



DENVER CENTER FOR THE  
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# INSIDE OUT

A STUDY GUIDE FOR EDUCATORS



# TWO DEGREES

# TWO DEGREES SYNOPSIS

Emma Phelps is a paleoclimatologist, focusing on ice in Greenland. In drilling and studying ice core samples, she sees first-hand the symptoms of our changing planet, which makes the need to act all the more crucial and urgent. In addition to her growing sense of urgency for the planet, Emma, as a recent widow, experiences grief that compounds itself with each passing month. Now she's been asked to come to Washington D.C. to testify in a Senate Committee regarding climate change legislation, and in this intersection of science and politics, of politics and the personal, she finds more than just a little is breaking up under the strain of change.



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### **TWO DEGREES**

By **Tira Palmquist**

Directed by **Christy Montour-Larson**

Developed at the 2016 Colorado New Play Summit

Producing Partners:  
**Martin and Jo Ann Semple**

*Two Degrees* is the recipient of an **Edgerton Foundation New Play Award** and a **Women's Voices Fund** beneficiary

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# THE PLAYWRIGHT—TIRA PALMQUIST

Tira Palmquist's plays include *Overburden*, *Two Degrees* (Denver Center), *Ten Mile Lake* (Serenbe Playhouse), *Age of Bees* (MadLab Theater, Tesseract), *And Then They Fell* (Brimmer Street, New York Film Academy), and others. *Two Degrees* has been featured in numerous festivals (including the 11<sup>th</sup> Annual Denver Center New Play Summit, the New American Voices festival in the UK, the Caltech 2014 Mach 33 Festival and the 2014 Great Plains Theater Conference) and will have its World Premiere in the Denver Center's 2016/17 Season. *Two Degrees* was also listed in the Honorable Mention list for the 2016 Kilroys. *And Then They Fell* was workshopped by Brimmer Street (Los Angeles, 2015) and the UMass New Play Lab (2014), and premiered at Brimmer Street in Los Angeles in September 2016. *Ten Mile Lake*, which premiered in 2014 at Serenbe Playhouse just outside of Atlanta, GA, was developed and workshopped in 2012 at the Seven Devils Playwrights

Conference, and was a finalist for the 2015 Primus Prize. *Age of Bees* premiered at MadLab Theater in 2012 (and was named Best Original Work by the Other Papers "Best of 2012" list), and was subsequently produced in 2015 at the Tesseract Theater in St. Louis. *Age of Bees* is now available through Original Works Publishing. Her work has been developed by Seven Devils, Inkwell, 9Thirty Theater, The Road Theater, EST-LA and the Theatricum Botanicum Seedlings program. Tira teaches creative writing at the Orange County School of the Arts. She is a member of the Playwrights Union, the Anteaus Theater's Playwrights Lab and is a member of the Dramatists Guild. Her work as a director and dramaturg includes several seasons at the Seven Devils Playwrights Conference and the New Territories Playwriting Residency, a program she developed with Brian Clowdus at Serenbe Playhouse in Georgia. More info at [www.tirapalmquist.com](http://www.tirapalmquist.com).

## CHARACTERS

NOTE: All the characters in *Two Degrees* are fictitious.

### Dr. Emma Phelps

"Climatologists, like other scientists, tend to be a stolid group. We are not given to theatrical rantings about falling skies. Most of us are far more comfortable in our laboratories or gathering data in the field than we are giving interviews to journalists or speaking before Congressional committees. Why then are climatologists speaking out about the dangers of global warming? The answer is that virtually all of us are now convinced that global warming poses a clear and present danger to civilization."

—Lonnie G. Thompson, Ohio State University climatologist. "Climate Change: The Evidence and Our Options," *The Behavior Analyst* 33 (2010): 153

*Two Degrees* is a play where we see the action primarily through the eyes of Dr. Emma Phelps, who is a paleoclimatologist. When we first meet her, she's recently arrived in Washington D.C. from Copenhagen, for the purpose of testifying on behalf of the Environmental Protection Agency on a Senate subcommittee hearing on the Climate Action Plan. She's never testified in Washington before, but is doing this as a favor for her college friend, Senator Louise Allen of Detroit, Michigan.

Emma's friendship with Louise goes back to her college days as a graduate student at the University of Michigan. Together with Emma's husband Jeffrey, the trio formed a strong bond, even though they were from different departments: the Sciences, the Humanities, and the Law (Louise originally studied law before she started running for office). In the summer of 1990, Emma and Jeffrey moved in together and married shortly after graduation. Because of Emma's work as a paleoclimatologist, they moved to Boulder, Colorado, where there is a strong community of climate scientists at the University of Boulder, Institute of Arctic and Alpine Research (INSTAAR) and National Center for Atmospheric Research (NCAR).

### Senator Louise Allen

Senator Louise Allen is on the U.S. Senate Committee of Environment and Public Works, and she heads the

Subcommittee on Clean Air and Nuclear Safety (both real committees in the Senate). In the world of our play, the recent election has shifted Washington's attitudes towards climate change, and the administration is rolling back former policies and regulations that would have kept the fossil fuel industry in check. The administration is also trying to repeal the former President's "Climate Action Plan", so Louise's subcommittee is in charge of putting together a bipartisan panel of experts for a hearing called "Climate Change: Re-examining the Climate Action Plan."

Senator Louise Allen is a Democrat who has always made her positions on climate change clear, but Emma questions why Senator Allen is allowing so many non-scientists, business interests, and climate change deniers on the panel. Allen also has her hands full with the actions of other Senators on the subcommittee, like her antagonist Senator Wallace of Oklahoma, who are trying to put more speakers on the agenda for the hearing that serve their own pet interests.

### Jeffrey

Jeffrey has been Emma's husband for twenty-five years. As a couple, they face a new dilemma as Emma's important work as a climate scientist takes her away from home for long periods of time. "The season" for international climate scientists to be on the ice is April through August, when there's daylight, instead of the rest of the year when Greenland is in twenty-four hours of darkness. As a teacher, Jeffrey's summer vacation days overlap the exact same period that Emma needs to go away to work in Greenland. Her professional need to travel has put stress on their relationship.

Jeffrey feels like an outsider in Boulder in many ways. Not only does he miss his extended family in Michigan, but he also doesn't feel like he fits in Emma's world of Ph.D environmental scientists. As a high school teacher, he feels her co-workers who teach at the university look down on him. Emma assures him constantly that she loves him for many reasons. She admires his poetry. She appreciates that he's "good with people." Their relationship works

because they are complimentary partners and Jeffrey often point things out to Emma that she can't see.

### Wilson

Eric Wilson is the Chief of Staff to Senator Louis Allen. It's an important White House position that has been portrayed in movies like *American President*, where Martin Sheen plays the Chief of Staff to the President, or TV shows like *West Wing*, *VEEP*, and *Newroom*. Often times, the elected leader will award this position to someone that she is very close to on the campaign. While not stated in the play, Wilson most likely was Senator Louise Allen's right hand man on all of her election campaigns, and the trust between them is very deep. As Chief of Staff, Eric Wilson also manages his own team, like the interns Jonah and Katie, his personal assistants in the process of vetting speakers for the hearings.

A Senator or President's Chief of Staff can "vet" visitors brought in for special projects, and the Chief of Staff has the power to vet in the name of his Senator. Through the process of vetting, Emma learns that there's a lot more to a public presentation in D.C. than the scientific information she's trying to communicate. As these hearings will be recorded on TV live through C-SPAN, Eric Wilson's job is to help Emma appear confident and professional, even though this is her first time. Wilson also knows that there's a difference between Emma's past history as a college professor at the University of Colorado in Boulder, and the listeners at the hearing, which will include Senators, members of the national media (like Rachel Maddow, Joy Ann Reid, and Chris Cuomo) and the public television audience. With the stakes high that they only have three scientists on the panel defending climate change, Wilson is fastidious of every gesture and detail that would be under the microscope, from how Emma dresses, to how much water she drinks. Most importantly, Wilson advises Emma to talk in words her listeners will understand.

### Malik

Malik is one of the indigenous Greenlanders who have been hired by the scientists to help maintain their camp during the April-August work season. Their camp is in a very specific spot in the middle of the ice sheet in Greenland, so there are no towns or villages nearby.

Malik and Emma have struck up a special friendship and while they are not romantically involved, they have been flirting. Something about Malik, not just his physical appearance, reminds Emma of her husband Jeffrey. As Malik flirts with Emma, we learn his political views. He's working with the scientists because of his hatred of the international mining companies that are there to destroy the Greenlanders' cultural heritage and take away the wealth underneath the ice.

YouTube example of a Greenlander speaking in English: <https://www.youtube.com/watch?v=liIjByOEMiY>

YouTube example of a Greenlander speaking on television in Greenlandic about the issues of the day: [https://www.youtube.com/watch?v=Bce46x\\_04BQ](https://www.youtube.com/watch?v=Bce46x_04BQ)

From Philip D Thompson, Vocal Coach for *Two Degrees*

### Clay Simpson

Clay challenges Emma's worldview as a climate scientist, but only after they've become friends. Their debate over the current situation in Greenland is not one of enemies staring each other down, but a complicated conversation between friends who care about each other. Clay is a good listener. He can hear Emma's point of view about the environmental problems in Greenland, but he also raises some other practical points of concern.

Clay, through his job, has been to Greenland, and has spent time getting to know the indigenous people. He's even made the extra effort to learn Greenlandic, as a way of connecting with the culture. Clay believes that the U.S. is the best country to work with the indigenous people in Greenland. It's also a matter of national security concern, as the recent discovery certain metals in Greenland makes it vulnerable to terrorist organizations. Clay feels strongly that if the ice is going to melt in Greenland, and it can't be stopped, then the U.S. is the most responsible country for working with indigenous peoples to mine the rare earth minerals which are under the ice in Greenland, exposed for the first time because of climate change. Clay has an impressive resume as a technical advisor and has swiftly risen up the corporate ladder.

## CLIMATE CHANGE LEGISLATION

### How does a bill make its way through the U.S. Senate?

First, a senator sponsors a bill. It's then sent to the appropriate committee. In this play, Senator Louise Allen heads a sub-committee on Clean Air and Nuclear Safety. The next step, which is dramatized in the play, is a hearing. The senators on the subcommittee propose experts, like Dr. Emma Phelps, who are then brought in and vetted. Dr. Emma Phelps then provides both written testimony and oral testimony for the Senators to consider, in creating legislation. Once the committee writes the legislation, it's put to a vote, and sent to the full Senate for consideration.

**When did the U.S. Congress start to become aware of climate change?** Scientific breakthroughs in the 1950s demonstrated that burning carbon was a sign that human behavior was warming the planet. President Lyndon B.

Johnson, in 1965, was given a report from his Science Advisory Committee that industrialized civilization was responsible for a warming planet. But it wasn't until NASA's director of the Goddard Institute for Space Studies testified before a packed congressional hearing in summer 1988, that global warming made national headlines. With record temperatures in Washington D.C. that day, and the building's air conditioner on the fritz, Hanson told a room filled with sweaty lawmakers that he had "99% confidence" in a "real warming trend linked to human activity". Later that same month, scientists and policymakers gathered at the historic World Conference on the Changing Atmosphere in Toronto where the first discussion on emissions reductions was proposed. By November 1988, the United Nations' Intergovernmental Panel on Climate Change (IPCC), began advising governments about the threat of climate change.

# CLIMATE CHANGE TIMELINE

**December 11, 1997.** The Kyoto Protocol was adopted. Owing to a complex ratification process, it didn't come into force until February 16, 2005. Currently, there are 192 Parties to the Kyoto Protocol. The Kyoto Protocol sets binding emission reduction targets for 36 industrialized countries and the European Union. Overall, these targets add up to an average 5 per cent emission reduction compared to 1990 levels over the five year period 2008–2012 (the first commitment period). It places a heavier burden on developed nations under the principle of “common but differentiated responsibility and respective capabilities”, because it recognizes that they are largely responsible for the current high levels of Greenhouse Gas (GHG) emissions in the atmosphere.

The first element was the binding emission reduction commitments for developed countries. This meant the space to pollute was limited, and what is scarce and essential commanded a price. GHGs—most prevalently CO<sub>2</sub>—became a new commodity. The second element was the establishment of flexible market mechanisms, which are based on the trade of emissions permits. Kyoto Protocol Parties bound to targets are required to meet them largely through domestic action—that is, by reducing their emissions at home. But they can meet part of their targets through three market-based mechanisms that ideally encourage GHG abatement to start where it is most cost-effective, for example, in the developing world. It does not matter where emissions are reduced, as long as they are removed from the atmosphere. This has the parallel benefits of stimulating green investment in developing countries and including the private sector in this endeavor to cut and hold steady GHG emissions at a safe level. It also makes leap-frogging—that is, the possibility of skipping the use of older, dirtier technology for newer, cleaner infrastructure and systems, with obvious longer-term benefits—more economical. The Kyoto Protocol also established a rigorous monitoring, review and verification system, as well as a compliance system to ensure transparency and hold countries to account.

**February 10, 2016.** House of Representatives passes “Scientific Research in the National Interest Act” by a 236 to 178 vote. This bill directs the National Science Foundation (NSF) to award federal funding for basic research and education in the sciences through a new research grant or cooperative agreement only if it makes an affirmative determination, justified in writing, that the grant or agreement promotes the progress of science in the United States, is worthy of federal funding, and meets certain other criteria.

**June 26, 2009.** The American Clean Energy and Security Act of 2009 (ACES) bill was approved by the House of Representatives by a vote of 219-212,

but was never brought to the floor of the Senate for discussion or a vote. This energy bill would have established a variant of an emissions trading plan similar to the European Union Emission Trading Scheme.

**September 3, 2016.** President Obama formally enters the United States in the Paris Agreement. Here is an excerpt from President Obama's remarks on September 3, 2016:

We are here together because we believe that for all the challenges that we face, the growing threat of climate change could define the contours of this century more dramatically than any other challenge.

One of the reasons I ran for this office was to make sure that America does its part to protect this planet for future generations. Over the past seven and a half years, we've transformed the United States into a global leader in the fight against climate change. But this is not a fight that any one country, no matter how powerful, can take alone. That's why last December's Paris Agreement was so important. Nearly 200 nations came together as a strong, enduring framework to set the world on a course to a low-carbon future.

And someday we may see this as the moment that we finally decided to save our planet. There are no shortage of cynics who thought the agreement would not happen. But they missed two big things: The investments that we made to allow for incredible innovation in clean energy, and the strong, principled diplomacy over the course of years that we were able to see pay off in the Paris Agreement. The United States and China were central to that effort. Over the past few years, our joint leadership on climate has been one of the most significant drivers of global action.

Website: <https://www.whitehouse.gov/blog/2016/09/03/president-obama-united-states-formally-enters-paris-agreement>

**November 4, 2016.** The Paris Agreement entered in force. The Paris Agreement brings all nations into a common cause to undertake take ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort. The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

# GREENLAND

Greenland was named by Viking Eric the Red, in spring 985, who was exiled here for murder, but wanted to entice fellow Norseman to join him. In Greenlandic the island is known as Kalaallit Nunaat for “White Earth.”

- Greenland, the largest island in the world (approximately three times the size of Texas), lies off the northeast coast of Canada. By contrast, Australia is considered a continent.
- Ninety-five percent of its surface is ice.
- Although geographically adjacent to the North American continent, Greenland is geopolitically connected to Europe, due to its longstanding cultural ties with Denmark. Greenland’s capital, Nuuk, is at the same latitude as Fairbanks, Alaska. Most of Greenland lies above the Arctic Circle, which means that the sun is visible at midnight in midsummer, and the sun is not visible even at midday in midwinter. Average wintertime temperature is 25 degrees below zero Fahrenheit. In Qaanaaq, a town at the far north of the island, the sun goes down on October 24 and doesn’t return until late February.
- As of 1 January 2016, 11% of Greenland’s population of 55,847 people is foreign born, which equates to a whopping 6021 individuals who hail from 51 different countries. Danes account for the majority of internationals in Greenland (76%), which makes sense since Denmark has a long history of colonialization.
- Before Danish colonizers brought diesel generators to villages, the only heat and light during the dark months of October and February came from stone dishes holding seal or whale fat because there was nothing else to burn for fuel—no trees at all and almost no vegetation.

**Indigenous People:** Greenland has been inhabited by indigenous people from the North American continent for over 4,500 years; the Greenlandic language is closely related to Canadian Inuit languages. Descendants of central Asians, Inuit hunters and their families began crossing the 200-mile-wide Bering Land Bridge from Siberia perhaps as early as 30,000 years ago and slowly wandered across the polar north. They reached Greenland 5,000 years ago. Their cold-adapted, boreal culture, a single entity, stretches 6,000 miles across ice caps, pressure ice, barren lands, rivers, mountains, fjords, and frozen ocean. Today, 89-90% of Greenland’s population are Inuit.

The paleo-Eskimos—known as Independence I people were muskox hunters who wandered across

the top of Greenland and down the east side. Their tool kit included notched lance blades, knife blades, scrapers, arrow points, and burin spells made of chert, as well as bone needles for sewing using thread made of the long sinews of whales.

This group gave way to the Saqqaq, a group of perhaps four or five hundred hunters who lived between 2000-1500 BCE. Also users of stone and bone tools, they lived in egg-shaped houses made of peat and stone with ceilings of stretched animal skins, situated on low promontories overlooking the water.

A 600 to 800-year silence in Greenland was followed by the coming of the Dorset people from Foxe Basin and Hudson Strait. They traveled down the western coast of Greenland and lived on caribou, seal, whale and the now-extinct great auk. The Dorset people were known for their elegant walrus ivory carvings of human and bear spirits, sealman, and bear-men, and believed that humans and animals were incomplete without each other. They disappeared by the middle of the 9<sup>th</sup> century.

The last group, the Thule, still living a stone age existence, arrived in Greenland in 1050, just as the Normans were preparing to invade Britain. Ice and weather kept them isolated. They didn’t even know there were other people in the world. By 1450, they had made their way to the east coast of Greenland and settled at Ammassalik, hunting muskox and making skin clothing from Arctic fox, seal, polar bear, and caribou—just as Greenlandic hunters are doing now. From the Canadian Arctic they brought new technology: sinew-backed bows, kayaks, umiaks, and dogsleds. A cooling climate later pushed them south down Greenland’s west coast.

The last migration of Thule people from Baffin Island came in 1865, the year Tolstoy wrote *War and Peace*. They brought back tools that had been lost and forgotten—the kayak and bows and arrows. This last group of Eskimos walked to Greenland via Pond Inlet and Ellesmere Island in 1862 led by Qidlaq, a local shaman who had dreamed Greenland. It took them seven years to make the trip. They made their first home at Etah, north of present-day Qaanaaq. Some stayed, but those who returned to Pond Inlet were hounded by misfortune. The shaman died and many starved to death on their way home. Those families who stayed on the north coast of Greenland fared better. The hunting was good and the weather was better than in eastern Canada. Many of the people now living in Siorapaluk and Qaanaaq are descended from these ice age pilgrims.

**Enter the Vikings:** In 982 CE, Erik the Red, a Viking living in Iceland, was exiled from Iceland for murder. He sailed west and “discovered” a fjord in Greenland. When he returned to Iceland, he persuasively

convinced 500 Vikings to join him in Greenland in an effort to entice settlers to the island. In 985 CE, out of the 25 ships departing for Greenland, only 14 survived. (Greenland is actually ice, while nearby Iceland is actually green.) The Viking society in Greenland survived for 500 years. Around the year 1000 CE, Erik the Red's son Leif Eriksson brought the first Christian missionaries.

**Colonial Days:** Greenland became a colony of Denmark in 1814, and was granted home rule in 1979. Both Danish and Greenlandic were considered official languages in Greenland from 1979 until 2009, when Denmark granted Greenland further self-rule and (among other measures) Greenlandic became the sole official language. During this time, the Christian Denmark culture made it a policy to intermarry with the indigenous peoples, and also made an effort to Christianize the country by getting rid of shamanism and black arts practices. Today, most native Greenlanders are a new race of indigenous and Danish decent.

**Climate:** "Greenland's climate hasn't remained boringly steady for the last 14,000 years: it has gotten colder for some periods, then reverted to being milder again. Those climate fluctuations were important to the settling of Greenland by Native American peoples before the Norse. While the Arctic has few prey species—notably reindeer, seals, whales, and fish—those few species are often abundant. But if the usual prey species die out or move away, there may be no alternative prey for hunters to fall back on, as they can at lower latitudes where species are so diverse. Hence the history of the Arctic, including that of Greenland, is a history of people arriving, occupying large areas for many centuries, and then declining or disappearing or having to change their lifestyle over large areas when climate changes bring changes in prey abundance."

From *COLLAPSE: How Societies Chose Failure or Success* by Jared Diamond, 2005, pg. 228-229.

**Suicide in Greenland:** "By 1985, suicide was killing more people than cancer... At that time, almost no one was studying suicide in Greenland. There were a few psychologists, but they were Danish, so it was impossible for Inuit people to get help in their native language. In therapy, each word mattered. Plus, the stigma around suicide was intense. It was shameful. People who had lost children to suicide weren't even acknowledging that fact to each other, it was so taboo."

"When communities are disrupted, families start to collapse. There's an increase in alcoholism, child neglect and physical abuse, all of which are risk factors for suicide. Later, people who didn't get

the love and support they needed as children find it difficult to cope with the routine heartbreak of dating, and a breakup becomes the final insult in a lifetime of hurt. 'There are a lot of negative consequences to rapid modernization,' says Greenlandic sociologist Steven Arnfjord. 'We're still dealing with a lot of aftermath from policies of the '70s and 80s.' There's also something broader—a loss of identity that happens when a culture, in this case Inuit culture, is demonized and broken down. When a culture is largely erased over less than a generation, as it was in Greenland, a lot of young people feel cut off from older generations, but not really part of the new one. It's especially difficult for young men, whose fathers and grandfathers were hunters, and who struggle to understand what it means to be an urban Inuit man. Without strong families and communities to help them cope, some of them are so overwhelmed and lost, they take their own lives."

From "Arctic Suicides: It's Not the Dark that Kills You" by Rebecca Hersher.

**Minerals Exploration in Greenland:** As the Arctic ice continues to melt due to global warming, Greenland's mineral and energy resources—including iron ore, lead, zinc, diamonds, gold, rare earth elements, uranium and oil—are becoming more accessible. The political establishment in Greenland has made natural resource extraction a central part of its plans to become economically self-sufficient, and ultimately politically independent, from the Kingdom of Denmark. This will be no easy task, and it is made more difficult by Greenland's rapidly aging population.

Greenland is widely believed to hold excellent potential for a host of natural resources, including zinc, lead, gold, iron ore, heavy and light rare earth elements, copper and oil. Considering that only a small fraction of this massive island has been properly explored, in the coming years more data gathering and analysis would be helpful to assess the full potential of Greenland. Greenland's rising temperatures allow workers to operate the mine for eight months per year.

**Mining in Greenland by China:** As the melting ice reveals Greenland's mineral and energy resources, there is a highly competitive race between countries to secure resources. For example, the European Union is in a quest to secure alternative resource suppliers. Current suppliers in the middle-east are growing concerned over competing with Greenland in a market that they control and dominate. American and European governments are concerned about China's dominance in the global supply chain and what that means for Greenland.

# GREENLAND THROUGH AN AMERICAN'S EYES

By blogger Sarah Goodall

Geologically, Greenland is part of North America, but subterranean tectonic plates know nothing about cultural similarities and differences! If you only visit Nuuk, the capital of Greenland, you would conclude that Greenland is more European than North American. (You can thank the Danes for that.) If you visit smaller towns and villages along the coast, particularly in North and East Greenland, you would probably say that Greenland is like no other place you have seen before, and that it has an identity all its own.

## FACTS OF LIFE

1. **Use of the Metric System (and Celsius).** This came as no surprise to me since 98.5% of the world's countries use these systems. But the United States of America is not one of them, so Americans better study up on their metric-to-imperial and Celsius-to-Fahrenheit conversions or else download a nifty conversion app, otherwise you might find yourself at a loss ordering a cold one or checking the weather!
2. **Locavore = Carnivore.** A localvore is someone who wants everything they eat to be fresh, organic, and wholesome and to come from an 80 km / 50 mi radius, give or take. Greenlanders are the original localvores, but only because they are also carnivores. Farming is simply not possible because a permafrost Ice Sheet covers 80% of Greenland, and the terrain that is exposed is primarily rock. Meat and fish are the only local items here, save a few small farms in South Greenland experimenting with crops like potatoes, strawberries, and even beekeeping. (Just so you know, every fruit and vegetable and dry good you would ever want IS available in Greenland, but it is imported.)

## MONUMENTAL

1. **Hygge is religion.** Hygge (pronounced *HOO-gah*) is best translated to "coziness" in English. It is *the art of being totally happy and content and heart-warmed by your surroundings*, whether it is curling up on the couch with your dearest and good wine, watching a film with lots of popcorn and candy, or sitting around a dinner table with your close friends and laughing until your cheeks hurt. Many Greenlanders will prefer *weekend hygge* while Americans will opt for going out to restaurants and bars for entertainment.
2. **Work/Home Balance & Sanctity of Holiday.** My hunch is that this 'phenomenon' exists everywhere *but* the United States. There's no other way to put it than when Greenlanders are at home, they are 100% focused on their loved ones. If I could make a Venn Diagram of work life and home life, it would just look like 2 circles with no overlap. Of course there are busy days, but they are more of an exception than a rule. Add to this 6 weeks of paid time off, 6 months of paid

maternity leave, and even paid paternity leave, and you've got plenty of evidence that this a culture that values a healthy balance of professional and personal life. Juxtapose that to Americans who get a few weeks of holiday if they are lucky, feel guilty about it, and still answer work emails while sitting on a white sandy beach.

3. **There is a Circle of Trust.** It is not uncommon to see children running around or to see babies asleep in prams outside, seemingly unattended. The uptight and xenophobic American might go as far as calling that child neglect, but really it is just a sign of small communities that feel comfortable around their fellow countrymen. It is downright refreshing, to be honest!
4. **There's no such thing as bad weather.** Is it pouring rain outside? Is there a meter (3 feet) of snow on the ground? Is it -25°C (-13°F) outside? Doesn't matter. Maybe air traffic will get delayed, but life on the ground in Greenland doesn't stop because of a little bad weather. People still walk their dogs, wait at the bus stop, go on runs, and carry on with life as usual.
5. **Possessions are cared for with the utmost attention.** Everything is expensive in Greenland. Everything. Single cucumbers are at least \$5.00, iPhones are \$900, shoes and clothing are 2-3 times the price as in the United States, and you don't even want to think about the Internet prices. Not only are items expensive, but also they are not in endless supply. In smaller towns and villages, if something is out of stock on the shelves, it could be a week or more before the container ship comes with replenishment. Therefore, Greenlanders do understand how to care for their possessions and conserve a bit.

## FUN & SILLY

1. **Coffee is religion.** There are three rules. 1) No time is a bad time for coffee. 2) It only comes in strong, stronger, and strongest. 3) Anything other than french press is heresy. Also, coffee time here is not the quick Starbucks grab n' go style like in the United States. For the record, Starbucks does not even exist in Greenland. Instead, it is a whole experience with espresso machines, fancy glassware, stylish french presses, and sealskin cozies—even at home!
2. **Licorice is also religion.** Licorice tea, licorice hard candy, licorice ice cream, you name it! In all honesty, this one might be THE hardest for Americans to grasp. In the airport I once heard an American squeal, "What is it with you people and licorice!?" I laughed to myself as I silently chewed licorice gum. Lady, I admit that I, too, was once a licorice-hater, but that was before I tasted the good stuff. Now I'm hooked!
3. **Clothes dryers are not in fashion.** Many people don't even own a dryer, but even the ones that do still prefer to hang clothes on a drying rack. And sometimes the drying rack goes outside on the terrace (or hung on the outside of the railing), even in cold temperatures!

# GLOSSARY

**Albedo:** Ice has a higher albedo (or reflectivity) than vegetation, soil, or water. As ice expands, more solar radiation is reflected to space, less is absorbed by the surface, and temperatures decrease. Cooler temperatures lead to more ice growth, more reflection of solar radiation back to space, and even cooler temperatures—a positive feedback. But positive ice-albedo feedbacks can work in the opposite direction as well. Once ice begins to melt and uncover land or water, more solar radiation will be absorbed by the surface, raising temperatures and causing even more ice to melt. This positive feedback might act more quickly over the oceans than over land because sea ice can melt faster than large continental ice sheets.

**BOULDER, COLORADO:** Boulder is the third location of our play. As a married couple, Emma and Jeffrey decided to move to Boulder so she could be near the University of Colorado, Boulder and the National Center for Atmospheric Research.

Website UCAR: Center for Science Education. <https://scied.ucar.edu/>

Online, NCAR/UCAR has a great Learning Zone for students, with lesson plans, videos, and classroom activities: <https://scied.ucar.edu/resources>

**Center for Climate and Security:** Found within the Pentagon. As of July 2015, the U.S. military made an official public statement in support of climate change, as it is a “threat-multiplier” for international instability, leading to war. The Center for Climate and Security (CCS), a non-partisan security and foreign policy institute with a distinguished advisory board of military, security and foreign policy experts, envisions a climate-resilient international security landscape. CCS facilitates policy development processes and dialogues, provides analysis, conducts research, and acts as a resource hub in the climate and security field.

Website: [www.climateandsecurity.org](http://www.climateandsecurity.org)

**The Committee on Energy and National Resources:** Energy and National Resources is one of the many U.S. Senate committees. Since its creation, the Committee on Energy and Natural Resources and its predecessors have made policy in the following major areas: energy resources and development, including regulation, conservation, strategic petroleum reserves and appliance standards; nuclear energy; Indian affairs; public lands and their renewable resources; surface mining, federal coal, oil, and gas, other mineral leasing; territories and insular possessions; and water resources.

**Climate Action Plan:** Obama’s Climate Action Plan, 2013. The three pillars of the plan are to cut carbon pollution in America, to prepare the United States for the impacts of climate change, and to lead international efforts to combat global climate change and prepare for its impacts.

**Computer modeling:** To predict a range of scenarios, scientists create computer models based on their evidence and equations. Not only are scientists accurately predicting the climate change trends we’re seeing now, but computer modeling is helping them see how the changes are accelerating at a faster rate than once thought.

**Cutting CO2 and Carbon emissions:** A core part of the Paris climate accords was getting major countries like China and the U.S. to agree to cutting CO2 and carbon emissions.

**Environmental Protection Agency (EPA):** The mission of EPA is to protect human health and the environment. EPA’s purpose is to ensure that:

- all Americans are protected from significant risks to human health and the environment where they live, learn and work;
- national efforts to reduce environmental risk are based on the best available scientific information;
- federal laws protecting human health and the environment are enforced fairly and effectively;
- environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and these factors are similarly considered in establishing environmental policy;
- all parts of society—communities, individuals, businesses, and state, local and tribal governments—have access to accurate information sufficient to effectively participate in managing human health and environmental risks;
- environmental protection contributes to making our communities and ecosystems diverse, sustainable and economically productive; and
- the United States plays a leadership role in working with other nations to protect the global environment.

[www.epa.gov](http://www.epa.gov)

**Greenland’s the canary:** Canaries are much more sensitive than humans to toxic gases such as carbon monoxide, methane or carbon dioxide. Throughout much of the twentieth century (before the invention of machines to detect unsafe gas levels), miners would carry caged canaries into the mines with them. If the canary became ill or died, the miners knew they had to leave immediately.

**Hagiography:** 7: biography of saints or venerated persons  
2: idealizing or idolizing biography

**Hansen, James:** Atmospheric physicist at Columbia University. He is best known for his research in climatology, his 1988 Congressional testimony on climate change that helped raise broad awareness of global warming, and his advocacy of action to avoid dangerous climate change. In recent years he has become a climate activist to mitigate the effects of climate change, on a few occasions leading to his arrest. In 2000, Hansen advanced an alternative view of global warming over the last 100 years, arguing that during that time frame the negative forcing via aerosols and the positive forcing via CO<sub>2</sub> largely balanced each other out, and that the 0.74±0.18 °C net rise in average global temperatures could mostly be explained by greenhouse gases other than carbon dioxide, such as methane and chlorofluorocarbons.

[www.columbia.edu/~jeh1/](http://www.columbia.edu/~jeh1/)

**Heavy oxygen isotope O18:** Oxygen is one of the most significant keys to deciphering past climates. Oxygen comes in heavy and light varieties, or isotopes, which are useful for paleoclimate research. Like all elements, oxygen is made up of a nucleus of protons and neutrons, surrounded by a cloud of electrons. All oxygen atoms

have 8 protons, but the nucleus might contain 8, 9, or 10 neutrons. “Light” oxygen-16, with 8 protons and 8 neutrons, is the most common isotope found in nature, followed by much lesser amounts of “heavy” oxygen-18, with 8 protons and 10 neutrons.

**Ice Core Drilling:** The North Greenland Eemian Ice Drilling—NEEM—is an international ice core research project aimed at retrieving an ice core from North-West Greenland (camp position 77.45°N 51.06°W) reaching back through the previous interglacial, the Eemian. The drill contains up to 4 meter of ice core. After a section has been drilled, rotation is stopped, and the cable is pulled. Small spring-loaded knives—“core-catchers”—cut into the ice core and prevents it from gliding out of the drill. A force corresponding to a drag of 400-1000 kg is needed to break the ice core, which is then brought to surface. On the surface, the drill is disassembled, and the core is pushed backwards out of the inner core barrel. The chips are removed, and after re-assembly, the drill is ready for another trip to the interior of the ice cap.

**Ice Core Samples:** The study of ice cores can both improve our understanding of the history of our climate and improve our ability to make good projections of future climate. None of the former deep ice cores from Greenland contains complete and undisturbed layers from the Eemian, because the layers have either melted or have been disturbed by ice flow close to the bedrock.

Understanding the dynamics of the climate system is the main objective of the extensive analysis program, which involves many different types of measurements:

- the isotope ratios of the ice reveal past temperatures in Greenland and at the source areas that supply the moisture that ends up as precipitation over the ice sheet
- impurities in the ice reflect the impurity load of the atmosphere of the past
- gas bubbles trapped between the snow crystals contain samples of the atmosphere of the past, reflecting the atmospheric composition, e.g. the amount of greenhouse gasses
- the crystal structure of ice, the temperature of the bore hole, and the content of biological material in also provide information about past climatic conditions
- analysis of the more than 2½ km ice core will be performed at the Centre for Ice and Climate and cooperating research groups from 13 nations
- modelling of the ice flow suggests that the annual layers in the Eemian ice are about 7 mm thick. It will therefore be possible to investigate on an annual basis how the previous interglacial started and ended.

**Mann, Michael E.:** Dr. Michael E. Mann is Distinguished Professor of Atmospheric Science at Penn State, with joint appointments in the Department of Geosciences and the Earth and Environmental Systems Institute (EESI). He is also director of the Penn State Earth System Science Center (ESSC). Mann is the author of several books including his most recent work, *The Madhouse Effect*, which features cartoons by Pulitzer Prize-winning political cartoonist Tom Toles. Through satire, *The Madhouse Effect* portrays the intellectual pretzels into which denialists must

twist logic to explain away the clear evidence that man-made activity has changed our climate.

Website: [www.michaelmann.net/](http://www.michaelmann.net/)

**Mitigation:** a human intervention to reduce the source or enhance the sinks of greenhouse gases.

**National Center for Environmental Information:** The National Centers for Environmental Information (NCEI) is responsible for preserving, monitoring, assessing, and providing public access to the Nation's treasure of climate and historical weather data and information. NCEI is responsible for hosting and providing access to one of the most significant archives on Earth, with comprehensive oceanic, atmospheric, and geophysical data. From the depths of the ocean to the surface of the sun and from million-year-old sediment records to near real-time satellite images, NCEI is the Nation's leading authority for environmental information. The top priority during the near future is to build on the full spectrum of atmospheric, oceanographic, coastal, and geophysical products and services that the Data Centers delivered.

Website: [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

**National Conference of Mayors:** Many local politicians, such as coastal towns in Florida, are already seeing climate change cause destruction, but they can't get their national Representatives and Senators to respond to their cries for help. The U.S. Conference of Mayors Climate Protection Agreement strives to strengthen the idea that climate disruption is an urgent threat to the environmental and economic health of our communities. Many cities, in this country and abroad, already have strong local policies and programs in place to reduce global warming pollution, but more action is needed at the local, state, and federal levels to meet the challenge. On February 16, 2005 the Kyoto Protocol, the international agreement to address climate disruption, became law for the 141 countries that have ratified it to date. On that day, Seattle Mayor Greg Nickels launched an initiative to advance the goals of the Kyoto Protocol through leadership and action by at least 141 American cities.

Under the Agreement, participating cities commit to take following three actions:

- Strive to meet or beat the Kyoto Protocol targets in their own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
- Urge their state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol; and
- Urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system.

Website: [www.usmayors.org/climateprotection/agreement.htm](http://www.usmayors.org/climateprotection/agreement.htm)

**NEEM:** The North Greenland Eemian Ice Drilling (NEEM) project set up camp on the northern Greenland Ice Sheet, well above the Arctic Circle. Beginning in 2007, each summer (April through August), scientists gather to drill ice cores in order to research the Eemian, which is the previous

interglacial period (thousands of years between Ice Ages), which began 130,000 years ago and ended 115,000 years ago. Temperatures during the Eemian were a few degrees Celsius higher than they are today, and therefore learning about the Eemian may teach us what to expect in our near future, as temperatures rise to a similar level.

The drill site for the NEEM project was chosen on an ice divide with high precipitation, flat bedrock and thick ice. Ice cores can be drilled to over 2,500 meters. Ice flow modeling suggests annual layers during the Eemian are about seven millimeters thick, so scientists can learn details about annual changes. Analyzing the ice involves several measurements: gas bubbles in the ice (i.e. samples of the atmosphere of the past), structure of the ice, biological material, and impurities in the ice and isotope ratios.

The NEEM project includes research scientists from thirteen nations: Belgium, Canada, China, Denmark, France, Germany, Iceland, Japan, the Netherlands, South Korea, Sweden, Switzerland, the United Kingdom and the United States.

Website: <http://neem.dk/dansk/>

Link to University of Colorado, Boulder Video Gallery of NEEM: <https://instaar.colorado.edu/galleries/neem-deep-ice-coring-project-greenland/>

**Paleoclimatology:** The study of past climates. In determining what has triggered climate change in the past, scientists hope to learn how natural and human triggers might change our climate in the future. Climate leaves an imprint on the planet, in the chemical and physical structure of its oceans, life, and land. Some of these artifacts, known as climate proxies, reveal general climate patterns over the entire Earth, while other proxies reveal seasonal change in specific regions. By reading the signs of past climate, scientists reconstructed the history of Earth's climate over hundreds of thousands—in some cases millions—of years. When combined with observations of Earth's modern climate into computer models, paleoclimate data help scientists to predict future climate change.

**Pre-Industrial levels:** Models for measuring temperatures and CO<sub>2</sub> levels are based on the Earth's climate before the Industrial Revolution. It's a broad term, mostly referring to the 1800s, but can also mean more modern times. For example, NASA and National Oceanic and Atmospheric Administration (NOAA) calculate the average annual temperature around the globe between 1951 and 1980 was around 57.2 degrees Fahrenheit (14 degrees Celsius). In 2015, the hottest year on record, the temperature was about 1.8 degrees F (1 degree Celsius) warmer than the 1951-1980 base period.

**Predation:** In an eco-system, predation is a biological interaction where a predator feeds on its prey. Predators may or may not kill their prey prior to feeding on them, but the act of predation often results in the death of the prey.

**Rare earth elements:** one of a set of seventeen chemical elements in the periodic table, specifically the fifteen lanthanides, as well as scandium and yttrium. Scandium and yttrium are considered rare earth elements because they tend to occur in the same ore deposits as the lanthanides and exhibit similar chemical properties.

Despite their name, rare earth elements are—with the exception of the radioactive promethium—relatively

plentiful in Earth's crust, with cerium being the 25th most abundant element at 68 parts per million, or as abundant as copper. They are not especially rare, but they tend to occur together in nature and are difficult to separate from one another. However, because of their geochemical properties, rare earth elements are typically dispersed and not often found concentrated as rare earth minerals in economically exploitable ore deposits.

**Smithsonian National Museum of Natural History:** The National History Museum is part of the free Smithsonian exhibits on the National Mall in Washington, D.C. Through many of their permanent exhibits, they address the issue of climate change, like this clip here from the Ocean Portal: <http://ocean.si.edu/ocean-videos/climate-change-effects-glaciers-and-ice-sheets>.

**Summit Station:** Summit Station, or Summit Camp is a year-round research station on the apex of the Greenland Ice Sheet. Its coordinates are variable, since the ice is moving. Summit Camp was originally established in April 1989 in support of the Greenland Ice Sheet Project Two (GISP2) deep ice coring effort. Two major structures were planned and built: The Big House, an insulated panel building (housing a galley, common space, and office), elevated to minimize snow drifts; and a geodesic drill dome to house the deep drill. Extensive under-snow trenches were also constructed to house the core handling, processing, and storage facilities. Many smaller Weatherport hut buildings and tents were also erected as storage and shop areas, as well as sleeping quarters. These were erected and taken down each season. On July 1, 1993, the bedrock was reached. Originally a summer station only, the station had been manned year round since the early 2000s, with a winter population of 4 to 5. Here's the website of Summit Station: <http://www.summitcamp.org/>

**Transport Plane:** All transport to and from the camp is carried out in ski-equipped Hercules LC-130 airplanes. Watch the plane taxiing and taking off from camp. [http://neem.dk/about\\_neem/](http://neem.dk/about_neem/).

**97% Consensus:** Climate scientist Michael Mann says: "97% consensus. THAT is an amazingly high level of consensus." If you're wondering how this consensus is being collected from scientists all over the world, read Phillipe Squarzoni's graphic novel *Climate Changed: A Personal Journey Through Science*, pg. 83-88. "The IPCC was founded in 1988 by an initiative of two organizations of the United Nations: UNEP (The Environmental Branch of the UN) and the World Meteorological Organization. Jean Jouzel is the vice-chair of the IPCC's working group on the scientific basis of climate change and a Nobel Peace Prize Winner in 2007 along with Al Gore. Basically, the IPCC is thousands of researchers from all over the world who have come together to take an inventory of what science can tell us about climate change. So that means putting everything together that appears in scientific literature and summarizing it. In the end, the report of over 800 pages will be the collective work of 120 authors and 500 contributors, with the help of 700 collaborators. There's a technical summary for the scientific community then another summary written for policymakers written in a more educational, concise tone."

# STUDY QUESTIONS

## Pre-Performance Questions

1. What do you think the title of the play signifies?
2. What is our responsibility to the earth and to future generations that will inhabit our planet? If climate change is caused by humans, are humans obligated to rectify the situation?

## Post-Performance Questions

1. What surprised you about the scenic design? How does it add to the overall storytelling?
2. How would you describe the relationship that Emma and Clay have? What obstacles do they find in their path?
3. What loss is Emma grappling with through the play? How is she coping with this loss?
4. How does the argument that Emma and Jeffrey have affect their relationship?
5. How does Emma and Louise's relationship develop? What do we learn from their past and what do you think will happen in their future?
6. Why is Emma called by her school friend to testify before Congress? What was the reason for her invitation? Describe how Emma feels about the invitation? Did her testimony go as you expected?
7. What do mineralogists want with Greenland's natural resources? How is this a new take on climate change and the effects of ice recession?
8. How do the play's events and situations impact the relationships between the characters in ways similar to the various effects of climate change? What do you think happens to the characters after the play's final scene?

# PERSPECTIVES

**Make your experience unforgettable when you join us for one of these insightful, educational events:**

## Creative Team Perspectives

**Feb 3 | 6:00pm | The Conservatory Theatre**

Get an exclusive insider's perspective before the show when you join us for a free, professionally-moderated discussion with the creative team.

## Cast Perspectives

**Feb 12 | 1:30pm**

Join a fun and engaging discussion with the actors after the performance.

## Perspectives: Higher Education Advisory Council

**Mar 5 | 1:30pm**

Participate in a topical discussion led by members of our academic community after the matinee.

## Perspectives: Theatre & Theology

**Mar 7 | 6:30pm**

Join Pastor Dan Bollman of the Rocky Mountain Evangelical Lutheran Synod after the performance to examine each show through a theological lens.

# WANT TO KNOW MORE?

Denver Public Library recommends these library resources to enhance your theatre experience.

## Read!

*How To Change Minds About Our Changing Climate: Let Science Do The Talking...*

by Seth B. Darling And Douglas L. Sisterson; Illustrations By Sarah M. Sisterson.

In *Two Degrees* Emma has to give testimony convincing the Senate that climate change is real, here Darling and Sisterson deal with many of the questions Emma would need to rebut in order to convince even the most skeptical of climate change deniers.

## Watch!

*Bill Nye's Global Meltdown: The Five Stages Of Climate Change Grief* (National Geographic 2016)

The ever entertaining Bill Nye “the science guy” explores the repercussions of global warming through the lens of the five stages of grief: denial, anger, bargaining, depression and acceptance. This 45 minute episode can't take on too much but it certainly does an entertaining job of showcasing how science really can help us alleviate the effects of climate change.

## Listen!

*This Changes Everything: Capitalism vs the climate* by Naomi Klein. The Copenhagen Accord is the agreement brokered in 2009 which established a worldwide goal of keeping global climate change to no more than a 2 degree temperature increase all the while maintaining our economic status quo. Klein argues that is absolutely not the way to fix climate change, since climate change is a PRODUCT of the economic systems we have in place. You can listen to this compelling book or watch the documentary.

## Download!

Lao Tzu is credited with saying “A journey of a thousand miles begins with a single step” and this journey of climate change has only just begun, take your first steps by logging on to Denver Public Library's Zinio account and downloading a digital copy *Mother Earth News* and learn the skills to live a greener lifestyle.



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