2020 GY400 Schedule and Syllabus

Class meets at 9:15 a.m. and 1:15 p.m., unless otherwise noted. Courses will be in-person occasionally, including on Days 1 and 3 of Week One. The course makes use of current published literature, linked in the syllabus (right column). Most mornings will involve discussion of the articles assigned for that day, together with skills development/training.

WEEK ONE

Day	Class (when in person: Palmer 19)	Readings (to be completed by the next class
10/19	9:15 am/in person Palmer 19: **Intro to WAIS** (https://docs.google.com/presentation/d/1JOq3sOAbMAJF34g-l3tFKw2lfELtoZMsiHp1xdSceeU/edit?usp=sharing) (Trevor), **subglacial geology of Antarctica** (https://canvas.coloradocollege.edu/courses/31345/files/folder/Lectures%20-%20Presentations?preview=907083) (Christine), and the GY400 interdisciplinary/collaborative endeavor . Introduce **Methods and Models** (https://canvas.coloradocollege.edu/courses/31345/assignments/80454) assignment. WAIS intro slides **here** (https://docs.google.com/presentation/d/1JOq3sOAbMAJF34g-l3tFKw2lfELtoZMsiHp1xdSceeU/edit?usp=sharing) 11:15 First Mondays: J. Kameron Carter- **White Prometheus Bound** (https://today.coloradocollege.edu/announcements/2675) 1:15 PM- Ice sheets in the climate system (Trevor video **here** (https://coloradocollege.zoom.us/rec/share/Qt1ebxJ21pfnOOFGtSFocsfjdBzwBV7hkCdRjinbCeEfrfRoBfthPfeVaTDvZxP6.I3UerQupKPgkgyEy) & lecture slides **here** (https://docs.google.com/presentation/d/1NVg3FhlXbrO1QAckuB6GpbUK7789Y9Q3ZdftNta334g/edit?usp=sharing))	All read: **Passchier (2018). Ice Sheets and Cl** (https://canvas.coloradocollege.edu/courses/313 Group 1 - Paleoclimate **Steig and Neff (2018): The Prescience of Paleoclimat** (https://canvas.coloradocollege.edu/courses/31345/files/88 **Fischer et al. (2018): Palaeoclimate Constraints on th** (https://canvas.coloradocollege.edu/courses/313 Group 2 - Present and Future **Pattyn and Morlighem (2020): The Uncertain Future o** **Slater, Hogg, and Mottram (2020): Ice-Sheet Losses T** (https://canvas.coloradocollege.edu/courses/313
10/20	9:15 am/in person Palmer 19: **Introduction to ice dynamics** (https://docs.google.com/presentation/d/1fqUULdxrv1Ble1o80GVEfeMc0wOgTB_WVrFUi2Ytq1E/edit?usp=sharing) (Trevor lecture) 10:30 – 12:00 Meet in GIS lab to start preliminary model experiments for Pliocene data-model comparison. 1:15 PM: via **ZOOM**, (http://%20https://coloradocollege.zoom.us/j/92191298633) **Discussion** of Readings and **Overview of** (https://canvas.coloradocollege.edu/courses/31345/files/folder/Lectures%20-%20Presentations?preview=907083) **tectonic evolution of West Antarctica** (https://canvas.coloradocollege.edu/courses/31345/files/folder/Lectures%20-%20Presentations?preview=907083) (Christine lecture, video recording is **here** (https://coloradocollege.zoom.us/rec/play/bDBOWpKJ0lOB0o96YWV0roRxD-XyyKAxrAB_OXlMsWq0vPSKRy2gCl4HUh3uolmKaVpb_vik-fMRxh-y.I-puoTS_il0grtFN?continueMode=true) .)	**Milillo et al. (2019) Heterogeneous Retreat a** (https://canvas.coloradocollege.edu/courses/313 **Diagnosing Thwaites** (https://eos.org/feature Skim: **Christianson et al. (2016): Sensitivity c** (https://canvas.coloradocollege.edu/courses/313 ***Thwaites Glacier, the "Media Darling"*** *(sourc* **Thwaites Glacier coverage** (https://www.p glacier) on PBS Newshour **Thwaites Glacier coverage** (https://www.t Goodell (2017): **The Doomsday Glacier** (t
10/21	9:15 AM: in person with option to join by Zoom	**Pollard and DeConto (2012): Description of a**

	Discussion of reading **Ice sheet and climate models** (https://docs.google.com/presentation/d/1g309NOkXfYmBigG9JVubPLc-N0XILiCOcOx34WbzYBo/edit?usp=sharing) (Trevor lecture) PM: 1:30–3:30 GIS exercise and seminar by **Dr. Kiya Riverman** (https://kiyariverman.weebly.com/) on Thwaites Glacier (meet in GIS lab).	(https://canvas.coloradocollege.edu/courses/313 **DeConto and Pollard (2016): Contribution of** (https://canvas.coloradocollege.edu/courses/313 Skim: **Pollard, DeConto, and Alley (2015) Pot Failure.** (https://canvas.coloradocollege.edu/cou
10/22	*note: Icesheet models started on Tuesday should finish Thurs. night or Friday morning.* 9:15 AM: 1. Discussion of papers, on Zoom 2. Intro to **working with PSU ice sheet model output** (https://github.com/trhille/PSUICE_analysis/blob/master/PSUICE_analysis_tutorial.ipynb) (Trevor tutorial) 3. Begin work on **Model - data comparison: a/ visual examination of IODP cores.** (https://canvas.coloradocollege.edu/courses/31345/assignments/81116) We'll work **in the GIS lab.**	**Gasson and Keisling (2020): The Antarctic Ic** (https://canvas.coloradocollege.edu/courses/313 **Dutton et al., (2015): Sea-Level Rise Due to P** (https://canvas.coloradocollege.edu/courses/313
10/23	AM: Asynchronous work on core analysis 10:45 AM: meet in Palmer for paper discussion 1 PM: Meet in GIS lab. Prepare preliminary model run output for model-data comparison. Model-data comparison cont'd	**Take it from us about the Pliocene : We don' around the world** (https://canvas.coloradocollege.edu/courses/313 . (<-- Not assigned reading, but may be of inter No but really, let's go back to basics. BEDROC **Paxman et al. (2019** (https://canvas.coloradocollege.edu/courses/313 preview=877114)) Antarctic topography since ic **Paxman et al. (2020): Long-Term Increase in** (https://canvas.coloradocollege.edu/courses/313 Not assigned, but this is the paper we brought u **Simulations over the Last 40 Million Years w** (https://canvas.coloradocollege.edu/courses/313 With close reading, a parallel assignment: Deve experimental design, and plans for analysis.
		do you listen to PODCASTS? if so....swap in an **Andrea Dutton lecture (June 2020)**

WEEK TWO

Day	Class	Reading and Problems

10/26	Asynchronous: extract and upload trimmed output from completed runs in GIS lab AM **by Zoom** (https://applications.zoom.us/lti/rich/home/meeting/detail) : 1- Roundtable discussion: each share results of data-model comparison 2- Group discussion on next set of model experiments, drawing upon experiences of Week 1 and the paleotopography 'time slices' **12:30 - 2:45 pm Zoom seminar** by **Dr. Guy Paxman** (https://pgg.ldeo.columbia.edu/people/guy-j-g-paxman) : Antarctic bed topography evolution and icesheet vulnerability [**recording** (https://coloradocollege.zoom.us/rec/play/x-vdsuoUtl354K-yF2zM3ijq4J4444Wq_m3E7WnNMT5-qOEHlF-YRQHroqjru4ktXWX2wOkqMPmike8k.yF7ZeJ4BkxqmMskF)] Brainstorm session on student proposal plans.	**Steig et al (2013): Recent Climate and Ice-Sheet C 2,000 Years** (https://canvas.coloradocollege.edu/cours **Neff (2020): Amundsen Sea Coastal Ice Rises** (https://canvas.coloradocollege.edu/courses/31345/files And briefly revisit: **Steig and Neff (2018): The Prescience** (https://canvas.coloradocollege.edu/courses/31345/files/886473/do LIG/Eemian case study: **Mallorca carbonate encrustati** (https://www.sciencedaily.com/releases/2018/09/180910
10/27	AM: 9–11 seminar by **Dr. Peter Neff** (http://peterneff.weebly.com/) : "Ice Core Studies of West Antarctic Climate" [**recording** (https://coloradocollege.zoom.us/rec/play/Yie372tXvXpQw6sMosXiwusXlgRMiuhNoUPv4xUX_aK42axnWQub0lEE9HBtmSieKOaDTume-blR-bbX.vqWMjmx1_7ju6jk9)] PM: Asynchronous peer review of proposals (revised proposal due Wed. 11 a.m.).	Independent reading for model experiment proposals
10/28	All day work session 11 am : Revised experiment proposals due, each student present proposal plans / All discuss. 12:30 - 5:30 Get model experiments running!	Work on Methods and Models assignment (https://canvas.coloradocollege.edu/courses/31345/files
10/29	**10:30 am Zoom class** (https://applications.zoom.us/lti/rich/home/meeting/detail) - Learning from detrital minerals (and vignette on Mediterranean-Antarctic seawater connection) [Christine] Work time - READ to understand and prepare for detrital geo/thermo Chronology. In addition to papers at right, please acquaint yourself with background and extensive web resources at University of Arizona Laserchron Center *Periodically check in on* models and multi-day runs.	Reading/preparing for Week 3: Licht et al. (2014): **U-Pb detrital zircon signature of** (https://canvas.coloradocollege.edu/courses/31345/files %20FT%20and%20He?preview=899208) Zundel et al. (2018): **Thurston Island (West Antarct Separation: A Multistage Evolution Revealed by A** (https://canvas.coloradocollege.edu/courses/31345/files %20FT%20and%20He?preview=894933)
10/30	1:00 pm. Geo Seminar : Rosario Esposito. "Earth Science in pop-culture, and volcano research using inside micro bubbles (fluid inclusions)" via Zoom: **https://coloradocollege.zoom.u** (https://coloradocollege.zoom.us/j/94686776876) 2:30 PM : Student presentations on **methods and models** (https://canvas.coloradocollege.edu/courses/31345/assignments/80454) assigned on Day 1. **Work Day** Set up models & begin multi-day runs. Focus upon model experiments	

WEEK THREE - PRIMARY RESEARCH : icesheet model runs and U-Pb age dating at Univ. Arizona Laserchron Facility (https://sites.google.com/laserchron.org/arizonalaserchroncenter/home) (via remote operation)

Day	Class	Reading and Problems
	Week Three equates to Discovery Science - there will be frequent short meeting to share and discuss results.	
11/2	9:15 to 11: Ice sheet models: check-in **12 to 1**: Orientation to U-Pb instrumentation by **Arizona Laserchron Center** (https://sites.google.com/laserchron.org/arizonalaserchroncenter/home) staff. Information and resources on U-Pb and (U-Th)/He dating at University of Arizona are **here** (https://canvas.coloradocollege.edu/courses/31345/pages/university-of-arizona-information-on-analytical-facilities-and-resources) .	Analytical sessions on "Nu" and "E2" mass spectrometers will begin today in the afternoon and continue t Friday 6 pm. GY400 students will work in teams of two using remote access, aided by ALC staff, Christine Robin, who will be physically IN the labs at University of Arizona. We will do sample changes, standardize mineral "knowns," and initiate instrument operation. To prep for Sophie Coulson's visit: **Mitrovica, Gomez, and Clark, (2009) The Sea-Level Fingerprint of West Antarctic Collapse** (https://canvas.coloradocollege.edu/courses/31345/files/914412/download) **Gomez et al., (2010) Sea Level as a Stabilizing Factor for Marine-Ice-Sheet Grounding Lines** (https://canvas.coloradocollege.edu/courses/31345/files/914411/download)
11/3 to 11/5	Nov 3. > ELECTION DAY < No class meetings / No formal class. Monitor results from icesheet models. (https://www.geo.arizona.edu/~reiners/arhdl/longer.htm) (https://canvas.coloradocollege.edu/courses/31345/files)	
11/4	Geochron Work Day- Receive some initial ALC data, and Select grains for Analytical sessions on "Nu" and "E2", (working in pairs on key samples) 1 pm. Seminar by **Sophie Coulson** (https://frankknox.harvard.edu/people/sophie-coulson) on ice sheets, crustal deformation, and sea level [**join via Zoom** (https://coloradocollege.zoom.us/j/3446791663)]	Jordan et. al. (2020): **Tectonic evolution of West Antarctica** (https://canvas.coloradocollege.edu/courses/31345/files/folder/PDFs%20published%20literature/West%20Anta%20bedrock%20geology?preview=877130) Cooperdock & Ault (in press): **Fe Oxide (U–Th)/ He Thermochronology: New Perspectives on Faults, F and Heat** (https://canvas.coloradocollege.edu/courses/31345/files/folder/PDFs%20published%20literature/Thermochron%20FT%20and%20He?preview=905711) Levy et al. (2016) **Antarctic Ice Sheet Sensitivity to Atmospheric CO2 Variations in the Early to Mid-M** (https://canvas.coloradocollege.edu/courses/31345/files/918732/download)
11/5	Geochron Work Day I. Picking zircons for analytical sessions on "Nu" and "E2", work in pairs using **CL and BSE image maps** (https://drive.google.com/drive/folders/1emu6dVtm1yRT0ts4mLJJJZAxXcbsFIGC) . 12:30: **Anna Ruth Halberstadt** (https://necsc.umass.edu/people/anna-ruth-halberstadt) seminar: **Miocene Antarctica climate/ice-sheet modeling** (https://applications.zoom.us/lti/rich/home/meeting/detail) . (*analyses on Nu and E2 ongoing, via automated data collection*) Geochron Work Day II. Analytical sessions on "Nu" and "E2", using Zircon maps made in AM.	Licht & Hemming (2017): **Antarctic glacigenic sediment provenance using geochemistry & petrology** (https://canvas.coloradocollege.edu/courses/31345/files/folder/PDFs%20published%20literature/Thermochron%20FT%20and%20He?preview=899213) **Aarons et al. (2019): Dust Transport to the Taylor Glacier, Antarctica, During the Last Interglacial** (https://canvas.coloradocollege.edu/courses/31345/files/894734/download) **Steig et al. (2015): Influence of West Antarctic Ice Sheet Collapse on Antarctic Surface Climate** (https://canvas.coloradocollege.edu/courses/31345/files/894740/download)
11/6	AM: **10–12 Zoom seminar** (https://coloradocollege.zoom.us/j/98150782826) by **Dr. Sarah Aarons** (https://climearthgeochem.com/) : Dust transport during	Periera et al. (2020): **The geochemical and mineralogical fingerprint of West Antarctica's weak under Pine Island and Thwaites** (https://doi.org/10.1016/j.chemgeo.2020.119649)