

NORTH POLE RESCUE PLAN

Could 1.5 billion m³ of rock save the Arctic ice?

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UTRECHT, September 13th - Could 1.5 billion cubic meters of rock save the North Pole? According to the plan ‘Diomedé Crossroads – Saving the North Pole? Thoughts on plausibility’, it may just do the trick. The plan is published on CleverClimate.org, a new platform for ‘large-scale climate solutions’.

View full report: www.cleverclimate.org/climate/12/diomedé_crossroads/

The North and the South Pole are opposites in more than one way. Antarctica being an island surrounded by oceans, the Arctic is an ocean itself surrounded by continents. These very inverse conditions give the two poles similarity as well. For both favour ice cap conditions that are guaranteed as much by isolation as by latitude.

However, the Arctic’s isolation is far from perfect. Especially the opening to the warm waters of the Atlantic create a soft belly. But there’s a backdoor to the Arctic as well. And it isn’t locked: the Bering Strait.

The plan describes how building a dam in the Bering Strait theoretically influences the three most relevant factors for both formation and melting of sea ice. These are temperature isolation, water salinity and water turbulence.

Although quantifications are missing at this point, it seems likely that a combined decrease of temperature, salinity and turbulence can only lead to a slow down of Arctic melting, particularly in the Arctic Chuckchi Sea, north of the Bering Strait, that in recent years proved very vulnerable to temperature rises.

Diomedé Dam

The plan differentiates three options: a dam at the narrowest point, connecting the Diomedé islands to mainland Alaska and Siberia. This has the disadvantage of actually increasing salinity in the Chuckchi, as it cuts off the inflow of sweet water from the Yukon river, that is actually a significant contributor to the inflow of sweet water through the Bering Strait northwards.

Diomedé Threshold

When opting for a threshold instead of a dam (‘the Diomedé Threshold’) this disadvantage may be turned into an advantage, as the Pacific inflow through the Bering Strait is much saltier at the bottom. The river water of the Yukon flows on top of this column. Adjusting the threshold to a specific depth salt Pacific waters may be blocked while sweet water is allowed into the Arctic, to the point where salinity in the Chuckchi would decrease.

Temperature isolation of the threshold will be significantly lower though.

St Lawrence Dam

The only option that will theoretically lead to a decrease of temperature, salinity and dynamics (through decreased wind fetch) combined is the St Lawrence Dam. This dam would connect St Lawrence island in the Bering Sea with the mainland of Alaska and Siberia. Placing the dam some 300 kilometres to the south would ensure capture of all Yukon sweet

water, where all Pacific salt water, that also carries large amounts of heat to the Arctic, are kept out.

Feedback prevention

If further research would prove these assumptions correct, building the St Lawrence Dam could be very beneficial to the World's climate system, as two important positive feedbacks to climate change are slowed down, one being the albedo effect and the other methane emissions from thawing permafrost. From this point of view, building the St Lawrence Dam could assist present mitigation efforts as tundra methane emissions are already a big contributor to the rising concentration of greenhouse gases.

Expert views

'The mentioned climate impacts of this plan are possible,' according to a reply of the National Snow and Ice Data Centre (NSIDC), the world's Arctic sea ice watchdog, associated with the University of Colorado.

'This is certainly an interesting idea. However, there are several issues: such a dramatic change in inflow into the Arctic could have unforeseen ramifications, not just in the Arctic, but also in the North Pacific and surrounding landmasses. Also, while a dam would stop ocean inflow, there would still be atmospheric inflow and atmospheric inflow into the Arctic is a significant factor,' writes Dr. Walt Meier of the NSIDC.

Dr. James E. Overland of the National Oceanic and Atmospheric Administration (NOAA) agrees to that: 'The main problem here is that northward Bering Strait transport is only a small part of Arctic sea ice loss and warmer temperatures. Most of the recent warming is from increased atmospheric transport of heat into the Pacific Arctic followed by more open water, dramatically increasing ice/ocean albedo feedbacks and heat storage in the ocean.'

Deliberately influencing salinity could indeed be of important influence, thinks Dr. Overland.

Practicalities

Apart from the climate impacts Dr. Meier also takes time to look at what the author describes as 'practicalities': 'It does seem to me that they pose significant financial and engineering challenges. While the Bering Strait is relatively narrow and shallow, it is still far bigger than typical dams.'

Author Rolf Schuttenhelm: 'I'm Dutch. We appreciate dikes and dams and think them possible.'

The 'St Lawrence Dam', connecting St Lawrence island to main land Alaska and Siberia, would be over 300 kilometres long, in a part of the Bering Sea that is on average 50 meters deep. Building the dam would therefore require at least 1,5 billion cubic meters of rock.

Carbon credits

That may seem an expensive enterprise. However, if the St Lawrence Dam would prove capable of halting permafrost thawing, that would already, theoretically, be worth 10 to 15 billion dollars per year in carbon credits as tundra methane emissions are presumed to have already surpassed one Gt of CO₂ equivalents per year. With continued permafrost thawing these emissions will only keep rising.

Schuttenhelm doesn't advocate the plan himself. 'I agree many uncertainties exist. Right now they are too many. I disagree with the conclusion we should not act – out of human inertia. The cost of inaction is enormous.'

'This is just an idea. To me it just shows the possibilities of creative thinking,' he says. 'What we need now is an open debate among educated climate scientists. Unbiased rationality and social responsibility should go hand in hand. In a hurry.'

Melting trend

According to NASA the Arctic could be ice free as soon as summer 2013. This month the second lowest ice coverage was reached since satellite measurements began. If melting will continue well into September it is even possible the melting record of 2007 will be broken. On September 15th 2007 sea ice coverage was already 39 percent below the average summer minimum. This year is the first year in recorded history that both the Northwest Passage and the Northeast Passage are open to regular shipping.

Dr. Meier would not discourage further research into the Bering plan. 'In addition to mitigation and adaptation, geo-engineering approaches are certainly worth considering. However, it can be very tricky as the climate system is complex and interconnected. It's like a balloon - if you push in one place, you'll get a bulge in some other place. Nonetheless, any idea to address global warming is potentially valuable.'

Clever Climate

To stimulate such ideas the website www.cleverclimate.org - a platform for large-scale climate solutions - has been developed. Clever Climate encourages climate scientists and other creative thinkers to contribute their new ideas in the fields of increased carbon uptake, large-scale renewable energy implementations and for instance preventing positive feedbacks on the climate system.

'We need to work out all present plans, but the chance is at least 50 percent that all these combined will still be insufficient to prevent dangerous climate change. That's why we need new ideas and a platform to discuss them, says Sible Schöne, programme director of the HERE Climate Campaign.'

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