

Class Information: SIOG 239 Problems in Plate Tectonics

This class will build upon classic concepts in plate tectonics, with an emphasis on practical implementation of tools that will be applicable to a wide range of problems. These include quantitative seafloor analysis, plate reconstructions, modeling potential field data, and earthquake data analysis. The homeworks and essay assignment are designed to develop coding, data handling, and writing skills.

Instructor: Ross Parnell-Turner

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Meeting Times and Locations: Mon/Wed 11:00am–12:20pm (Zoom)

Format: 2 lectures per week; 4-units, letter or S/U grade.

Grades based on essay, homework assignments, and presentations.

Website on Canvas: <https://canvas.ucsd.edu/courses/15162>

Here you will find class information, lecture recordings and slides, and homeworks.

Module		Topic	Homework	Tools
Intro	Week 1	T 31-Mar L1	None: relax	
		Th 2-Apr L2		
Map projections and sonars	Week 2	M 6-Apr L3	0: Software to install	xterm, bash
		W 8-Apr L4		
Oceanic crust	Week 3	M 13-Apr L5	1: Map projections	GMT, bash
		W 15-Apr L6		
Marine magnetic anomalies	Week 4	M 20-Apr L7	2: Abyssal hills	GMT, bash
		W 22-Apr L8		
Gravity	Week 5	M 27-Apr L9	3: Marine magnetics	MODMAG
		W 29-Apr L10		
Tectonics on a Sphere	Week 6	M 4-May L11	4: Marine gravity	GMT, bash
		W 6-May L12		
Plate Reconstructions	Week 7	M 11-May L13	5: Rotation poles and flowlines	GPlates, GMT
		W 13-May L14		
Earthquakes and Focal Mechanisms	Week 8	M 18-May L15	6: Plate reconstructions	GPlates
		W 20-May L16		
Active Source Seismology	Week 9	M 25-May L17	None: work on essay	GMT, bash
		W 27-May L18		
California Borderlands	Week 10	M 1-Jun L19	7: California Borderlands	
		W 3-Jun L20		

Suggested textbooks

This class will focus on methods and implementation, however the following provide useful background:

Cox, A., and Hart, R. B. (1986). *Plate Tectonics, How it Works*. Blackwell.

Fowler, C. M. R (2005). *The Solid Earth*. Cambridge University Press.

Kearey, P., Klepeis, K. A., and Vine, F. J. (2009). *Global Tectonics*. Wiley-Blackwell.

Turcotte, D. L., and Schubert, G. (2014). *Geodynamics*. Cambridge University Press.

Computing

Computer-based homeworks will need the tools listed on the schedule, all of which will run on most Mac, Linux or Windows machines. If you do not have a computer account we will set you up with one.

Essay assignment

You will write a review essay, in the style of a *Nature* 'News and Views' article, on a recently published peer-reviewed scientific paper, published since 2010 on a topic relevant to plate tectonics. The objective is to improve your writing and critical skills.

Key Dates

1. Choice of peer-reviewed paper: Monday April 13th
2. First draft due: Monday April 27th
3. Discussion/feedback on first drafts: Monday May 4th
4. Final draft due: Monday June 1st

Format

Essays should be up to 800 words long (including figure captions, but not including title or references), and include one figure. They should be typed in 12 pt size font, with citations using the author-date format, and submitted in pdf format. Grades will be assigned with the aid of the rubric, which can be found on the course website.

Structure

1. Title. Not the title of the scientific paper but a short, snappy and relevant title to get the readers attention
2. Opening paragraph. Geared to non-expert that briefly states motivation for the paper (1-2 sentences), explicitly cites the study and topic (e.g., 'in a paper just published in *Geophysical Research Letters*, Bloggs and Smith report...'). States primary finding, and briefly summarizes the implications.
3. Main Body. Paragraph on background; paragraph on method (avoid being too technical), and some paragraph(s) on results.
4. Final paragraph. Highlight significance/implications of the work, and future research directions.
5. References. One for the scientific paper that you're reviewing, plus any others that you refer to.
6. Figure. One figure, with a caption written by you.