Whiplash Warning When Climate Science is Publicized Before Peer Review and Publication

By Andrew C. Revkin  July 23, 2015 2:20 pm

[Updated, Aug. 18, 2016, 11:33 a.m. | When the Hansen paper finally passed peer review and was published in March 2016, the elements predicting an imminent rapid rise in sea levels — the aspect of the paper that drew the attention of CNN, CBS and other major media — were largely replaced by projections.]

Update | | My July 26 post weighing the science in the Hansen paper is here.

Original post| Various updates | Who wins when a scary, but edge-pushing new climate study led by one of the world’s most prominent climate scientists makes headlines before it is either peer reviewed or published?

Everybody, and nobody. Let me explain what I mean.

Projecting a Coastal Catastrophe

The study is “Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming is Highly Dangerous.”

The 66-page “discussion paper” (the authors’ description) was posted Thursday in Atmospheric Chemistry and Physics Discussions, the discussion forum
of the European Geosciences Union journal Atmospheric Chemistry and Physics.

The paper was written by 17 prominent climate, ice and ocean scientists, led by James E. Hansen, the pioneering climatologist who since 2007 has argued that most of his peers have been too reticent in their projections of the possible pace of sea-level rise in a warming world.

It is a sweeping and valuable cross-disciplinary description of ways in which climate and ocean dynamics, pushed by the planet’s human-amplified greenhouse effect, could accelerate sea level rise far beyond the range seen as plausible in the last report from the Intergovernmental Panel on Climate Change and the most recent review of what leading experts on sea level think, this 2014 paper: “Expert assessment of sea-level rise by AD 2100 and AD 2300.”

The summary is powerful, but reflects longstanding views of Hansen and some other climate scientists:

We suggest that ice sheet disintegration is a highly nonlinear process and poses a danger of rapid sea level rise. We find evidence in paleoclimate observations and in global climate simulations supporting the existence of amplifying feedback processes that would contribute to nonlinear ice sheet response. Modern observations reveal that these processes are already underway, including cooling of the Southern Ocean surface. We conclude that a 2°C limit on global warming is not a safe “guardrail.”

But that’s not why it made headlines, including in the Washington Post and on CBS Evening News earlier this week.

The paper got attention in advance because of this passage and, particularly, the five highlighted words (my emphasis):

We conclude that continued high emissions will make multi-meter sea level rise practically unavoidable and likely to occur this century. Social disruption and economic consequences of such large sea level rise could be devastating. It is not difficult to imagine that conflicts arising from forced
migrations and economic collapse might make the planet ungovernable, threatening the fabric of civilization. This image of our planet with accelerating meltwater includes growing climate chaos and storminess, as meltwater causes cooling around Antarctica and in the North Atlantic while the tropics and subtropics continue to warm. Rising seas and more powerful storms together are especially threatening, providing strong incentive to phase down CO2 emissions rapidly.

The extent of danger posed by sea-level rise is a function of the pace of change far more than the final number. If there is new clarity on near-term coastal retreats, that is the news.


The new paper, which Hansen told me he’s been working on for eight years, was being rushed into public view with the hope of influencing negotiations at the December round of talks in Paris aimed at crafting a new global climate change agreement. You can hear from Hansen on the reasoning in the recording of his phone conference call with some reporters on Monday.

The authors’ cross-cutting vision of a new mechanism for faster sea rise — along with the novel model runs flooding the Atlantic and Southern Ocean with fresh water and the detailed assembly of supporting evidence — are all what edge-pushing science does. A new idea is broached and the community, like a school of intellectual piranhas, descends to nibble away the soft parts. What remains is new knowledge. A discussion journal like this one is just the kind of venue for such work to be tested. This particular journal has a clear and open review process.

[Insert, July 24, 8:40 a.m.] “Depending on the outcome of the peer review, it may or may not be accepted and eventually published in the peer-reviewed journal,” said Bárbara Ferreira, who manages media and communications for the Geosciences Union.

A similar jog to climate research came in 1987 in an informal proposal from Columbia University’s Wallace Broecker — in Natural History Magazine, not a reviewed journal — that human-driven global warming could precipitate an abrupt
chill in parts of the Northern Hemisphere. We were, in Broecker’s words, “poking an angry beast with a stick.” It turned out things were far more nuanced (as he later said, “The Earth system may be less responsive in the warm times than it was in the cold times”), but in a field that had long mainly foreseen smooth curves for planetary change with rising greenhouse gas levels, the result was a vital focus on the risks of abrupt climate change. (There’s a recent update from RealClimate.)

**Everybody Wins**

That all sounds great. A dramatic finding. Impressive coverage. Everybody gets something.

– Climate science gets fresh ideas to chew on. This paper, during and after the open review process, will be whittled down, with flaws pared away. But it will stimulate new lines of inquiry, as well.

– Advocates for action on greenhouse gases in Paris got the kind of headlines they crave (sift here to get the idea). Whoever paid the Glover Park Group to handle the rollout will see that return on the investment. The firm contacted a batch of environmental journalists last Friday, offering an embargoed look at the paper and the press call with Hansen on Monday. (I was alerted to the paper on Sunday by Hansen after he noticed I wasn’t on the initial distribution list.)

– Journalists and bloggers who covered it early got jumps in views and heaps of Twitter action as the most engaged segments of society — those most worried about warming and most dismissive of it — dove in.

**Everybody Loses**

So why does everyone lose?

The signs of trouble were there from the beginning. Eric Holthaus, the blogging meteorologist at Slate, sought input from scientists on Twitter after posting his piece on Monday. He said: “Curious whether other climate scientists think Hansen et al’s decision to publish in discussion journal diminishes the study?”
An anonymous blogger who writes knowledgeably on climate, known on Twitter as @ThingsBreak,* replied (this combines two tweets; the acronyms are for the journal name and the European Geosciences Union):

“Absolutely nothing weird or wrong [with] publishing in one of the EGU open review journals. But what’s weird is big press push when it’s just at the ACPD phase *before* reviewer comments and acceptance by ACP. Unusual.”

@EricHolthaus What’s weird is big press push when it’s just at the ACPD phase *before* reviewer comments and acceptance by ACP. Unusual.

— Things Break (@thingsbreak) 21 Jul 15

Most of the initial coverage from journalists who had an advance look, including Holthaus, stressed that the paper had not yet been reviewed.

But by late Tuesday, as other coverage built, so did questions about the way the study was released, and the quality of its analysis. In Science Insider, the news section of the journal Science, Carolyn Gramling included this tough line: “But how influential this paper will be is unclear, given its flaws.”

I was remiss in not including Brian Clark Howard’s National Geographic article last Thursday in which scientists raised important questions about the new paper. [Inserted July 27, 5:20 p.m.]

Another sign of trouble was that, despite the publicity push, the Associated Press, The New York Times, the BBC and The Guardian (despite its yearlong push for climate action blending advocacy and reporting) were among those who steered clear of the study. Listen to the taped call to get a visceral sense of the concerns of Seth Borenstein, the longtime climate reporter at the A.P.

As it turns out, those who held off were wise to do so for a reason unrelated to the lack of advance peer review. That portentous section above — which in many ways is the only part of the paper that is news given how it centers on the “likely” inundation of most coastal cities in this century without aggressive emissions cuts — is not in the version the journal has posted.
Altogether, three different documents circulated to journalists and some scientists this week ahead of the paper going online. The “front-page thought” (my shorthand for the element of a story that merits news attention) is not in the paper posted by the journal. It’s in a shorter version, lacking references, that a publicist at Glover Park told me was going into more of a lay publication. [I’ll update that when there’s clarity.]

The final draft posted for discussion has more nuanced language, in line with what those arguing for more near-term climate and coastal risk have already articulated.

Should everyone who excerpted quotes that aren’t in the paper now correct the stories? I’ll leave that up to them.

Maybe we’ll all be a little slower on the draw next time when work is promoted before it is publicized or peer reviewed. This isn’t the first time those covering climate science have been through this drill.

[Note, 9:00 p.m. | The next few paragraphs were reorganized slightly for clarity.]

There are other merits to slowing down a bit in examining an issue that will be with us for generations — long past Paris. This is a marathon, not a sprint. Burnout is real. Just ask those interviewed for the recent Esquire story on “pretraumatic stress” in climate scientists. (Here are strategies for keeping energized.)

None of this detracts from the value of the science being discussed here.

There’s an invaluable new report out from an international team of experts on paths to more effective climate risk assessment that describes precisely why the work of Hansen and his co-authors and those who now review the work is essential:

This report argues that the risks of climate change should be assessed in the same way as risks to national security, financial stability, or public health. That means we should concentrate especially on understanding what is the worst that could happen, and how likely that might be. (I learned
about it, interestingly enough, through a Judith Curry post on Hansen’s paper.)

It looks like Elizabeth Kolbert, who posted this morning on the paper for the New Yorker, got the right version of the paper. Her conclusion is that the risks of unwelcome surprises rise with unabated emissions and warming. And the world, so far, hasn’t meaningfully diverted from a high-emissions trajectory.

Unabated emissions of greenhouse gases will guarantee civilization will have no set coastline to develop for centuries, if not millenniums, to come.

The sad reality is that’s not news.

As time allows, I’ll append some comments that have come in from researchers before the week is out. (I have to run out now to talk about climate science and journalism with students at a fantastic girls’ school in the struggling city of Newburgh, N.Y.)

Here’s one to start, from Kevin Trenberth at the National Center for Atmospheric Research (he’s sent variants of this note to other journalists*, but it’s worth posting in full):

The new Hansen et al study is provocative and intriguing but rife with speculation and “what if” scenarios. It has many conjectures and huge extrapolations based on quite flimsy evidence, but evidence nonetheless. In that regard it raises good questions and topics worthy of further exploration, but it is not a document that can be used for setting policy for anthropogenic climate change, although it pretends to be so.

The paper is long. It hinges upon interpretation of paleo and other data that is apt to be somewhat controversial. It uses a model that is coarse resolution and which does not have a very good climate simulation. The evaluation of the model leaves much to be desired: no differences are shown compared with observations, and some errors are large. No mention is made of ENSO or Pacific decadal variations that dominate interannual and
decadal variability in the real world, and which are a key to understanding the recent hiatus, and recent trends that are not representative of longer-term trends, although frequently interpreted as such. In section 4.5, the authors point out the need to simulate a number of features realistically and the model does not really do them very well, especially basic things like sea surface salinity. So the relevance of the model is not established. They use the model for a number of highly artificial experiments that are supposed to depict melting of ice at high latitudes: “freshwater injection.” These experiments introduce a lot of very cold fresh water in various places, and then they see what happens. The question is how relevant these are to the real world and what is happening as global warming progresses? They do not seem at all realistic to me.

A key to a lot of this is how clouds change, and one needs to get clouds right in the first place to have confidence in the results. Unfortunately, this is an area where major problems exist. Huge problems occur over the southern oceans for instance and all models have far too much sunshine penetrating to the surface compared with observations. No doubt the southern ocean, featured strongly by Hansen et al, plays an important role, but data there are poor, and change is not well known; in particular the recent hiatus in global warming greatly influences any observations, which can therefore be quite misleading wrt trends. I certainly do not believe the result claimed with regard to less snow over Antarctica with a warming climate. Although Hansen argues that the real world is responding even faster than in the model scenarios, this is not at all clear owing to the natural variability.

The paper is quite well written and a tour de force in many respects, but there are way too many assumptions and extrapolations for anything here to be taken seriously other than to promote further studies. The authors often say that “these model limitations must be kept in mind” – and there are many other model limitations not discussed – but then they do not keep them in mind when drawing conclusions. Some of the conclusions with regard to the need for immediate actions I strongly agree with, but it seems that this study has gone out of its way to make the case, stretching credibility.
Richard B. Alley, the longtime climate scientist at Penn State, sent this note in the string including Kevin Trenberth:

Kevin as usual is succinct and trenchant. A few other thoughts you can use or lose...

As you, and most of your readers, well know, this is a not-yet-refereed single paper, and even though it is from a remarkable team led by one of the most influential climate scientists, that does not change the fact that the reports of the National Academy of Sciences, the IPCC or the Royal Society that assess our understanding are not based on one such paper, and are very unlikely to be changed much by this paper. Starting with the IPCC or the Academies on this topic, and staying with them until there is a really solid reason to change, is highly useful, and in my opinion this paper as it stands is not a really solid reason to change.

For those of us who actively research these topics, the new paper will stimulate discussion, has highlighted processes that we should understand better, and so is likely to help guide research as we try to weave together the deep-time and recent history with process understanding to provide useful sea-level projections for the future.

For the broader community, using the IPCC results but remembering the shape of the uncertainties may be valuable. In the couple of decades leading up to the most recent IPCC report, the ice sheets were losing slightly less than 0.001% of their mass per year, a rate that would require more than 100,000 years to remove all of the ice, and the equivalent of me going on a diet for a year and losing about 1/3 of one potato chip. The IPCC most-likely future projected moderate acceleration of sea-level rise in a warming world, but still a slow rate of change compared to the fastest rates we can envision. Hence, while there is very little support for the fastest rates in the new paper, it remains that if the IPCC most-likely value proves to be in error, the future rate of rise is more-likely to be higher rather than lower. In this as in many aspects of the climate-change problem, the distribution of possible impacts of a warming world is skewed, with a long tail on the costly side.
This in turn means that focusing on the most-likely rise from the IPCC rather than the full distribution will tend to underestimate the full challenges we face, rather than overestimating them. And, if someone believes that uncertainties in scientific understanding justify a wait-and-see attitude toward global warming, looking at the distribution of uncertainties suggests a serious reconsideration.

July 25, 8:45 a.m. | Ken Caldeira, a climate and energy researcher at the Carnegie Institution, sent this note by email:

The open “discussion” journals favored by the European Geophysical Union (EGU), including Atmospheric Chemistry and Physics Discussions (ACPD), may be doing the scientific community a disservice.

For those not initiated into the ways of these journals, scientists submit manuscripts to Atmospheric Chemistry and Physics Discussions where they are published without peer review, and then later if successfully peer reviewed, a modified version appears in the regular journal Atmospheric Chemistry and Physics.

This produces at least two versions of every paper: A non-peer-reviewed draft and and a final peer-reviewed version. The continued circulation of the non-peer-reviewed draft can act as a kind of pollution of the scientific literature, as it is often unclear to the uninitiated what it means to be published in an EGU “Discussions” journal.

One of the key contributions of the editorial and peer-review process provided by journals is the vetting of the scientific content both for importance and quality. There is way too much stuff being written to read everything, and the editorial process at a high-quality journal is supposed to help provide a filter and direct scientists to important, high-quality, papers.

It is a fiction to believe that busy scientists have the time to review a panoply of manuscripts that they are not specifically tasked with reviewing.
Journal editors know how hard it often is to obtain thorough reviews of papers.

By publishing papers that are not peer reviewed, EGU journals such as ACPD are contributing to the noise of science, when the role of the editorial process should be to help readers find the rare nuggets of important high quality signal amid the abundance of excess noise.

**Further reading**

I forgot to remind folks where the “whiplash” thought in the headline came from. In 2008, I first noted that there was a damaging whiplash-like effect when journalism was confronted with divergent findings on consequential, but complex science frontiers. I looked back at that story and realized it’s highly relevant. Here’s an excerpt and link:

> When science is testing new ideas, the result is often a two-papers-forward-one-paper-back intellectual tussle among competing research teams.

> When the work touches on issues that worry the public, affect the economy or polarize politics, the news media and advocates of all stripes dive in. Under nonstop scrutiny, conflicting findings can make news coverage veer from one extreme to another, resulting in a kind of journalistic whiplash for the public.

> This has been true for decades in health coverage. But lately the phenomenon has been glaringly apparent on the global warming beat.

> Discordant findings have come in quick succession. How fast is Greenland shedding ice? Did human-caused warming wipe out frogs in the American tropics? Has warming strengthened hurricanes? Have the oceans stopped warming? These questions endure even as the basic theory of a rising human influence on climate has steadily solidified: accumulating
greenhouse gases will warm the world, erode ice sheets, raise seas and have big impacts on biology and human affairs.

Scientists see persistent disputes as the normal stuttering journey toward improved understanding of how the world works. But many fear that the herky-jerky trajectory is distracting the public from the undisputed basics and blocking change. “One of the things that troubles me most is that the rapid-fire publication of unsettled results in highly visible venues creates the impression that the scientific community has no idea what’s going on,” said W. Tad Pfeffer, an expert on Greenland’s ice sheets at the University of Colorado.

“Each new paper negates or repudiates something emphatically asserted in a previous paper,” Dr. Pfeffer said. “The public is obviously picking up on this not as an evolution of objective scientific understanding but as a proliferation of contradictory opinions.”

Several experts on the media and risk said that one result could be public disengagement with the climate issue just as experts are saying ever more forcefully that sustained attention and action are needed to limit the worst risks. [Please read the rest.]

Addendum, July 23, 4:35 p.m. | * Steve Smyth, a longtime Dot Earth reader who writes ShoreLine Earth, had reached out to Trenberth and was the first to alert me to his comments.

Correction: July 23, 2015
In a complete mental lapse, I originally wrote that the Twitter reply to Eric Holthaus came from Michael Tobis, a retired University of Texas climate analyst (his Twitter handle is @mtobis). Via Twitter, I realized it was the blogger known as @ThingsBreak. Apologies all around!