantifiable, reversible time of the kind that Maria Assad (2003), in her essay "Time and Uncertainty," in *KronoScope*, the journal of the International Society for the Study of Time, argues serves to place uncertainty as other to time itself (see also Rosenthal 2002). The people in the Andamans, and, even, elsewhere, were completely absent, *other* to the space and time frame of geology highlighted in the talks. They did not, by and large, even feature as temporary features in the more enduring geospace of the Indian Ocean.

<11> Singh's talk began very differently from those earlier presentations: "The earthquake has altered our shores and we are very lucky to be here, especially in India. We cannot ignore this event." Singh was the only speaker at the workshop who made mention of knowing anyone affected by the tsunami. He told us of a Cambridge University colleague who had been in Sri Lanka during the tsunami and had taken terrified note of receding waters at his beach hotel. Singh also showed pictures of people fleeing from the waves – a choice that gave his later animations of aftershocks on a computer map of the Andamans a chilling edge. By asking, "What shall we do?" as computer models replayed the path of the wave, Singh came closest to calibrating the scale of science to the scale of recent history, and, indeed, to a temporality in which not everything was under control, a temporality that, like ocean water, could overwhelm one's rational capacities to make order out of perception and sensation. As scientists in his audience watched circles representing quakes gradually dot his Andamans map, they seemed visibly struggling at once to think of the real, human, consequences of the diagram and to consider what the patterns might add up to in the longer frames of geology. But by asking that we imagine what his diagrams meant in human terms, Singh made the audience uneasy – and his talk was met with something of a bewildered silence. I suggest that this was because, in a setting in which "geological time" had been the organizing catchphrase – and an epistemological mooring for scientific objectivity – Singh's talk summoned up the uncertainties in scale that characterize oscillating ocean time, the at-sea feeling that attention to watery time can engender.[5]

<12> Singh broke the silence after his lecture by saying that more bathymetry should be done, that remotely operated vehicles should be used to map the seafloor. He offered that his institute in France might put an instrument in the Andamans, and made an impassioned case for international cooperation. This brought up another tension organizing the dynamics of the conference: the place of India in global ridge science. The conference was meant in part to welcome the Indian oceanographic community to the InterRidge organization. India had recently become an associate member of InterRidge (full members are the United States, the U.K. France, Germany, and Japan; other associate members are Canada, China, Korea, Norway, and Portugal[6]) and many Indian participants at the meeting were keen to use this opportunity to gain access to collaborations with countries with more oceanographic research infrastructure. Some Indian scientists phrased their concern to me as one of "catching up" to other nations – introducing another temporality into this discussion, the time of national scientific "development." [7] The announcement at the InterRidge meeting of an early warning system by the secretary to the Indian Department of Ocean Development must be seen in this context, as must the *Sagar Kanya's* voyage to the Andamans. [8]

<13> Amitav Ghosh's trip to the Andamans might now be seen in a new light as well. More than documenting the "hurried history of an emergent nation" colliding "with the deep time of geology" (Ghosh 2005a: 11), his writings suggest how the shifting temporalities of water are bound up in narratives of the tsunami as well. Thinking not about the quake, but about the wave can lead us to a different science, a different sociology. In *The Hungry Tide*, one of Ghosh's main characters, a translator from Kolkata, reflects on time in the Sundarban archipelago. I hear in this passage something of what I imagine drew Ghosh so quickly to the Andamans to bear witness:

To me, a townsman, the tide country's jungle was an emptiness, a place where time stood still: I saw now that this was an illusion, that exactly the opposite was true. What was happening here, I realized, was that the wheel of time was spinning too fast to be seen. In other places, it took decades, even centuries for a river to change course; it took an epoch for an island to appear. But here, in the tide country, transformation is the rule of life; rivers stray from week to week, and islands are made and unmade in days (Ghosh 2004: 224).

To be sure, the oscillating ocean time that unleashed the tsunami is different from that motivating Ghosh's river of spinning time. It is, rather, the common fact of inundating suddenness to which I wish to draw attention, a suddenness that not only roils immediately into social forms of life, but that also sometimes pushes people into the arms of steadier, longer-term temporal imaginaries, like those attached to geological timescales.

<14> In the final installment of his Andaman and Nicobar series, Ghosh recounts an encounter with the Director of the Car Nicobar Malaria Research Center. This scientist has lost his wife and daughter to the tsunami and, when presented with belongings of theirs that survived the disaster, refuses to entertain the idea of keeping them. He is far keener to hold on to the record of his research, a series of slides of the malaria parasite. Ghosh finds himself amazed by this choice and asks "Was it perhaps that in this moment of utter desolation there was



some comfort in the knowledge of an impersonal effort? Could it be that he was seeking refuge in the one aspect of his existence that could not be erased by an act of nature?" (2005c: 11). These are questions, it seems to me, that Ghosh was well prepared to ask; one strand of *The Hungry Tide* follows the tale of a scientist who loses much of her data in the wave that follows the book's climactic cyclone. As in his novel, Ghosh fastens on to the emotion of science as vocation, to a structure of feeling that takes objective knowledge as subjective succor.

<15> I am left wondering – and I don't have an answer, not having done long-term ethnography with scientists at NIO – whether geological time and its coordination with slow scientific time might have offered for some of the scientists at the Goa meeting what Ghosh glosses as "comfort in the knowledge of an impersonal effort." Still, at the InterRidge conference, scientific structures of feeling seemed in some turmoil. On the one hand, many speakers held the tsunami and its victims at a distance, the distance available by speaking in terms of long, geological time frames (and, in other contexts, by placing the victims in another time, a time of the other). Others, like Singh, seemed to find themselves transformed by the disaster, more eager than before to call this international group of scientists to do something, to find ways to calibrate geological time to social time, to risk mixing methods and theories in order to wrest their reproducible science into the present, into the unpredictable and turbulent moment of oscillating ocean time.

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## Notes

[1] Early dispatches from the fieldwork can be found in Helmreich (2003, 2005). [[^](#)]

[2] In anthropology, the Andamans have been positioned in a complex relation to temporality. A. R. Radcliffe-Brown (1922) did his first ethnographic fieldwork in the archipelago, from 1906-08, at a time when it still housed the British India penal colony. He bemoaned the fact that he could not see an "authentic" Andamanese society in full function, and sought to recreate the social history of Great Andaman through interviews with a key informant about the way things used to be (Kuper 1983). This deliberate search for and construction of a more pristine and primitive time of the other became a hallmark of later ethnological work, which sought to describe the indigenous Andamanese, Jarawas, and Shompen as throwbacks to an earlier stage of human evolution (Kath Weston has written instructively on how such descriptions were inseparable from the British project to settle "nomadic" Andamanese in "Homes," a practice that made of these local people a parallel incarcerated population in the archipelago). In the aftermath of the 2004 tsunami, such stories were reanimated, as news agencies like the BBC reported that "Tsunami folklore 'saved islanders'," that the indigenous Andaman peoples had age-old wisdom linking oceanic phenomena – the receding of sea waters – to survival strategies. Kai Friese, writing in an *Outlook India* piece on January 16, critiqued such accounts with a polemical pique:

anthropology is alive and well, in the islands and it's having a field day in the news. The Indian *Express* on Sunday gave us a double-page spread with a field guide to "the tribes and their survival tricks". The Great Andamanese "whose strongest physical characteristics are distinctly Negroid"; the Jarawas who "look at heavenly bodies and can decipher what is to come"; the Shompen, "the only primitive tribe of the islands with Mongoloid features", and so on.[[^](#)]

[3] The immense history of life and politics on the coasts of the Indian Ocean is obviously far beyond what this essay can even put its toe into. Omnivorous readers are referred to McPherson (1993). [[^](#)]

[4] The *Sagar Kanya* began to deliver preliminary reports in early February. According to the *Deccan Herald*, "an area in Port Blair may have sunk by a metre while Andaman Island appears to have been twisted." Also reported were the destruction of young coral reefs near the Andamans and the inundation of farmland by saltwater. [^]

[5] The tight fastening of scientific sentiments about objectivity to ideas about geological time was only one calibration of science to society evident during my visit to NIO (though certainly the prevalent alignment, owing to the dominance of geological concerns at this gathering on ridge systems). Fisheries scientists (not much in evidence at the meeting) think of their science as having immediate implications for social and political management – and, with fish populations subject to influences ranging from tidal to climatic forces, consider oscillating ocean time central to their work, and, indeed, inextricable from the entangled temporalities of local, national, and international maritime politics. Scientists working in marine biotechnology (the use of marine organisms as raw materials for bioengineered products), meanwhile, see their work keyed to the temporality of local and global capitalism (local, in connection with national priorities around aquaculture or the bioremediation of coastal pollution; global, in connection with pharmaceutical production and marketing). NIO's entry into biotech, subsidized by India's Department of Biotechnology, provides these scientists with an idiom for thinking of "science" as keeping pace with a speedy, marketized "society," especially as India moves from a state-socialist model of science funding to a vision of the nation as a corporatized state player in global technology markets (see Prakash 1999, Sunder Rajan 2005). Oscillating ocean time is less important here than the boom and bust cycles of capitalism.

Depending, then, on the particular sciences at issue (e.g., geology, biology, biotech) and the social and political institutional conditions supporting those sciences, a wide variety of temporal relationships between "science" and "society" can obtain. [^]

[6] Corresponding members are Australia, Austria, Brazil, Italy, Denmark, Iceland, Mexico, Mauritius, Morocco, New Zealand, the Philippines, Russia, Spain, Sweden, South Africa, and Switzerland. [^]

[7] Researchers at NIO were concerned to get their graduate students postings in Europe and the United States and to make sure that Indian scientists were on board American, Japanese, and French research vessels doing science in the Indian Ocean.

Such signs of Indian national sentiment that materialized at the meeting did not sit well with non-Indian conferees. During a discussion about whether the Indian Ocean region should have its own working group within InterRidge or whether existing groups devoted to biology or geology should share it, one French scientist opined that research groups "should be thematic rather than geographical. A geographical focus means that local people will dominate and you won't always get the best people to do the best science that way." This uncharitable estimation was given a sharper (and offensive) point when this researcher concluded by saying, "It's a bad joke, but I would not like to have an Indian reservation in the Indian Ocean." A Japanese scientist, dealing with questions of national ocean access far more diplomatically, paired a geological question with a political one,

moving discussion to the specifics of the Andaman back arc basin, where aftershocks had been occurring. He said, "I have two questions for Indian scientists: 1. What is unique about the Andaman back arc basin? and 2. What is the chance of international science teams investigating the Andaman system, since there are lots of political restrictions on going there at the moment?" The head of the Indian Ridge program, Kamesh Raju, offered seismic specifics and speculated that international scientific access to the Andamans might be eased in the aftermath of the tsunami. [[^](#)]

[8] Indeed, India's place on the timeline of "development" was in part popularly imagined through the country's response to the tsunami disaster, which, at least as far as Tamil Nadu was concerned, was widely seen as evidencing a speedy, efficient, industrialized nation (with the response to the Andamans telling a somewhat different story). As a point of comparison, consider the lackluster response of the American government to Hurricane Katrina, widely characterized as incompetent, even "third world" in its execution. Disaster response here becomes an index of a country's progress along the arc of "development." Thanks to Ajantha Subramanian for this observation, and for pressing me to think about the various relations between scientific and social time I outline in note 5. Thanks also to editors Justin M. Scott-Coe and W. Scott Howard for helping me sharpen my arguments and to Michael M. J. Fischer for an early set of comments. [[^](#)]