What is albedo?

- The proportion of incident light (light shining on something) that is reflected by a surface, or more simply, **how reflective something is.**

- Albedo is therefore a percent or fraction.
  - Albedo of 60% (or 0.6) means that a surface reflects 60% of incident light and absorbs the other 40%. Albedo of 5% (or 0.05) means it only reflects 5% of the incoming sunlight and absorbs the rest (95%).

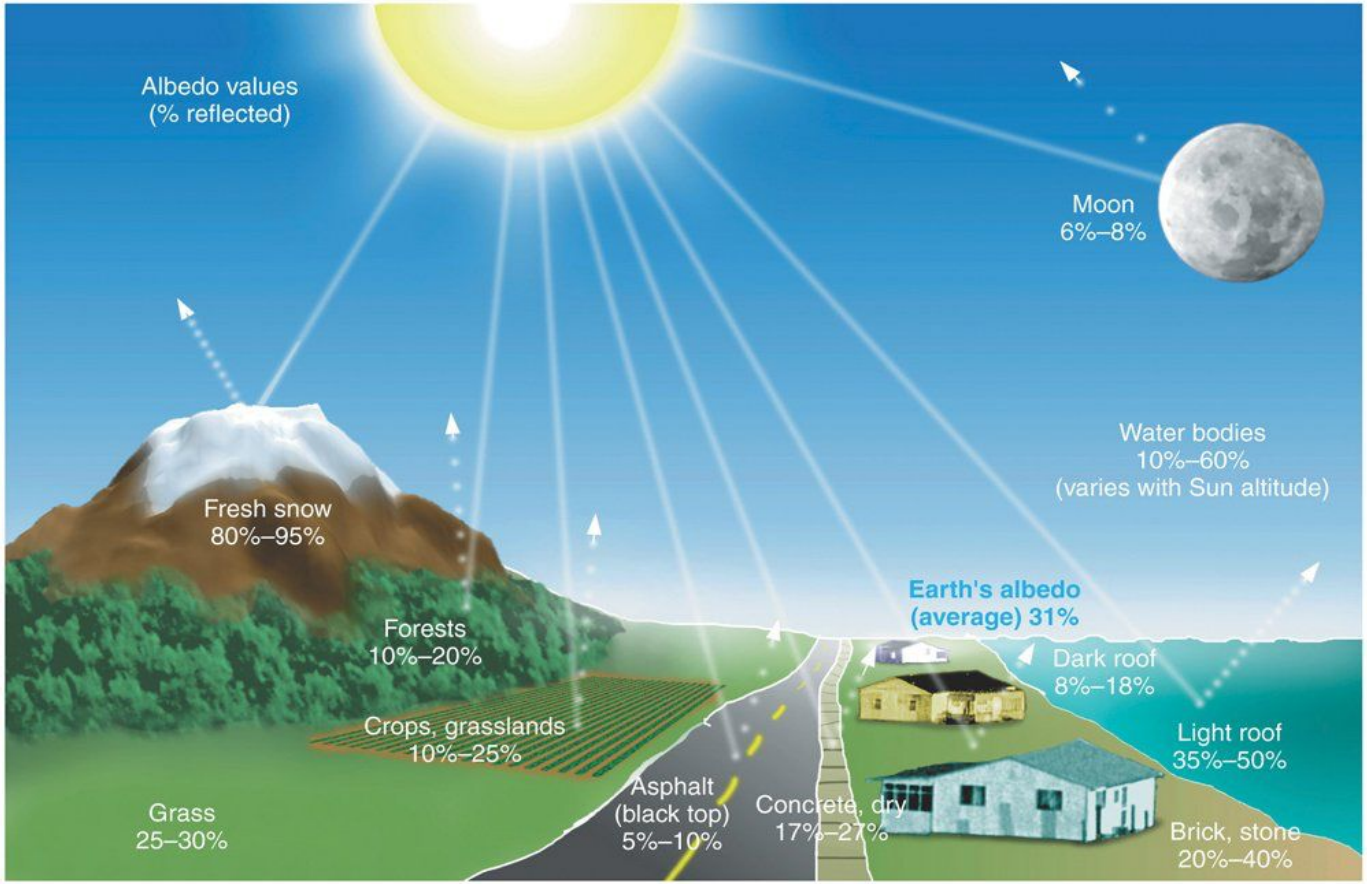
Why do school busses often have white-painted roofs?

CIRES Education & Outreach

https://cires.colorado.edu/outreach/

Different surfaces have different albedos, which impacts how much of the Sun's energy they absorb -- and as a result -- how much they warm up during sunny conditions.

Why would it be better to wear light colored clothing in a desert, but dark colored clothing in a cold environment?

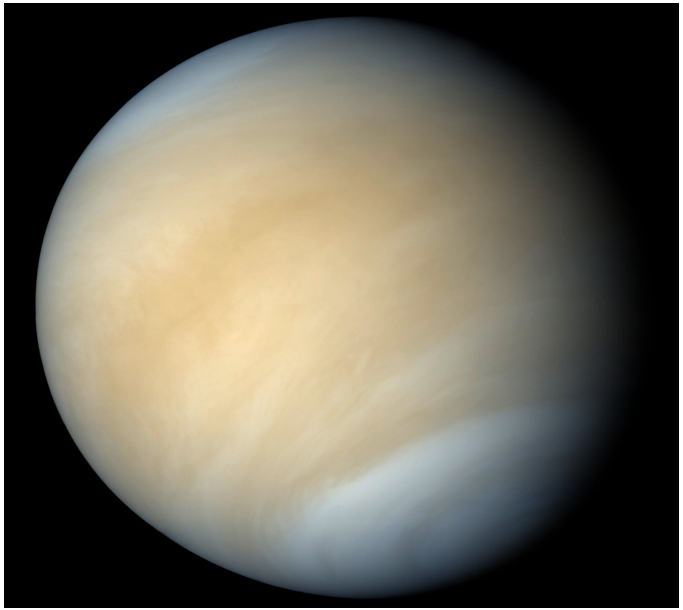


https://cires.colorado.edu/outreach/

Albedo applies even to a planetary scale.

Which planet has a higher albedo? Why would this be important?

Earth



Venus

https://cires.colorado.edu/outreach/

Albedo, and changes to albedo, are very important across Earth's poles. Which has a lower albedo: fresh snow or dirty snow? Which would absorb more sunlight?

Fresh snow

Dirty snow

What happens to the temperature of something that absorbs more sunlight?

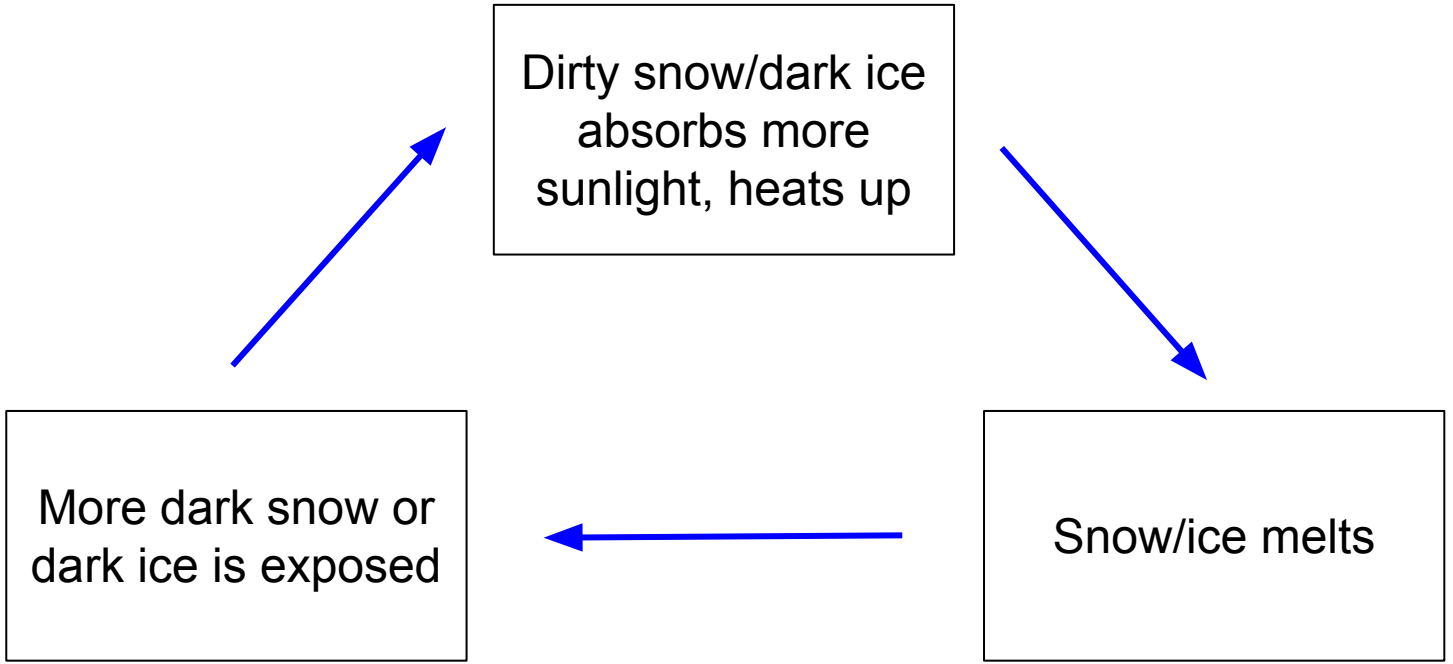
Which of these two surfaces (fresh snow or dirty snow) will melt more quickly?

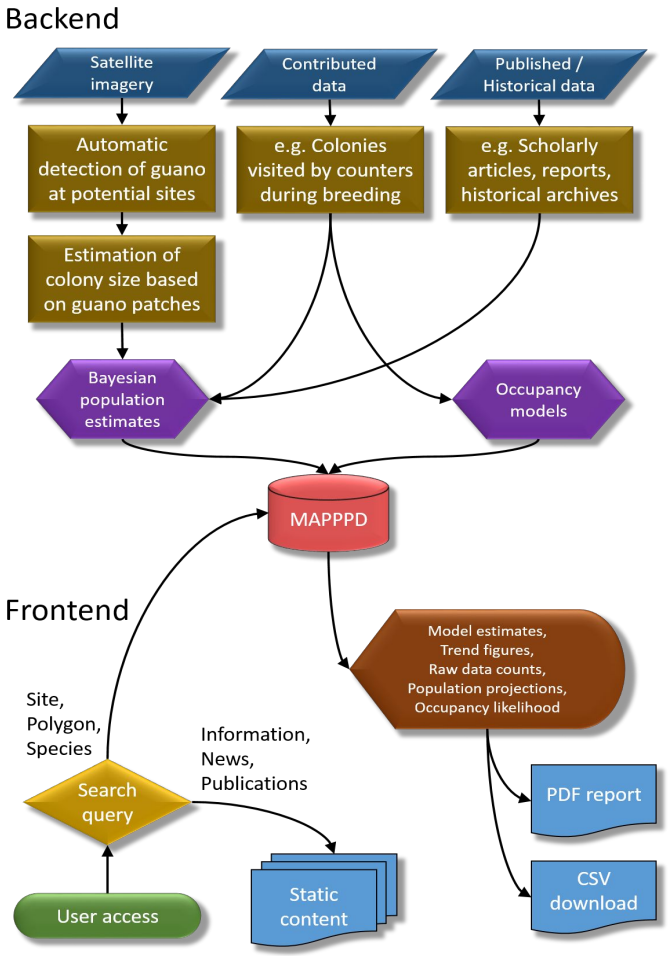
Fresh snow

Dirty snow

https://cires.colorado.edu/outreach/

Albedo and feedback loops





https://cires.colorado.edu/outreach/

MAPPPD team

Meet the MAPPPD team

Dr. Heather Lynch

Heather is a professor at Stony Brook University and the principal investigator of the MAPPPD project. Prior to arriving at Stony Brook Heather was a student at Princeton and Harvard, then continued into a Post doctoral research position at the University of Maryland. She has a background in physical sciences and quantitative modeling. She coordinates and manages all aspects of MAPPPD to ensure funding agency expectations are met.

Dr. Chris Che-Castaldo

Christian is a postdoctoral researcher and the lead modeler of the MAPPPD project. Chris has nearly a decade of experience in bayesian modeling techniques having previously worked at the University of Maryland with Dr. Bill Fagan. His role is to build the backend database of MAPPPD and construct population estimates and forecasts.

Dr. Grant Humphries

Grant is a postdoctoral researcher and the lead web developer of the MAPPPD project. Grant's primary interest has been seabird ecology and spatial modeling, but has a decade of experience using machine learning techniques and programming with R and Python languages. His role is to build the front-end of MAPPPD in line with the needs of stakeholders.

Michael Schrimpf

Michael is a PhD student at Stony Brook University under the supervision of Dr. Heather Lynch and the lead modeler for the occupancy data presented on MAPPPD. He is an avid birder with an interest in seabird ecology with a focus on quantitative methods. He has constructed a model which predicts the occupancy of certain species at a variety of sites on the Antarctic Peninsula.

Phil McDowall

Phil is a PhD student at Stony Brook University under the supervision of Dr. Heather Lynch and is a programmer for the MAPPPD project. He is a computer scientist by training and has been working on combining a variety of penguin data with high performance computing techniques. He developed the original concept framework for MAPPPD along with Dr. Heather Lynch.

CIRES Education & Outreach

NSF

https://cires.colorado.edu/outreach/

Satellite photo of an emperor penguin colony

The bigger the stain, the more penguins there are!

CIRES Education & Outreach

https://cires.colorado.edu/outreach/

There is a linear relationship between stain size and penguin count

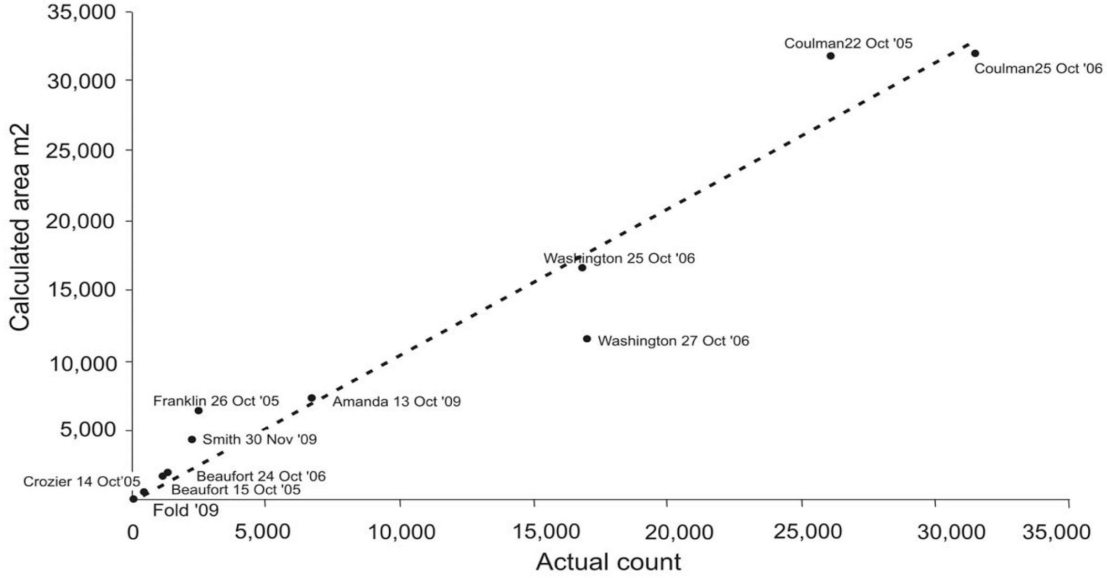


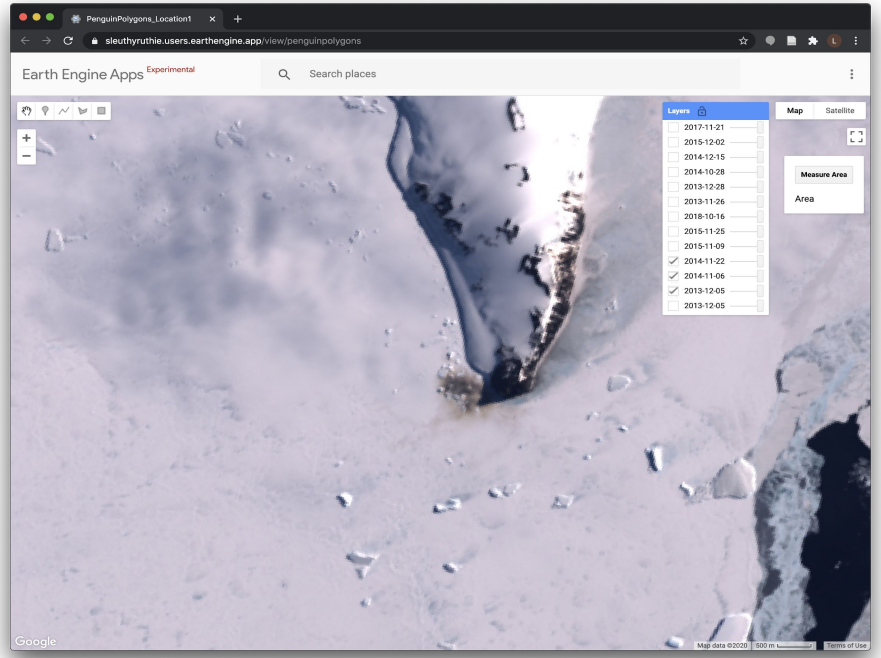
Figure 2. Regression plot based on the eleven ground truthing sites. The slope of the regression was 0.933 (SE = 0.046). Ground truth sites: Co6. Coulman Island 2006, Co5. Coulman Island 2005, Wa6. Cape Washington 2006, Wa5. Cape Washington 2005, Am. Amanda Bay 2009, Sm. Smith Peninsula 2009, Fr. Franklin Island 2005, Be6. Beaufort Island 2006, Be5. Beaufort Island 2005, Cr. Cape Crozier 2005.
doi:10.1371/journal.pone.0033751.g002

CIRES Education & Outreach

https://cires.colorado.edu/outreach/

Estimating penguin colony size from satellite images

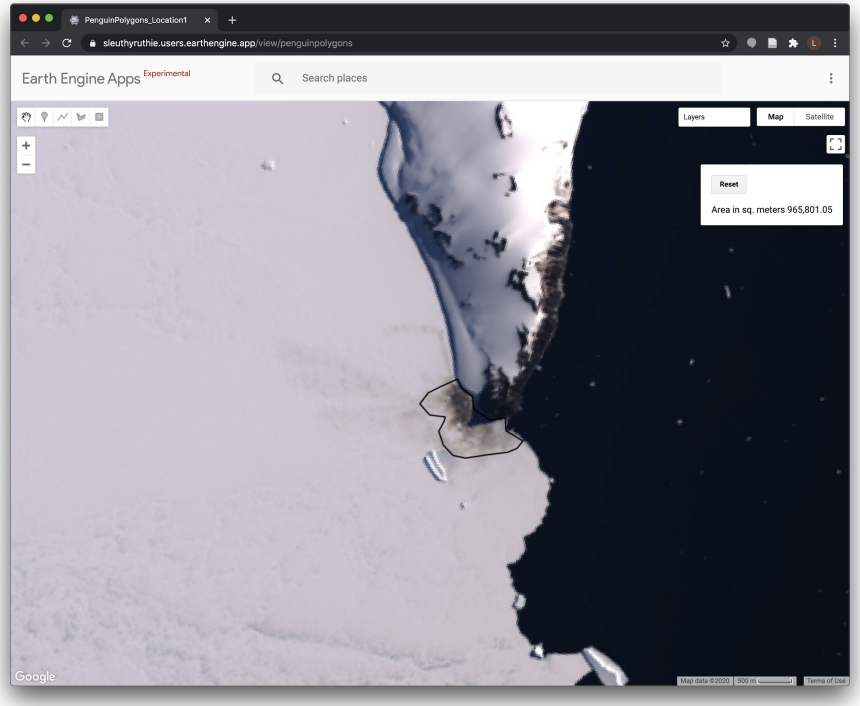
Clicking the ‘Layers’ box will show a drop down where Landsat images from different dates can be selected:



https://cires.colorado.edu/outreach/

Estimating penguin colony size from satellite images

Click the “Measure Area” button, which will cause the cursor to change to crosshairs. Click around the area you determine to be sufficiently low albeo to represent a penguin colony. The area enclosed by the polygon you create is given in square meters.



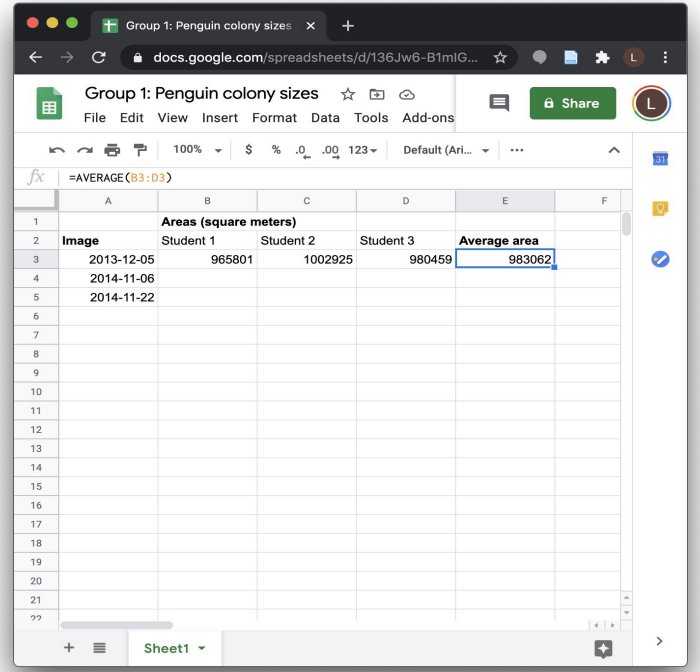
Within your group, discuss what you consider to be penguin vs no-penguins. Does everyone agree, or are there differences in interpretation?

CIRES Education & Outreach

https://cires.colorado.edu/outreach/

Estimating penguin colony size from satellite images

As a group, compile your results in a Google spreadsheet and calculate an average:



(Note: These are just example data. Actual values will be different!)

https://cires.colorado.edu/outreach/