

Cores to Code:

A three-week hands-on
learning experience for college-
level students focused on
paleoseismology and
subduction zone science

June 7-27, 2025, Cal Poly Humboldt, Arcata CA



Who conducted the course?

Advisement and coordination

Geoscience Education and Inclusion Program Manager

Course Instructors

Tina Dura

Andrea Hawkes

Harvey Kelsey

Diego Melgar

Shannon Fasola

Teaching assistants

Mira Anderberg

Brandon Hatcher

Field trip

Harvey Kelsey

Andrew Meigs



Photo credit: Andrew Meigs; In absentia: Diego Melgar and Meigs

The students: recruitment

Target participants:

- Rising juniors and rising seniors
- Earth science academic focus, broadly defined
- Have not had a previous summer-long research experience

The solicitation

- 3-week paid undergraduate program
- Paleoseismology and subduction zone science
- All travel and lodging expenses covered.
- Stipend = \$2000
- Commitment to 22 days (June 7-28,2025)

Applicant pool

- 171 applicants from 90 institutions, 9% from 2-yr comm colleges
- Number of applicants that met minimum requirements = 60

The students: selection

Objective: recruit ten students from 60 applicants

Evaluation process

- three questions served as the basis of ranking
- three instructors followed a rubric to evaluate answers
- was a blind evaluation – applicant 1, 2, 3 etc.

Top twenty were identified by name and institution

Top ten were offered slots

Waiting list = next ten

We went 5 deep into the waiting list to fill ten slots:

class demographic = seven women and three men

Course calendar: Major activities

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						Students arrive in Eugene
Coastal tectonics field trip (2 days)		Orientation (2 days): Introduction to course content and expectations, 3-hr field coring exercise		Field work (3 days): Five teams, two students each Coring in coastal marsh Sediment description Sample collection		
Student check in, dorms at Cal Poly Humboldt						
Day off	Presentations of coring results	Laboratory (3 days): Same five two-student teams Microscopic examination of samples for foraminifera and diatoms			Morning: Lab finish up Afternoon: meet-and-greet w/ local emergency preparedness managers	Day off
Computer lab (3 days): Introduction to Python and crustal deformation modelling exercise			Prepare for final presentation	Morning: final presentation Five presentations Afternoon: students pack up	Students return to Eugene by van	Students travel to home

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Two-day field trip:
Start, Eugene
End, Cal Poly Humboldt
Spend night Charleston OR

Cape Arago SP

Eugene

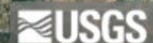
Siletzia tectonics

Cape Blanco SP

Cal Poly Humboldt, Arcata CA

Data LDEO-Columbia, NSF, NOAA
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

155 km



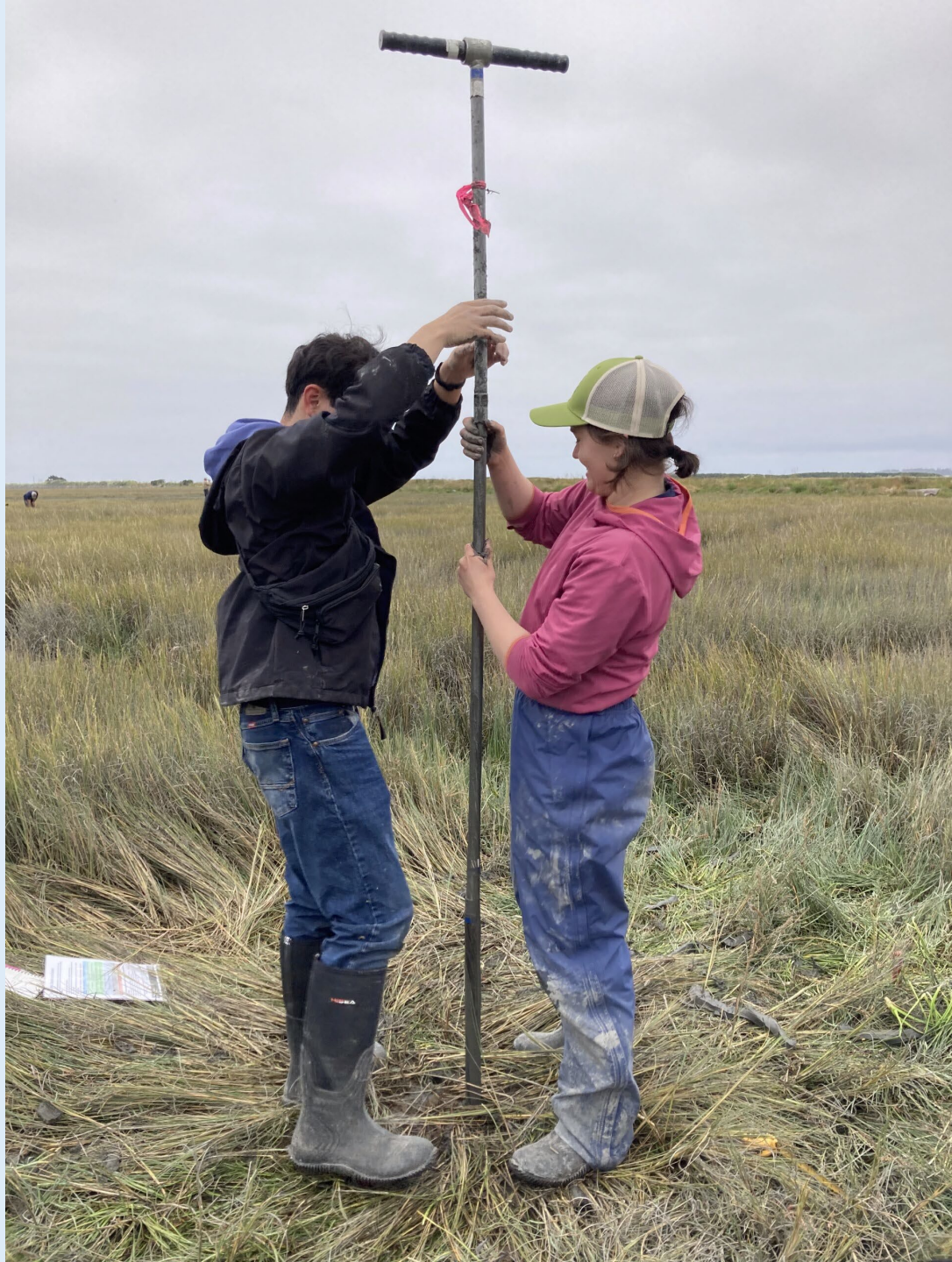
Coastal tectonics

- Deformation of marine terraces
- Coseismically subsided marshes
- Subduction zone earthquake cycle
- Cape Blanco GNSS site



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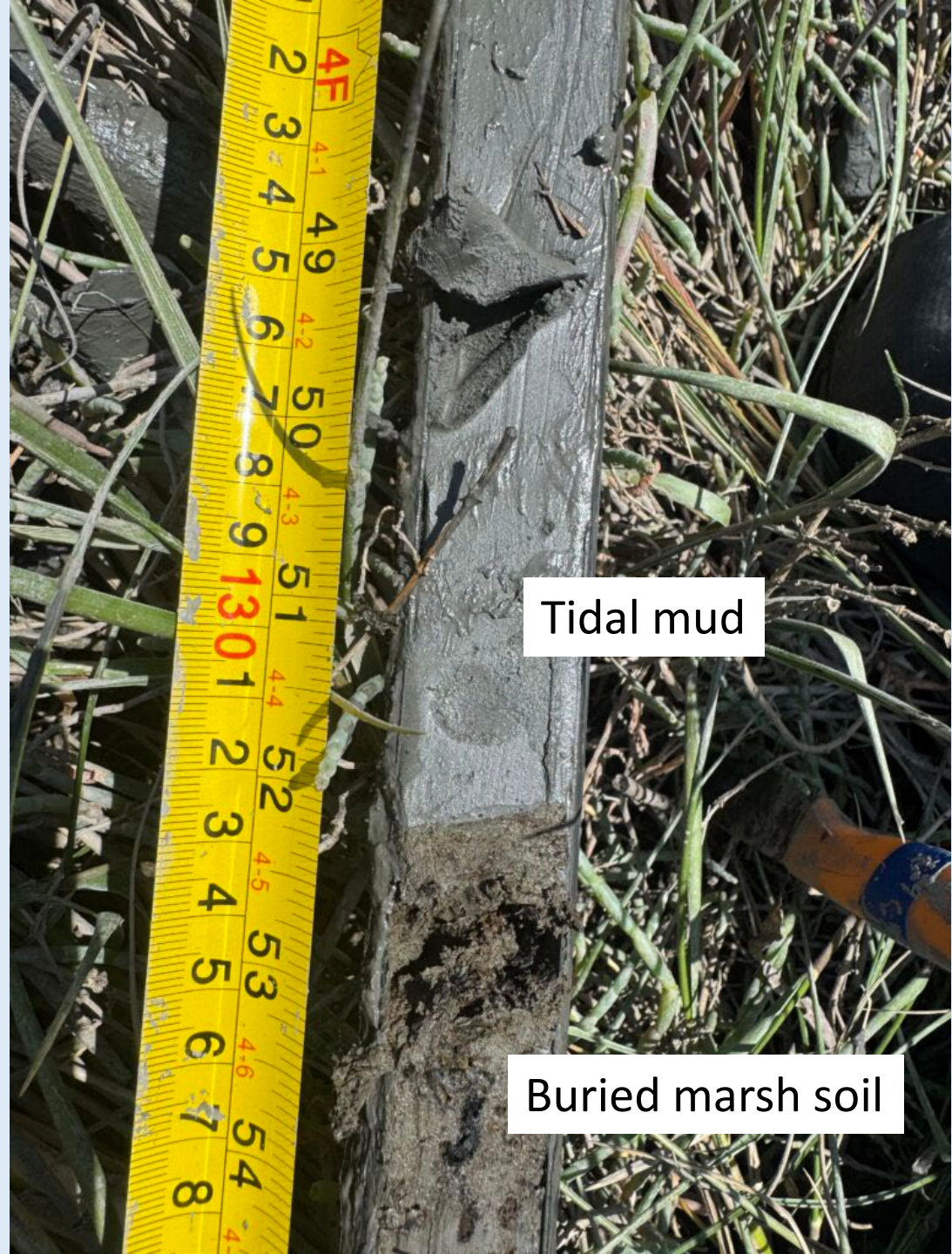
Coring along transect lines



Describing and sampling cores



Students
sampled from:
--buried marsh
soil
--tidal mud
overlying buried
soil



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Stratigraphic correlation of core logs along the sampling transect

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How do you estimate the amount of vertical land level change?? Identify microfossils indicative of different elevations, tidal marsh versus tidal mud



Students picking foraminifera from core samples of tidal mud and tidal marsh



Examining diatoms typical of tidal mud and marsh with a petrographic microscope

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Computer modelling exercise (3 days): Execute deformation modelling exercise			Prepare for final presentation	Morning: final presentation Five presentations Afternoon: students pack up	Students return to Eugene by van	Students travel to home



Employ models to investigate:
Which kinds of earthquake rupture models (slip, surface deformation) best match the coastal abrupt land level change during subduction zone earthquakes?

Learning Goals

- Introduction to Python
- Write/run Python code (Jupyter notebooks)
- Load land level change data
- Determine best-fitting models

Acknowledgments:

NSF – C2C will run again



GEI Program Manager

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Andrew Meigs

Humboldt County emergency preparedness managers



UO Crescent office support:

Amanda Eriksen

Cal Poly Humboldt support:

Eileen Hemphill-Haley

Brandon Browne

Laurie Marx

Cal Poly Geology Dept

Cal Poly Geography Dept

Cosmos Lab technician help

Land Access Brian Bertoldi

CA Dept of Fish and Wildlife

