ON-RAMPS
to more effective teaching in tectonics

What are On-Ramps?

On-Ramps are quick-start guides to help you get up to speed in effective strategies for actively engaging students in the classroom to improve learning.

Context

The landscape of college and university teaching in the geosciences has changed over the past 20 years. Faculty now spend less time lecturing and more time actively engaging students in the classroom, and active engagement is more common in geosciences classrooms than it is in biology, chemistry, or physics.

- Teach the Earth and On the Cutting Edge have literally thousands of web pages about how to more actively engage geoscience students. But what if you don't know where to start, or you don't have a lot of time?
- On-Ramps are designed to be catalysts to take you up to highway speed, with advice and resources to help you actively engage students effectively in the classroom.

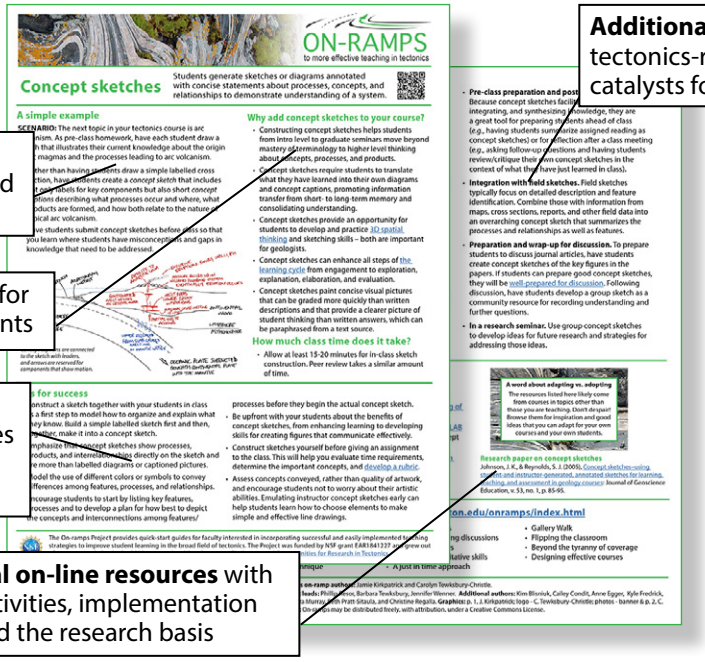
What's in each On-Ramp?

A simple example with a tectonics-related classroom scenario

Rationale and benefits for both you and your students

Tips for success with in-the-trenches advice for effective implementation

Additional on-line resources with links to activities, implementation details, and the research basis



Additional examples of a variety of tectonics-related topics to serve as catalysts for your own courses

On-Ramp topics

- Interactive lectures
- Brainstorming
- Concept sketches
- Jigsaws
- Compelling discussions
- Quantitative skill-building
- A just-in-time approach
- Case studies
- Gallery Walk
- Flipping the classroom
- Beyond the tyranny of coverage
- Designing effective courses

Download a zipped folder of all On-Ramps

Why is active learning so important?

It dawned on me about two weeks into the first year that it was not teaching that was taking place in the classroom, but learning.

Pop star Sting, reflecting upon his early career as a teacher
NSF 96-139, *Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering and Technology*

We cannot do our students' learning for them, and cognitive science research over several decades has demonstrated that:

- Exposure does not equal learning.
- People learn when they are actively engaged in building knowledge and when they apply what they know to problem-solving.

- **What we do in the classroom matters.** If we care about student learning, we need to create environments in the classroom that promote student learning.
- The key is to ***actively engage students***. Student-centered teaching methods, such as those in these On-Ramps, are well documented to be effective in improving student learning.

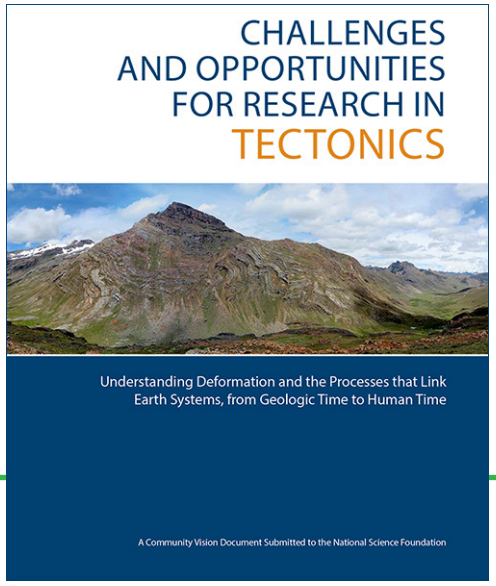
As you enter a classroom, ask yourself this question: "If there were no students in the classroom, could I do what I am planning to do?" If the answer to the question is yes, don't do it.

General Ruben Cubero, Dean of the Faculty
United States Air Force Academy
Novak et al., 1999, Just-in-Time Teaching

The On-Ramps Project provides quick-start guides for faculty interested in incorporating successful and easily implemented teaching strategies to improve student learning in the broad field of tectonics. The Project was funded by NSF grant EAR1841227 and grew out of a recommendation in the 2018 community vision document Challenges and Opportunities for Research in Tectonics.

Why On-Ramps in Tectonics?

- In 2018, the tectonics community presented a vision document to the National Science Foundation on the challenges and opportunities for research in tectonics. In the section on achieving the vision, the document points toward the need to recruit and educate a diverse and rigorously trained work force.
- The vision document recommends facilitating practical implementation of best practices in geoscience education and suggests development of a tectonics educator's onramp.
- Our project owes its inspiration to this report and to a request from lead authors Kate Huntington and Keith Klepeis to spearhead the first phase of development.



Writing and disseminating the On-Ramps

- In April of 2019, an international team of passionate educators from across the spectrum of the broad field of tectonics gathered at Wesleyan University for an NSF-funded writing soirée.
- Over the course of three days, we wrote the initial eight On-Ramps. Members of the writing team will continue to be involved in developing additional On-Ramps, and we hope that faculty in other areas of the geosciences will take the idea and develop On-Ramps in their own fields as well.
- We chose a dual format for the On-Ramps – both pdfs and web pages – to broaden the reach.
- On-Ramps will reside on the website Teach the Earth, managed by the National Association of Geoscience Teachers, and will be linked to from a variety of other web sites. If you would like to help disseminate the On-Ramps via your web site or program, please contact one of the project leads (see footer).

Standing from left to right: Anne Egger *(Central Washington University)*, Sean Fox *(SERC, Carleton College)*, Kim Blisniuk *(San Jose State University)*, Sara Mana *(Salem State University)*, Barbara Tewksbury *(Hamilton College)*, Phillip Resor *(Wesleyan University)*, Cailey Condit *(University of Washington)*, Christine Regalla *(Boston University)*, Kendra Murray *(Idaho State University)*, Beth Pratt-Sitaula *(UNAVCO)*, Jennifer Wenner *(University of Wisconsin, Oshkosh)*, and Kyle Fredrick *(California University of Pennsylvania)*.

And participating remotely: Carolyn Tewksbury-Christle *(ETH Zürich)* and Jamie Kirkpatrick *(McGill University)*.

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