

Should This Exist? Episode Transcript: Cloud Brightening

“Cloud brightening for climate fever”: Should This Exist? with Caterina Fake

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CATERINA FAKE: Hi it’s Caterina. On today’s show, we begin with a story from the Philippines on the island of Luzon – not far from where my family’s from... and one afternoon in June of 1991, when residents say the air in the small village of Lourdes started to vibrate.

NBC: A volcano dormant for 600 years, erupted in multiple explosions that sent up huge clouds of ash visible 60 miles away in Manila.

FAKE: Mt. Pinatubo blew her top with ash spewing straight up 20 miles into the atmosphere and then opening like an umbrella – into a dark cloud that stretched as far as Vietnam and Cambodia.

NBC: And within minutes, falling ash turned day into night.

FAKE: It was the second largest eruption of the 20th century, and it went on for nine hours.

NBC: People in surrounding villages ran for their lives.

FAKE: 800 people died. And 100,000 were left homeless.

NBC: Tonight the volcano continues to spew out tons of molten rock.

FAKE: But the reverberations didn’t end for the climate. Something major shifted in the stratosphere. And gas from that ash plume scrambled weather patterns, and produced a cooling of the entire planet by almost one degree Celsius for almost two years.

Now some climate researchers are asking: can we replicate that? Mt. Pinatubo’s eruption was almost a natural climate experiment in keeping the planet cool.

KELLY WANSER: We have a rising fever that’s approaching an emergency level where things start to break down.

FAKE: Kelly Wanser is an activist focused on climate innovation. She calls these approaches “emergency medicine for earth’s climate fever.”

WANSER: Stabilize the patient – kind of medicine. So you can have the patient in a place where you can treat the underlying condition.

FAKE: It's emergency medicine because it's directly messing with basic ecological systems – the clouds, the earth's atmosphere.

Planetary scale projects like this are sometimes called “geoengineering.” Ages ago, they sounded more like science fiction than science. But now carbon emissions are soaring.

No one wants to use this technology – it's drastic. It's not even a plan B. It's more like a plan D.

WANSER: Just like with medicine, like you want to do as little as possible for as short a time as possible, that the more you do, the riskier it is.

FAKE: You'll meet Kelly Wanser and researchers working on an intervention called marine cloud brightening.

How would it work? And how soon? How would countries control it? Can we deploy this technology in time to save the planet? And if we do, what repercussions might it have?

[THEME MUSIC]

FAKE: Hey it's Caterina. And today, my producer Amy and I are in Palo Alto, California.

FAKE: We're here to meet Kelly Wanser from Silver Lining, which is an NGO which does geoengineering, although she prefers not to call it that.

AMY: It's a good day to talk about clouds. It is overcast.

FAKE: And then there's this somewhat anonymous looking building where I'm very familiar with PARC.

FAKE: PARC is the Palo Alto research center. It's been around since 1970. And it was originally a subsidiary of Xerox with all kinds of ground-breaking innovations developed here – laser printing, ethernet, the modern personal computer.

FAKE: Very Silicon Valley style... kind of low to the ground.

AMY: Invisible or something or trying to be.

FAKE: Yeah, If you were trying to be not the ostentatious Bond villain, but you were trying to be the subtle inconspicuous Bond villain, this is how you would design your buildings.

Aha, I see Kelly inside. Did you just arrive?

WANSER: This morning...

FAKE: Kelly Wanser is executive director of Silver Lining and works in partnership with PARC. She spends a lot of time here when she's not in New York or Boston or Seattle or Washington, DC.

WANSER: Just you know, working the... working the process...

FAKE: ...advising and advocating for innovation and research that would act quickly on the climate system – like within a few decades or less.

FAKE: Wow. It feels so labby – there's so much lab stuff. It's like gear, gear, gear, gear. Rooms with machines buzzing and beeping and flashing, diagrams.

FAKE: Kelly's leading us through the labyrinthine hallways at PARC – and we pass a small windowless lab room where a group of white-haired men dubbed the 'Old Salts' are conferring in a circle.

WANSER: Well, we're just we're actually just popping our heads in, we'll come back later for real.

FAKE: Kelly promises we'll come back here, because what might look like your grandad's ham radio club – is actually on the cutting edge of fast-acting climate intervention.

WANSER: We're concerned about rapid climate change, near-term climate change, and the fact that the portfolio of options that we have today, reducing emissions, growing trees, those operate over many decades.

FAKE: May not be fast enough.

FAKE: Kelly's not your typical climate activist. She worked as an entrepreneur in technology for 20 years, which sets her apart from most. She's much quicker to advance radical ideas like geoengineering.

FAKE: But you don't like that term?

WANSER: Well, I think the National Academy of Sciences calls it solar climate intervention. And geoengineering was a term that I think was coined by a couple of young scientists in the 60s or 70s. This is more like medicine than engineering.

FAKE: In a minute, we'll look at how Silver Lining plans to execute this solar climate intervention. But the *why* is pretty clear. Advocating for climate innovation was a passion for

Kelly for a dozen years as a tech entrepreneur. But about four years ago, once the urgency became clear, it was hard for her to work on anything else.

WANSER: And I did a talk that was called Emergency Medicine for a Climate Fever, and I do think in terms of how we think about the earth's system, we have a rising fever that's approaching an emergency level where things start to break down. And our job right now is to understand whether we have emergency medicine and how to think about it.

FAKE: Kelly studied economics and philosophy in college. Among many influences in her work in climate intervention, she says she was particularly inspired by a French chemist who became a Buddhist monk – Matthieu Ricard.

WANSER: He has a quote that I can't remember the exact nature of, but it has to do with, you know, that life's meaning really is about reducing suffering. And so for me, in the climate situation, that's the sort of, what we say in tech, high order bit. That's the sort of guiding principle.

FAKE: Which prompted me to probe even further about her earliest ambitions.

FAKE: What did you want to be when you grew up?

WANSER: When I was really little, my mom told me I wanted to be Pope.

FAKE: Pope?

WANSER: Yeah and apparently I was pretty upset when she told me that wasn't an option.

FAKE: I don't know what answer I was expecting, but it certainly wasn't "Pope".

FAKE: And so much of what we're doing and so much of what we're talking about is called playing God by a lot of people.

FAKE: Some call geoengineering playing God with the planet. Skeptics say we'd have to be truly desperate to even consider this on such a global scale. But other experts believe we've reached that point.

WANSER: Our position today is that we don't know enough about these options to know whether there's something we really want to take seriously as climate responses, or there's something that we need to preclude. But we think that our current level of understanding of them is not sufficient.

FAKE: In exploring the options out there, Kelly refers to a recent report from the National Academy of Sciences on the most promising areas to reduce or arrest warming quickly.

WANSER: In the category of fast-acting cooling, the fastest way to reduce warming on the planet is to push sunlight away from the planet. And they looked at all the possible ways of doing that from mirrors in space to ping-pong balls on the ocean, plastic sheets on the Arctic, painting roofs white.

FAKE: It went by a bit quickly, but you did hear that right – back in the '60s, scientists floated the idea of trillions of ping-pong balls that could reflect the sun's rays back from the ocean.

WANSER: They looked at how invasive they were, how risky they were, and they recommended the most promising approaches, the ways that are based on one of the ways that nature keeps the planet cool, which is the reflection of sunlight from particles and clouds in the atmosphere. And what their hypothesis was that if you were to slightly increase the reflection of sunlight particles from the atmosphere by one or two percent, that you might offset a doubling of CO₂ and that could be three degrees or more of warming.

FAKE: This happens naturally in the case of massive fires of which we've seen a lot recently.

WANSER: That's right.

FAKE: Volcanoes, other natural events.

WANSER: That's right.

FAKE: Volcanoes and wildfires do help cool the planet, but pose their own grave threat to human life. So here at PARC and the University of Washington and Harvard, they've started looking into whether there's a less destructive way to increase the reflective capacity of clouds. By making them brighter.

It's a project that could have immediate and wide-ranging impact. So perhaps it's not surprising that a team of engineers has come out of retirement to work on it. "The old salts."

WANSER: These retired engineers, to work on this technology for the sake of their grandchildren.

FAKE: Those guys that we saw down the hall? Honestly, it was like the room of the elders. It really was like you kind of looked in there, and I felt very much as if suddenly we had walked into a secret cabal of, you know, the enlightened.

FAKE: That sounds like hyperbole, but if anything, it's an understatement.

GARY COOPER: Gary Cooper.

JACK FOSTER: Jack Foster.

SUDS JANE: Suds Jane.

FAKE: The old salts are a half dozen physicists and engineers and computer scientists – who've now spent 12 years as volunteers, thinking about ways of seeding the clouds with sea salt and other materials. Doing this increases the cloud's reflective properties.

AN OLD SALT: Clouds, as you know, are little aerosols of tiny water droplets, really small water droplets. The smaller they are, the whiter the cloud is. Rain clouds are dark because the droplets have gotten big, and they don't scatter light anymore.

FAKE: I did not know that.

AN OLD SALT: See, it all makes sense.

FAKE: Let's go over that one more time. Clouds made of small water droplets are brighter than clouds made of big droplets. Brighter clouds reflect more sunlight away from the earth, which slows global warming. So, how does spraying salt into the clouds help?

AN OLD SALT: So the idea is... we did not come up with this idea...

FAKE: They're building off the work done by John Latham at the National Center for Atmospheric Research and Stephen Salter at the University of Edinburgh.

AN OLD SALT: We're just the plumbers. This is a natural – well, it's a version of a natural process. The ocean, every time a wave breaks on the ocean. There are bubbles. Every time a bubble pops, a little tiny bit of salt gets put into the air.

FAKE: That tiny salt particle becomes a nucleus around which the condensation forms.

AN OLD SALT: And that's the natural way of doing it. We're trying to augment that.

FAKE: By spraying the clouds with an ultrafine salt mist from ships, it would add condensation nuclei to the atmosphere, increasing cloud reflectivity over the ocean.

FAKE: You can hear the spray coming out of the nozzle.

FAKE: The old salts are testing that in a small-scale system in PARC's lab.

AN OLD SALT: And so we have this plume of particles that are emitted. Well, it's like going to the seashore.

FAKE: It's salt spray.

FAKE: They're hoping in the near term to take this from a single nozzle, to a much larger system outside of this lab to study how those particles get released into the atmosphere.

WANSER: So you would need hundreds of these nozzles that you're just seeing one of. And as they work with more and more nozzles, they'll need bigger and bigger spaces to work with.

FAKE: So this room is probably about what, 200-square feet? So your next space will be how big and then how big and then how big. You need to bring it out to the ocean presumably.

AN OLD SALT: But it's taken us 12 years to get where we are, and we don't have something that we can actually deploy yet. So we need to do the research. We need there to be more funding for the research. And you know, we just keep working on it, because we're trying to save our grandkids. We've also contended that when we have patents, we'll make the patents freely available for people doing climate mitigation work.

FAKE: But as passionate as they are about their work, the old salts hope their technology is never used. It's more of an insurance policy – a fallback, if things get really bad.

AN OLD SALT: None of us is in favor of deployment. All we're advocating and that you can advocate for is that you do the research on this.

AN OLD SALT: We would be thrilled if it wasn't needed.

AN OLD SALT: We would be delighted if we say, oh, we don't need this is fine. We don't need it.

FAKE: It's rare to hear any group of researchers, much less volunteers, who've dedicated over a decade of their lives to a project, say they hope their work isn't needed. But they're motivated by something deeper.

Before we left them, one of the old salts wanted to talk about the inspiration for their 12 years of volunteer research.

AN OLD SALT: I just go to the little one that's fourth months old. Do you want to see? And I'm telling you, having grandchildren now is not undiluted pleasure, because you worry about the future.

FAKE: Not an undiluted pleasure for this grandfather for fear of what the future may bring.

Coming up, potential traps and possibilities of seeding the clouds for sunlight reflection on "Should This Exist."

[AD BREAK]

FAKE: Hi, it's Caterina, asking "Should This Exist" with Kelly Wanser of Silver Lining. We've been learning about Silver Lining's experiments with marine salt spray to increase the reflectiveness of clouds. The hope is that this will slow or even stop the steady march of global warming. But humans deliberately interfering with the climate isn't an easy sell... especially to some veterans of the environmental movement.

WANSER: So my experience in talking with Al Gore about this topic very briefly on two different occasions and a decade apart... I'll tell you the stories.

FAKE: As a young activist, she got a big, big dose of the negativity she'd be up against from an icon of the battle against climate change.

WANSER: I was at the Democratic convention when Obama was nominated, and I happened to have a floor pass, which allowed me access to the elevators up and down the stadium. And I got in the wrong elevator, and I ended up getting off behind the stage. And coming off the stage was Al Gore with his staffer. I said, you know, "I feel honored to meet you. And I was curious what you think about geoengineering," which I was calling it at the time. He was really unhappy to be asked about it and had a pretty strong reaction. He said, "Geoengineering, it's a terrible idea. It's like methadone. We should never do that."

FAKE: It's interesting that he compared it to methadone.

WANSER: I find it interesting cause methadone is kind of a treatment. But it was pretty clear that this was a sensitive, kind of off limits area. And I saw him a decade later at the TED conference. And I was reintroduced. And I wasn't going to bring it up. And this person said, you know, this is Kelly Wanser. She works on geoengineering. What do you think? And he's like, "Well, you know, I'm opposed to that." But he was much more relaxed about it. And so I took that as a sign of progress, but this is still something that it's not easy for, I think, particularly for people who've been working on climate change for a long time.

FAKE: If we were cloud brightening, would that just be a quick fix? Would it weaken the international resolve to reduce carbon emissions, or global reliance on fossil fuels? And there may be other pitfalls.

FAKE: In the hands of the wrong person, is this dangerous?

WANSER: The first thing I'll say is, unlike some things, it's not an easy technology for one person to sort of go and do. It's very visible. It's you know, that from the calculations we've done in Silver Lining, it's tens of billions of dollars a year. It's not cheap and easy to do. It's not something you can do in secret. It's something that takes a lot of research, and a lot of cooperation to find out answers to the questions that you want. Like satellites and aerial studies, and all kinds of things.

FAKE: So no rogue actors.

WANSER: It's a lot less likely than you think.

FAKE: I asked the same question of Dr. Steven Hamburg, the chief scientist of the Environmental Defense Fund.

STEVEN HAMBURG: Um...

FAKE: Like, some kind of super villain, like a Bond villain, who kind of came and deployed some radical method of changing the atmosphere for example.

HAMBURG: There's been some movies along those lines.

FAKE: There have been movies along those lines.

HAMBURG: I'm less worried... I mean, I think the real challenge we face so obviously, people doing nefarious things is always a concern.

But like any system, and this is the most complex we've got. Right? The biosphere, the whole earth. When you start tweaking, you have unintended consequences. We have to remember that geoengineering is not solving climate change. It's about masking some of the impacts. This is only, at its best, and if it works out well and doesn't have a lot of side effects, an opportunity in a climate crisis to buy some time relative to the worst possible effects of climate change.

FAKE: Kelly Wanser from Silver Lining, she likens it to a medical intervention. You know, this is, this would not be maintenance. This would be emergency medicine.

HAMBURG: Right, though metaphors are dangerous things. We're talking about all of humanity being impacted by any such intervention or at least large regions. And so we really have to think about it as how would, how do you get a global consensus for doing anything?

FAKE: Dr. Hamburg has been working on questions of governance for solar radiation management – holding meetings on every continent except Antarctica to find out what people are thinking. What are the impacts and potential risks?

HAMBURG: You know, the scale of the decision is just unprecedented. And so the challenge is that there's such a relatively small group of people who even know much about this topic, thinking about the implications, the moral hazard that potentially comes along with deploying these kinds of technologies. So we're involved in just trying to: How do you do the governance of the research? That's the sort of first baby steps.

FAKE: So far, I've heard several warnings of caution, but no definitive supervillain scenario for cloud brightening. So we went looking for perspectives rooted as much in history as science.

JIM FLEMING: I'm just working on a paper where I've talked about unreasonable approaches and slightly more reasonable approaches and then things that we could really do now to help with our climate pickle.

FAKE: We're in a pickle.

FLEMING: Yeah.

FAKE: I love your turns of phrase. We're in a pickle. Yes.

FAKE: Jim Fleming, a historian of science at Colby College says if we're "facing unprecedented challenges, it's good to take a look at the precedents."

FAKE: I love this approach of taking history and mythology and fiction, referencing Walt Disney, Mark Twain, Kurt Vonnegut. Right? You actually say, you know, "In fiction writing, there is a moral core that's missing from the speculations of scientists and engineers."

FAKE: In his book, *Fixing the Sky*, he says this history is "a tragic comedy of overreaching, hubris, and self-delusion."

But he says speculating about climate engineering has a long history. One of his favorite stories is of the first national meteorologist, James Espy, in the 1840s.

FAKE: The Storm King

FLEMING: The Storm King, Espy, yes...

FAKE: And why did they call him The Storm King?

FLEMING: Well, he had a very strong reputation as being the actual person who identified convection, the upward rising currents that cool and precipitate. And he never did this, but he proposed that we light giant fires up and down the Appalachian Mountains every Sunday afternoon. So after church, you would go out and have a gigantic bonfire up and down the Appalachians from Maine to Georgia. And then that would cause it to rain overnight. And it would be nice and fresh. And the rivers would be full by Monday morning for commerce. And I know there's a link here between climate engineering and the eruption of Mount Pinatubo in 1991.

FAKE: I've actually visited the town next to Pinatubo.

FLEMING: Is it still there?

FAKE: What's amazing about it is that the level of the lava and the volcanic detritus has basically buried the town. So mostly when you walk down the main street, you see the roofs. You're at roof level, and the only building above ground is the Cathedral, and you can walk right under the roof of the cathedral.

FLEMING: That should be a required field trip. If you're trying to make a volcano and you're not nature or you're not a deity, this is what might go wrong, too.

On the cover of the book, I put the technocrat with one giant lever to symbolize that no one person, one nation, one project should have ultimate control or claim they have ultimate control. But my version of positive engineering is like cleaner cars and quieter cities and fuel switching and engineering interventions or ideas that make important differences, but not tipping the earth with a gigantic lever.

FAKE: Professor Fleming isn't a luddite. He clearly advocates for small scale technological innovation. But in his opinion, geoengineering projects shouldn't leave the lab.

FLEMING: Climate engineering research should be done between adults, between consenting adults – in private. That is on computers, but not in the sky.

FAKE: And now from a historian to a futurist – Oliver Morton is a long-time editor at The Economist and author of *Planet Remade: How Geoengineering Could Change the World*.

FAKE: What would you say regarding geoengineering is your greatest worry as it relates to future generations, and what they might say about what we've done now in the 21st century, in the early days of the 21st century?

OLIVER MORTON: The greatest worry is that we talk enough about geoengineering for people to think it's a real possibility and thus if things get really bad, it could be called upon as a form of action. And yet we don't actually do the work that allows people to know how to call upon it as a form of action. So effectively, that's to screw the next generation or the generation after that doubly, in that we allow the idea of geoengineering to reduce the urgency we feel about reducing fossil fuel emissions. But we don't do anything to make geoengineering easier for them.

FAKE: Right.

MORTON: And so that's why a lot of people want to see geoengineering as an absolutely last gasp, you know, in case of global emergency, 'smash glass and pull lever' sort of a thing. And I just think that sounds like a remarkably bad way to treat the world.

FAKE: So preparation and forethought and you know, deliberate action and process.

MORTON: Yes. And at the moment, the fact that we're having this sort of like shadow discussion where the idea of geoengineering is out there, but very little research is being done, there's very little really informed discussion – that just leads to like bad ideas about geoengineering, ill informed ideas about geoengineering. There are some good reasons for thinking geoengineering is bad. But I want that debate to happen in a clearer, better way.

FAKE: Something Oliver Morton said resonated with me as sort of a common theme – both among those who believe geoengineering is the future, and those who preach extreme caution: the biggest danger may be thinking we have time.

Coming up on "Should This Exist": we're back with Kelly Wanser of Silver Lining on one of her frequent trips to Washington, DC – during the earth's warmest January on record.

[Ad Break]

WANSER: Hi Caterina, I'm saying hello to you here at the end of my work week in Washington, DC – outside the Capital.

FAKE: Hi, it's Caterina, I'm back with Kelly Wanser of Silver Lining who sent me this audio postcard from the grounds of the Capitol building. It was less than a year ago, but feels like a time capsule now.

WANSER: It is January, and this is not a typical day in DC for January. And it is a very beautiful, sunny 70 degree day. So this is the kind of weather that concerns us.

FAKE: In the pre-pandemic world, Kelly spent about a third of her time in DC. Then, as now, it was a complicated time under the Trump administration to be advancing any big American initiatives about climate change.

Just the same, what you'll hear from Kelly is a pretty optimistic view of legislators' receptiveness to environmental interventions. It's a by-product of their witnessing devastating climate events at home – a silver lining, as it were.

WANSER: The conversation about climate change has changed radically in the past year or so. Most legislators, both Democrats and Republicans, when you talk to them now, their staff will start telling me about things that are happening in their district or in their state.

So the administration is different, because they've taken really oftentimes... taken positions that are counter to what these national and international reports are saying or even what some of the U.S. science agencies are saying. And are even counter to what we're seeing in the natural system.

FAKE: And now that we're grappling with a global pandemic, there seems to be less interest in environmental oversight than ever.

WANSER: But I think there's reason for people to be hopeful, because lots of legislators in DC care about climate change across the spectrum. So that's going to be important in the next administration.

But it is human nature. We run ourselves right up to the edge of the cliff and then sometimes off the cliff, like we did in the financial crisis. And then we have to, we have to figure out what to do. It's just that in this case, there is a cliff you go off of that you can't recover from. And now we have to say, OK, we're going to need a combination of maybe some riskier things, some new technologies. But failure is not an option. It is not an option. So we have to figure it out, and we have to be quick and systematic in how we do it.

FAKE: Kelly Wanser of Silver Lining.

There may not be much consensus yet around geoengineering. But there's plenty of consensus that whatever we do to fight climate change, we need to do it *together*, and we need to do it *fast*.

The concern about cloud brightening and other solar climate interventions is that it's like playing God. But haven't humans been doing that already? We've caused huge shifts in the planet's makeup, driven thousands of species to extinction. If anything, we're like a god that sits on its hands while civilizations burn.

Cloud brightening may turn out to be impractical, or too expensive. It might in fact be like methadone, keeping us functioning but not the same as getting clean.

But methadone is designed to work best with other therapies. Maybe if geoengineering can be developed as part of a comprehensive strategy, it can help cure our energy addiction. In time.

Look, I don't get to decide Should This Exist? And neither does this show. Our goal is to inspire you to ask that question... and the questions that grow from it.

LISTENER: Cloud brightening is good, but it can't just be a license for us to keep doing what we're doing. Something needs to fundamentally change.

LISTENER: Nature is wild, y'all. You can't control the atmosphere. And I think to think that you can is maybe misplaced energy.

LISTENER: You know, maybe the Earth will spit more volcanoes, and she'll do it herself. We don't need to do it. Stop messing with her.

LISTENER: We can't agree on anything internationally. How do we come to consensus on something as massive as this?

LISTENER: Let's just stop breaking it. Then we won't have to fix it.

LISTENER: Much of the technology that we have with us right now feels like science fiction. In 200 years time, we may just need this.

LISTENER: I think that the geoengineering is incredibly dangerous. However, we must weigh that danger against doing nothing. Doing nothing is also incredibly dangerous.

FAKE: Agree? Disagree? You might have perspectives that are completely different from what we've shared so far. We want to hear them.

To tell us the questions you're asking go to "ShouldThisExist.com" where you can record a message for us. And join the Should This Exist newsletter at ShouldThisExist.com.

I'm Caterina Fake.