AEA Show: "Winter"
Opening Date: June 1, 2007

<Preshow Q&A, coming events, etc…>

0. (2:30)

< shore : terrain maps : forests :: city shot : globe >

▸ 0-1
Once drawn to Alaska, you recognize that everything else here, the birds, the large mammals, the plants, and the very rocks themselves journeyed here from somewhere else. Alaska as a land is made from seven major and many minor geologic terrains – originating from as far as the south pacific and driven here by the movements of the Earth's crust. There are six major coniferous and three major tundra ecosystems across the state. This great diversity of environments provides a seasonal home year round for the tremendous numbers of waterfowl and land animals, and a growing population of people.

< creamer's birds >

▸ 0-2
Each year great numbers of migratory animals return to Alaska. Birds come from as far as Argentina, and whales from the waters off Hawaii. They come to Alaska because of the vastness of the space and the richness of the resources available during summer months.

< land-bridge : airplanes >

▸ 0-3
The ancestors of Alaska Natives came across the Bering Land Bridge more than ten thousand years ago, and modern day immigration continues with the attraction of the last frontier. Some visit and leave; others settle and call this wilderness home.

▸ 0-4
Whether a bird from Argentina or an engineer from Texas, they that come and leave and come again – usually visit for the summers. Those that live here year-round enjoy that other six-month season – the very one for which Alaska is infamous.

<wood splitting : snow flying>

[Winter]

<snow fall : landscape>

▸ 0-5
No two winters are alike. Some – daily highs remain above freezing until well into October. Other years deliver three feet of snow in early September.

▸ 0-6
Many trees in Fairbanks still bow (attest) to the early snows of '92. (CUT)

▸ 0-7
Autumn is brief, less than a month, a flash of gold on the trail into the deep of winter. It is a beautiful time of year. Visitors are welcome, but residents may be preoccupied. (CUT)

< MODIS spread of white from mountains >

0-8

Winter is always here, isolated high in the mountains, awaiting to descend upon the lowlands.

<LSI – Daily Interior and/or Barrow MODIS>

0-9

Temperatures drop and one day the snow flies. It comes to the landscape and to the microcosm. It visits most parts of the globe in one form or another. In Alaska, it stays for half the year.

1. The Seasons (2:42)

[Siqinnaapchiaq]
[The day the sun returns – Inupiaq word]

1-1
Winter exists because the Earth wobbles – exactly like a spinning top that is about to fall over.

< Spin top : zodiac : State Flag >

1-2
Earth's wobble is great enough to have been discovered in 120 BC. The wobble, called precession, is caused by the sun and the moon playing a tug of war with the not quite spherical Earth.

1-3
The wobble is slow, taking about 26,000 years to complete. Draw a line out from the North Pole and it will inscribe a slow circle in space. By chance, it currently points at Polaris, our north star.

1-4
Precession is the reason the signs of the zodiac are no longer correct. (Cut)

1-5
The current state of the wobble leaves Earth with a tilt of 23.5 degrees. Over the course of a year, the northern and southern hemispheres are favored in turn by the sun. (Cut)

1-6
Without the tilt, we couldn't have seasons. The equator would always be hot, the poles always cold and dark.

< earth illuminated : different speeds and seasons>

1-7
Any given Alaskan day in March looks much like anywhere else. The sun rises, the sun sets. The day is a wall of light passing from East to West.

1-8
By the peak of summer, the relationship between day and night has changed considerably. Night is fleeting if present at all. The sun no longer rises in the east and sets in the west. It rises in the north – and sets in the north.

1-9
Mid-September appears the same as March – but each passing night is 7 minutes longer than the one before. You can feel the change. One day you drive home in the light and two weeks later, the sun has set for nearly an hour.

1-10
And then – mid-winter, and with the pole pointed away from old sol, the sunlight barely gives Alaska a side-long glance.

< timelapse of sun at solstice, daylight curve>

1-11
On the summer solstice, Fairbanks gains a high of just less than 22 hours between sunrise and set with the sun covering 330 degrees of the horizon. The rest is twilight. For the winter solstice, we see a little more than 3 and a half hours of daylight, barring mountains and fog. It will skim the horizon, covering only 50 degrees. It rises in the south. It sets in the south. The rest is darkness. (Cut)

<inscribed circle anim>

1-12

Traveling north of Fairbanks, we reach a point at which the sun never sets on the summer solstice and never rises in the deep of winter. This is the Arctic Circle. Go farther north and we find a world in which the sun glides out of sight in November and does not resurface until January.

2. [Cold is Relative] (6:34)

<KTVF weather footage for 2007 cold spell>

2-1

Alaska appears to be a miserable place to get stuck for a winter – but this is a matter of opinion – and geography. Residents of Anchorage grimace at the thought of Fairbanks' cold. And the perfectly warm Fairbanksans shiver at the mention of Anchorage's winds and wet ocean air.

VP:Cold weather – part 1

2-4

Fairbanks isn't known for its snow fall, with only 67 inches per year on average. While buildings in southeast Alaska need roofs that support the high levels the snowfall. In Fairbanks it's not the roofs that are built extra tough, it's our insulated walls.
Address Snow Depth Graphic – low total fall ; packing of snow, big differences from year to year.

<Snow fall graph : temperature graph >

2-2

Fairbanks is one of the cold spots of state, posting bone chilling lows, but these lows are accompanied by extremely dry air and dead calm winds.

2-3

Thick parkas, thermal underwear, heavy socks and insulated boots are very effective under these conditions. It may be cold, but one can dress for it.
Address Temperature Graphic high and lows – tight range in summer – broad and unpredictable in winter. Big changes from day to day in winter.

<Plume>

2-5

Fairbanks lays claim to being the U.S. city with the greatest range in temperatures. In winter it's quite common to have a 100 degree difference across the front door step.

VP:Cold weather – part 2

<log house : wood fire>

2-8

In Fairbanks wood heat is popular if only as a backup. When used primarily, it does require regular attention. It is as easy to let the stove overheat as it is to kill a fire prematurely. A well banked stove can run all night and still provide hot coals for a restart in the morning – making heat a breeze

- if one doesn't stay out late after work
- sleep in on Saturday
- isn't too Sunday lazy to make a proper fire
- or isn't too false-hopeful that the March days are getting warmer.

[Cat sat on thermometer]

Brower: Raised in a sod home

2-6

The UA Museum of the North is a prime example of the extreme effort required to build and maintain modern conveniences in the far north.

2-7b

The outer layers of the building's shell are comprised of 8 layers of wood, fabric, metal, and insulation.

3. [Survival] (10:35)

["When did we begin thinking that weather was something to be rescued from?"
– Gretel Erhlich, *The Future of Ice]*

< Ducks on the river >

3-1
In a climate as variable and extreme as Alaska's, a sense of time and conditions is critical for survival. You have to be adaptable and you have to think ahead.

Harms: Winter survival - Survival situation - Weakest species for temp tolerance
Harms: Body's primary goal - Shivering and hypothermia - Hypothermia progression

3-2
But Alaskans mustn't have trouble keeping warm. We Alaskans consume more ice cream than Americans anywhere else. Calories are a good thing – and we always have Cathie's jumping jacks (CUT).

3-3
One peculiar way to stay warm is practiced by the rare Alaskan snowbird – seen here.

[Definition: Snowbird]

3-4 (deleted)
or rather – here.

3-5
Then there's just wearing the right clothes.

Harms: Clothing

<IR Parkas>

Brower: Caribou clothing

VP:Clothing

Barnes: Animal Strategies - Subnivian life - Wood Frogs –Insects - Ground Squirrels

4. [The Long Dark] (12:45)

["Layer, layer, layer, take it off, take it off, put it on, take it off – it just got to be really tiresome."
– Laurel Ruth, Fairbanksan]

VP: Cold and Dark pt3
< Outhouse anim. >

▶ 4-1
Yes, many Fairbanksans live without running water – and yes, many pay some $500 a month rent for the privilege. Supply your own square of blue foam.

[Definition: Blue foam]

VP: Without Running Water

▶ 4-2
Now, even these normally mild-mannered Alaskans can get a little squirrelly in the thick of winter. The high occurrence of Seasonal Affectiveness Disorder, or SAD, is linked to our overabundant nighttime.

Bult-Ito: Circadian Clock – Seratonin – SAD - Importance of Exercise and Eating at the same time daily

<daily timelapse : skiing >

▶ 4-3
Outdoor activities may be reduced, but Alaskans learn to pack more into fewer hours of daylight. The lunch hour is a time to get out for a quick ski and practice for the town races.

<skiing – town races>

▶ 4-4
Other days, there's snow-shoeing, ski-joring, walking, bicycling, or snow-machining to work or class.

< Snow-shoeing>

▶ 4-5
And just because the sun goes down doesn't mean everyone huddles indoors. There's always the moon – and with the snow-cover established, there's plenty of light to go round.

<Moon time-lapse : Runners>

▶ 4-6 (CUT)
The running club continues on though-out.

[Definition: Crazy]

▶ 4-11
Even the raven's are out for a bit of fun after a good day of scavenging. A little thermal gliding in the plume from the power-plant.

<Ravens on steps and in plume>

▶ 4-7
And once a year it's always good to make sure your outhouse is still tough enough for a foot race.

<outhouse races>

▶ 4-8

When the weather's a little warmer, perhaps sledding's the ticket.

[Definition: Sledding]

<Dog sledding – in the sled : North American footage>

Mackey: Being out with the dogs.

4-9
As winter gets under way, so do the serious dog teams, running sprint races at the Open North American, and the well-known thousand-mile races – the Iditarod from Anchorage to Nome, and the grueling Yukon Quest, run between Fairbanks and Whitehorse in the Yukon Territory.

Mackey: Out with the dogs part 2

4-10
Not just for fun and sport, dog teams, snow machines, and skis are a reality of travel in the far north. When the rivers freeze, they are highways, making travel easy in both directions.

<Dog-sled on slough : Snow-machine on Chena>

4-12
As the cold sets in, it's time to learn a few lessons about living in the far north.

[First Lesson – How to get the groceries]

4-13
The If You are Driving – checklist

4-14
1. Plug the car in – and relax awhile.
2. Start the car – and relax while it warms up.
3. Check the Emergency gear in the trunk.
4. Un-plug the car.
5. Drive away on slightly square tires – the car's warm now, but the tires are still cold rubber.

[Second Lesson – How Do You Walk on Ice]

VP_Walking on ice

[Third Lesson – Experiments at 50 below]

4-15
Hot water or the very best extra-hot espresso, when thrown into the air at temperatures approaching 50 degrees below zero is said to evaporate before it reaches the ground.

<Coffee tossing clip 1>

VP-08 special – tale end "It works – I've tried it and it works"

<Coffee tossing clips 2&3>

[No decent coffee was harmed in this experiment]

4-16
Unfortunately, while still impressive, the warmer temperatures of late have only served to stain the snow.

4-17
Other experiments to try may involve blowing bubbles or finding a steel flag pole. We'll leave those for you to explore – and recover from the consequences.

4-18
Alas, winter isn't all fun and games. Sometimes going outside isn't a great idea.

<Ice-fog and plumes : T-valley intro seq >

4-19
Fairbanks lies in the Tanana River valley, nestled up against the hills at the northern end. The location protects the city from the winds encountered elsewhere in interior Alaska, but contributes to the intense cold – and the ice fog.

[Definition: Ice Fog] (may delete)

< Ice-fog drive-cam >

4-20
Normally, air gets colder with higher altitude – and this unstable circumstance contributes to air movement. Air warmed at the ground tends to rise through the colder, heavier air, producing clouds, generating wind, and flushing city pollutants out of the city.

< T-valley inversion seqs >

4-21
Winter days in Fairbanks, with the low sun, do not warm the surface air like we may want them to, and air deep in the valleys of Fairbanks can get colder and colder until the air above it is found to be warmer. This temperature inversion acts to cap what warm air is produced by the city – from the power plant, or cars on the roads. The tell tale signs are clouds of car exhaust drifting about intersections, and the power plant steam-plumes rising only a hundred feet or so, before being bent sideways as if met with a glass ceiling.

VP special Living on the Dome

<Power plant plumes from valley and hills>

4-22
A Fairbanksan living in the hills north of the city may leave the house and note a temperature of 0 degrees. At work, the temperature might be 20 below.

4-23 (CUT)
Inversions can be destroyed in a matter of hours to minutes. A light wind from the west can disrupt the stable air column and raise the temperature tens of degrees in short order.

5. [The Art of Winter] (5:14)

["To make a beautiful picture, you must look very carefully. You must see everything."
- Michio Hoshino. Alaska. August 1998]

5-1
A winter in the Interior is like nothing anywhere else on Earth.

5-2
The northern lights and moonlight to read by –

5-3
Hoar frost, ice art, and mountains magnified by the cold –

5-4
Alaskan winters are stunning – from the grand landscapes to the microscopic –

<moonlight : Aurora : SEM photography of ice fog crystals>

[Ice Fog Crystals]
[Scanning Electron Microscope]
[Photographs by Walter Tape and Ken Severin]

5-5
Alaska is a land of artists. Alaska Natives have produced art from local materials for thousands of years. Painters and poets, writers and smiths have journeyed north seeking to capture this life and land.

< artwork at Museum : timelapse sun>

Kes Woodward : Uniqueness of light : Blues

5-6
Beyond the imports, Winter demands its own art form – and a world championship to cap it off. The World Ice Art Championships are held in Fairbanks in the hopefully warming days of March.

< Ice Park carvers and park night shots: ice carving at Museum >

5-7
But winter is not unique only for its sights - or its lack of smells. It is a quiet world. Each and every activity is crisp and distinct and can be heard for miles.

[Name That Sound]
- Sound of a working block heater
- Footsteps at -30
- Owl
- Steady drip of water
- Car start

6. [The Future of Winter] (6:26)

["10 years of change in the Arctic is a preview for the next 25 years in the rest of the world."
- John Walsh]

< GRACE – spacecraft : GRACE LSI : Greenland images>

[GRACE: Gravity Recovery and Climate Experiment] [Altitude: 300 miles]

6-1
Since 2002, a pair of satellites have circled the Earth every hour and a half and over the course of each month, measure and re-measure minute differences in the force of gravity.

6-2
The satellites have shown that the Antarctic ice sheet has lost 36 cubic miles of ice per year for the last several years. Separate studies show that Greenland has lost from 38 to 57 cubic miles of ice each year, and that Alaska has lost more than 10 cubic miles per year.

6-3
There are now great concerns for the future of the polar ice pack, glaciers, permafrost, ocean currents, arctic wildlife, - the global climate. Not only the wobble of the Earth's axis causes seasonal change.

<Hoshino wildlife : Glacier time-lapse : sea ice video >
Barnes: Climate Change – advancing breakup
Brower: Earlier Melt
Barnes: Fire cycle - shrubification and aspen parklands -this museum
< MODIS - Fires>

Brower: Sea Ice importance to culture - Changes in Ice Thickness

< Cryosphere >

6-4 (CUT)
Small variations in Earth's orbit over tens of thousands of years affect the amount of solar energy reaching the Earth and have been shown to help trigger ice ages and periods of global warming.

6-5 (CUT)
We know the global climate is changing. We know that we are a factor in many ways. We know this complex system is something we do not yet fully understand.

6-6
The extent, age, and thickness of the polar ice pack has changed remarkably over the last 25 years. It is now younger, thinner, and covers less water in summer than previously observed.

Barnes: Permafrost
< Permafrost graphics and images >

6-7 (CUT)
Permafrost, a form of ice that influences nearly 25% of the northern hemisphere, shows substantial change, mostly in the form of decomposition due to warming air temperatures.

Barnes: Not just an arctic issue - This University

7. [The End of Winter] (3:00)

["Bog Walking … In the muck I see flecks of ice as if whole winters have been lost there."
- Gretel Erhlich, The Future of Ice]

▸ 7-1
Come March, the sun is unmistakably higher in the sky. Once again, we can feel its warmth – but the weather remains cold for a while yet.

▸ 7-2
The snows will not melt in earnest until April – and not clear until May. By then, the days are warming and we feel like having coming down from the mountain.

< MODIS Out Of Winter : timelapse melt – high trees : timelapse melt – snow edge >

▸ 7-3
With the snows gone, all is revealed that had lain obscured.

< leaf litter >

▸ 7-4
The rivers begin to break up, the solid pack of ice thins and then is carried downstream by the snow fed melt-water. There is danger in the waters here. The ice will often bunch, dam the rivers, and flood.

< Broken ice on Chena : Running water : dry grasses in breeze : budding >

▸ 7-5 (CUT)
Winter remains never far away.

<MODIS interior zoom on still>

▸ 7-6
On the north coast winter never truly gives up and often visits even after grasses have turned green and migratory birds have settled on their nests. Even in July, the on shore winds can bring the ice right up on the beaches. Then the winds change, and winter drifts back out to sea.

< MODIS Barrow in Summer : Sea Ice >

VP: Like Winter

▸ 7-7
No worries folks. Summer won't last forever. Winter will be back and after the long days, we could probably use the sleep.

<Program Credits>

LSI:

MODIS : Fairbanks and Barrow
GRACE : Current Location
Daylight Curve : Current Position

Current Sea Ice Extent ?

Q & A for PreShow

Q: While not the only cause, what planets are deemed most responsible for ice ages on Earth?
A: Jupiter and often Venus because distance to Earth is more important than size.

FACT: Fairbanks temperature records

FACT: Alaska snow-fall records

Q: What percent of global human freshwater needs are met through glacier runoff?
A: 60% (verify with Frank at NOAA)

FACT: As ice gets colder it becomes less slippery until at 40 below it's as slippery as a dry road.

Q: What percent of the UA Museum's Staff have at one time lived without running water?
A: Be interesting to find out.

Q: Glaciers have shaped how much of the land area of the planet?
A: Almost a third.

Alaska weather forecast sequence.

Screen Definitions

1. Out·side \(ˈ)aůt-ˈsīd, ˈaút-,\ *n* **1:** Beyond Alaska, or being the rest of the world **2 :** a place or region beyond an enclosure or boundary **3 :** outdoors **4 :** the extreme limit of a guess

2. snow·bird \-ˌbərd\ *n* **1:** any of several small birds seen chiefly in winter **2 :** any of a great number of people whom are hard to find for the snow because they took off for warmer climes

3. An·chor·age \ˈaŋ-k(ə-)rij\ *n* **1:** northerly suburb of Seattle conveniently located one half hour from Alaska **2:** a place suitable for anchoring **3:** Alaska's largest city

4. snow ma·chine \ˈsnō mə-ˈshēn\ *n* **1:** not a device for making snow (superfluous) **2:** any of various automotive vehicles for travel on snow **3:** see snowmobile

5. plug-in \pləgən\ *n* **1:** electrical outlet for a vehicle to power battery, oil pan, and block heaters so the vehicle will a) start, and b) run more efficiently at cold temperatures **2:** software required for making computers do what you really need them to do

6. cra·zy \ˈkrā-zē\ *adj* **1:** running (for fun or exercise) when the average temperature is somewhere below -30°F. Anything warmer is cake **2:** alt. … below -50°F

7. sled·ding \ˈsledding\ *n* **1:** the use of a sled **2:** excuse to acquire many dogs **3:** the conditions under which one may use a sled (see: many dogs)

8. ski·jor·ing \ˈskē-ˌjōr-iŋ, -ˌjór-, (ˈ)skē-ˈ\ **1:** winter sport for people low on dogs **2:** sport in which a person on skis is drawn over snow or ice by a dog (potentially nuts), horse (are you insane), or vehicle (definitely Alaskan)

9. blue foam \ˈblü-ˈfōm\ n **1:** insulation material used in house construction **2:** outhouse toilet seat found on peg by the front door

10. break up \(ˈ)brā-ˌkəp\ n **1:** that slushy muddy period between winter and summer **2:** the slushy muddy period between core relationships **3:** \vt to bring to an end

Alaska Weather Forecast

60 above zero:
Arizonians turn on the heat. People in Alaska plant gardens.

50 above zero:
Californians shiver uncontrollably. People in Fairbanks sunbathe.

40 above zero:
Italian & English cars won't start. People in Alaska drive with the windows down.

32 above zero:
Distilled water freezes. The water in Anchorage gets thicker.

20 above zero:
Floridians don coats, thermal underwear, gloves, wool hats. People in Alaska throw on a flannel shirt.

15 above zero:
New York landlords finally turn up the heat. People in Alaska have the last cook out before it gets cold.

Zero:
People in Miami all die. People in Alaska close the windows.

10 below zero:
Californians fly away to Mexico. People in Alaska get out their winter coats.

25 below zero:
Hollywood disintegrates. The Girl Scouts in Alaska are selling cookies door to door.

40 below zero:
Washington DC runs out of hot air. People in Alaska let the dogs sleep indoors.

100 below zero:
Santa Claus abandons the North Pole. Alaskan drivers get upset because they can't start the Mini-Van.

460 below zero:
ALL atomic motion stops (absolute zero on the Kelvin scale.) People in Alaska start saying..."Cold 'nuff fer ya?"

500 below zero:
Hell freezes over. Alaska public schools will open 2 hours late.