An interview with top climate scientist Bjorn Stevens

Posted on October 22, 2022 by niclewis | 205 Comments

by Nic Lewis

This week Die Zeit published an interview with Bjorn Stevens. Die Zeit is the largest German weekly newspaper (circulation well over one million), and has a highly educated readership.

Bjorn Stevens is Director at the Max Planck Institute for Meteorology, the principal German climate science research and modeling centre. He is very well known for his work on climate sensitivity, aerosols and, particularly, clouds. Professor Stevens is an excellent scientist and a key figure in the climate science establishment. He is joint lead co-ordinator of the World Climate Research Programme's Grand Challenge on Clouds, Circulation and Climate Sensitivity, and led the 2015 Ringberg Castle workshop that kicked off its climate sensitivity arm.

The interviewer, Max Rauner, an experienced science journalist with a PhD in physics, focused mainly on clouds, however Stevens also had interesting things to say about pronouncements by alarmist climate scientists. An English translation of the interview appears below.

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Climate research: "Too many children's book clouds"

How much fear are scientists allowed to spread in the climate debate? Cloud researcher Bjorn Stevens accuses his colleagues of being alarmist. He finds: We still know far too little.

What do the clouds do when the climate warms up? This is what Bjorn Stevens, director at the Max Planck Institute for Meteorology in Hamburg, is researching. His research group simulates clouds in climate models. When it comes to cloud issues, the World Climate Report relies heavily on his expertise. At the moment, however, Stevens would like to rewrite the world climate report.

DIE ZEIT: Professor Stevens, the world climate report describes clouds as the greatest uncertainty factor for climate forecasts. Why is that?

Bjorn Stevens: See that cloud out there? In my field, most people think of a cloud as these compact white objects in the blue sky.

ZEIT: Just like in the children's book.

Stevens: Yes, a pretty fluffy cloud. As if you could draw a line around the edge of the cloud. But that's an optical illusion, as anyone who's climbed into a cloud in the mountains knows.

ZEIT: Because it's getting foggy?

Stevens: Exactly. Clouds are tricksters. Even if the contours are sharp, the cloud structure is more like that of puff pastry. Nevertheless, many scientists use the children's book clouds as a guide because they are easier to simulate. This makes the climate models less accurate.

ZEIT: How much water does this cloud contain?

Stevens: A cloud the size of an old building can only hold a liter of water.

ZEIT: That would fit in a pint of beer!

Stevens: If you distributed all the condensed water in the atmosphere evenly around the globe, you would get a water film that is only two tenths of a millimeter thick.

ZEIT: Why then do clouds affect the climate so much and flood entire countries?

Stevens: Flooding occurs because clouds can be huge and air circulation during storms constantly replenishes the water. And they affect the climate because they are made up of a huge number of droplets that interact with sunlight and thermal radiation. A very large cloud has almost as many droplets as there are stars in the universe. And there are many clouds.

ZEIT: Are they warming or cooling the planet?

Stevens: Both. The energy balance of the earth has two parts: firstly, the incident sunlight and secondly, the heat given off by the earth, i.e. infrared radiation. All clouds have a cooling effect by reducing the amount of sunlight that reaches the earth's surface. And all clouds have a warming effect by absorbing the earth's infrared radiation so it doesn't escape into space – the greenhouse effect. The balance sheet shows: Water-rich low clouds over the tropical ocean have the greatest cooling effect and low-water ice clouds at high altitudes have the strongest warming effect. Overall, the cooling effect is greater.

ZEIT: And how does this balance change with global warming? Scientists from the Potsdam Institute for Climate Impact Research (PIK) recently published a worst-case scenario . It also mentions that by the end of the century our planet could get so warm that all the clouds are practically evaporating and we are doomed.

Stevens: That's nonsense. Put simply, the atmosphere wants to be cloudy because air rises. It's hard to get rid of clouds.

ZEIT: Why do the Potsdam climate researchers claim otherwise?

Stevens: You'll have to ask them that. I can only admire how the colleagues there comb through the specialist literature for the most alarming stories. I find it a pity that these are then presented uncritically.

ZEIT: So the scenario is wrong?

Stevens: Yes. It is based on a work by our institute taken out of context and on a second paper that has numerous shortcomings.

ZEIT: What shortcomings?

Stevens: The dramatic behavior of the climate in this simulation was based on an oversimplification of the clouds, which has nothing to do with reality. If you look closely, the most alarming stories often don't stand up to scientific scrutiny.

ZEIT: Do you also mean tipping point forecasts such as the melting of the Antarctic ice sheet, the collapse of the Gulf Stream and the desertification of the Amazon rainforest?

Stevens: Yes, and most others. Of course, the world will change as a result of global warming, even more dramatically in some regions. But how, where and when is far from certain.

ZEIT: In the German climate discourse, the PIK usually warns of tipping points , while your institute tends to downplay the danger of tipping points. Why is that?

Stevens: Tipping points are fascinating, and there's a good chance they exist. But they are also a matter of definition. What do you think of when you hear the word tipping point?

ZEIT: Of a self-reinforcing feedback that is irreversible.

Stevens: An accelerating change that cannot be reversed, right. Like a pencil falling down. He cannot fall back up by himself. But the tipping points highlighted by my colleague Hans Joachim Schellnhuber and others at PIK are based on their private, much weaker definition . Tipping points are reinterpreted to include less abrupt or even reversible climate changes. With this redefinition, they find tipping points everywhere. Then the alarm goes off. My institute does not play down tipping points, we just place more value on clarity.

ZEIT: Do you envy the Potsdam Institute for its media presence ?

Stevens: Who doesn't want to be interesting? Unfortunately, people prefer stories about the end of the world. I don't understand much about that.

ZEIT: Are you saying that global warming is not a problem?

Stevens: It's a huge problem, partly because we know so little about its actual impact. According to the IPCC , whether and where biblical droughts and floods will occur is uncertain for almost all regions .

ZEIT: Stefan Rahmstorf from PIK compares himself to a doctor who found out that smoking is dangerous and now has to call on people to stop.

Stevens: As a scientist, I like to explain to people how things I understand work. But what qualifies me to tell them how to behave? That must result from the social discourse, which should be shaped more by good

journalism than by charismatic scientists. If people don't learn to think for themselves, we're lost anyway.

"The contribution of the clouds is still overrated"

ZEIT: Let's talk about the danger of clouds again. Will Clouds Accelerate Global Warming?

Stevens: The interesting number here is climate sensitivity. It quantifies how much the earth will warm up if the CO_2 concentration in the atmosphere doubles...

ZEIT: ...compared to the CO_2 concentration before industrialization. That would still be in this century?

Stevens: If we continue as before, yes. In the last IPCC report , it was agreed that the global average temperature would then probably rise by 2.5 to 4.0 degrees Celsius. According to the simulations, the higher temperatures are mainly caused by a change in the clouds. We consider this effect to be overestimated today.

ZEIT: Were the models faulty?

Stevens: Yes. Too many children's book clouds, not enough real clouds. In the world climate research program we have tackled the climate models. The models with the most extreme predictions have failed, and confidence in the less catastrophic values of climate sensitivity has increased . In my opinion, however, the contribution of the clouds is still overstated.

ZEIT: How great is it?

Stevens: Based on our latest measurements and advances in theory, I would say today: zero.

ZEIT: Zero?

Stevens: Right, at least that's my working hypothesis. The climate sensitivity is then at the lower end of the IPCC estimate, around 2.8 degrees. We should keep looking, but so far there's no evidence that clouds play a major role.

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The original German version of the above interview, updated October 19, 2022 at 4:50 pm, is available here.

As a matter of interest, if, in the light of Bjorn Stevens' comments, one were to replace the cloud feedback estimate given in the recent IPCC Sixth Assessment Report (AR6) with a zero estimate, the AR6 feedback-based estimate of climate sensitivity would reduce by 27%. Applied to the AR6 3.0°C central estimate of climate sensitivity, that reduction would change it to 2.2°C, identical to the feedback-based estimate in my recent paper that estimated climate sensitivity using multiple lines of evidence.

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