## Antarctic Ice Sheet: past and present

#### An educational module for high-school and introductory-college students focused on changes in the Antarctic Ice Sheet from 20,000 years ago to present.

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The educational module uses Google Earth and Google Sheets and spans the subjects of glaciology, geomorphology, and climatology. Students will gain experience identifying surface features in Antarctica, mapping glacial landforms preserved on the seafloor, calculating retreat rates of parts of the Antarctic Ice Sheet, and critically thinking about why changes in ice-sheet extent happen. Prior knowledge on climate change, geology, and the cryosphere would be useful, but not required. The educational module includes a(n): educators’ guide (this document); pre-lesson assignment; lesson for students; lesson images in Google Slides; online Google Earth project titled “Antarctic Ice Sheet: past and present”; and online Google Sheet titled “Lesson Part 2 Template”. The answer key ("educators' answer key") is protected, so please complete this Google form to be granted access once your informal or formal educator status has been verified (https://docs.google.com/forms/d/e/1FAIpQLSdeGNaKnS9vLepuGFFWsglEONCwnJlXtIBqwgb2wlW7x\_kdpQ/viewform?usp=sf\_link).

#### Getting started

This educational module utilizes online resources including Google Earth and Google Sheets that are easier to use than downloadable versions or alternatives. Prior to students beginning the lesson, students should complete the 45-minute pre-lesson assignment alone or in groups either in class or at home prior to the lesson. The 1.5-hour lesson itself can be completed individually or in groups of 3-4 students, but the lesson developers recommend having students work in groups for the lesson. An option to streamline the pre-lesson assignment and the lesson is to hyperlink the website links, as they are provided in full to ensure they are preserved.

#### Module parts and timeline

##### Pre-lesson assignment (approximate time to complete is 45 minutes)

##### In-class discussion of the pre-lesson assignment and lesson activities (approximate time to complete is 10 minutes)

##### Lesson Part 1 (approximate time to complete is 25 minutes)

##### Lesson Part 2 (approximate time to complete is 25 minutes; students can use the google sheet template)

##### Lesson Part 3 (approximate time to complete is 25 minutes)

* Lesson wrap-up (approximate time to complete is 5 minutes)

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#### More information

<https://nsidc.org/cryosphere/glaciers>, <https://nsidc.org/cryosphere/quickfacts/icesheets.html>,

<https://www.bas.ac.uk/science/science-and-society/education/discovering-antarctica/>, <https://thwaitesglacier.org/education>