

IRIS Summer Internships and Other Workforce Training Opportunities



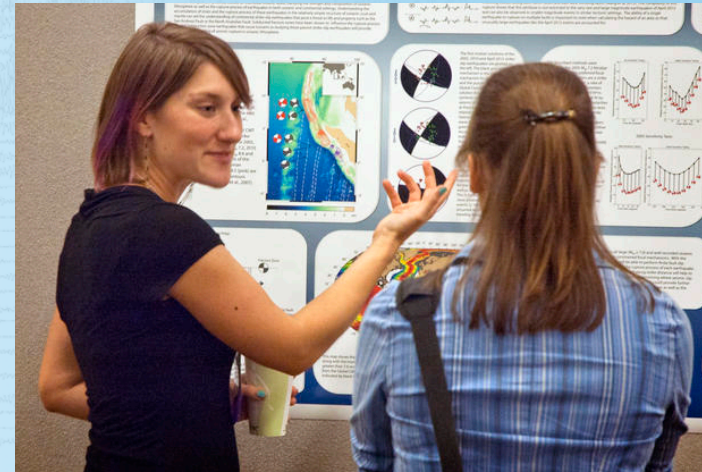
John Taber

Director of Education and Public Outreach

Facilitate – Collaborate – Educate

Overview

- Demographics
- IRIS Education and Outreach Program
- Undergraduate internships
- Graduate training
- Opportunities for collaboration



Geoscience job attrition, growth and replacement in the next 10 years in the U.S.

262,627 geoscience jobs today

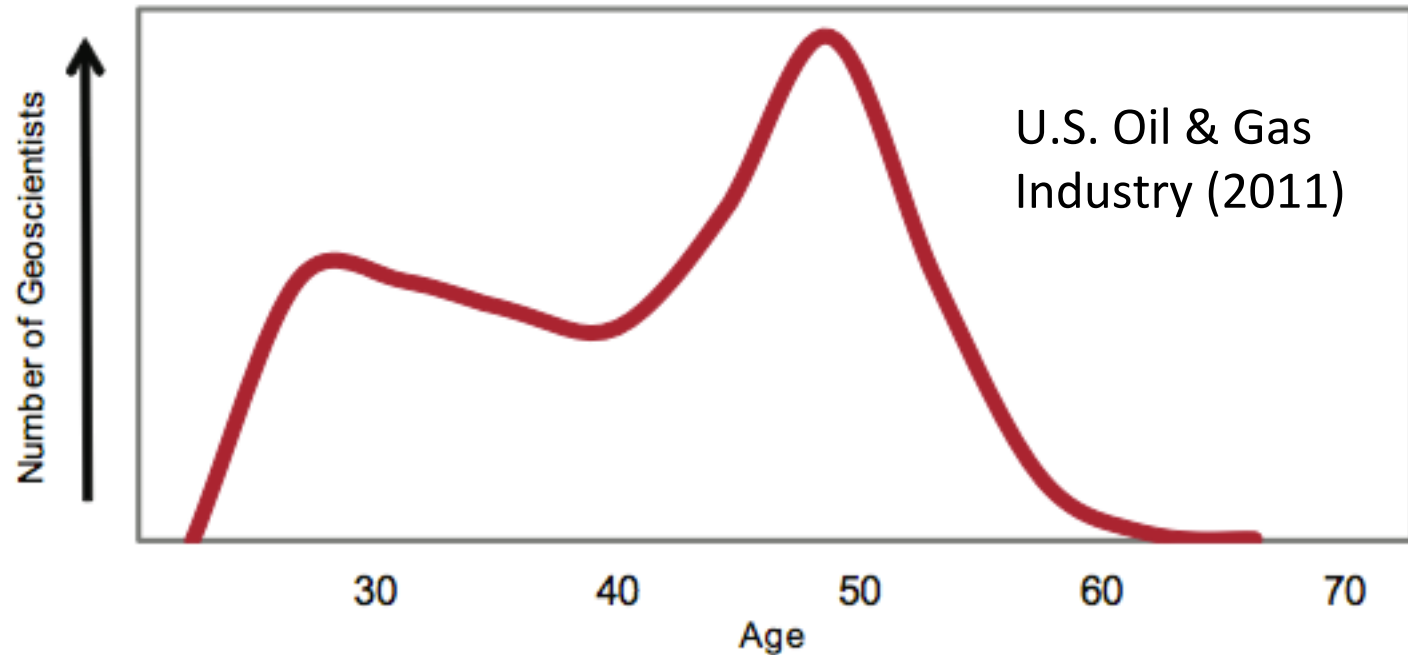
Geoscience Grads

130,000 geoscientists

72,000 geoscientists

15,000 total geoscientists

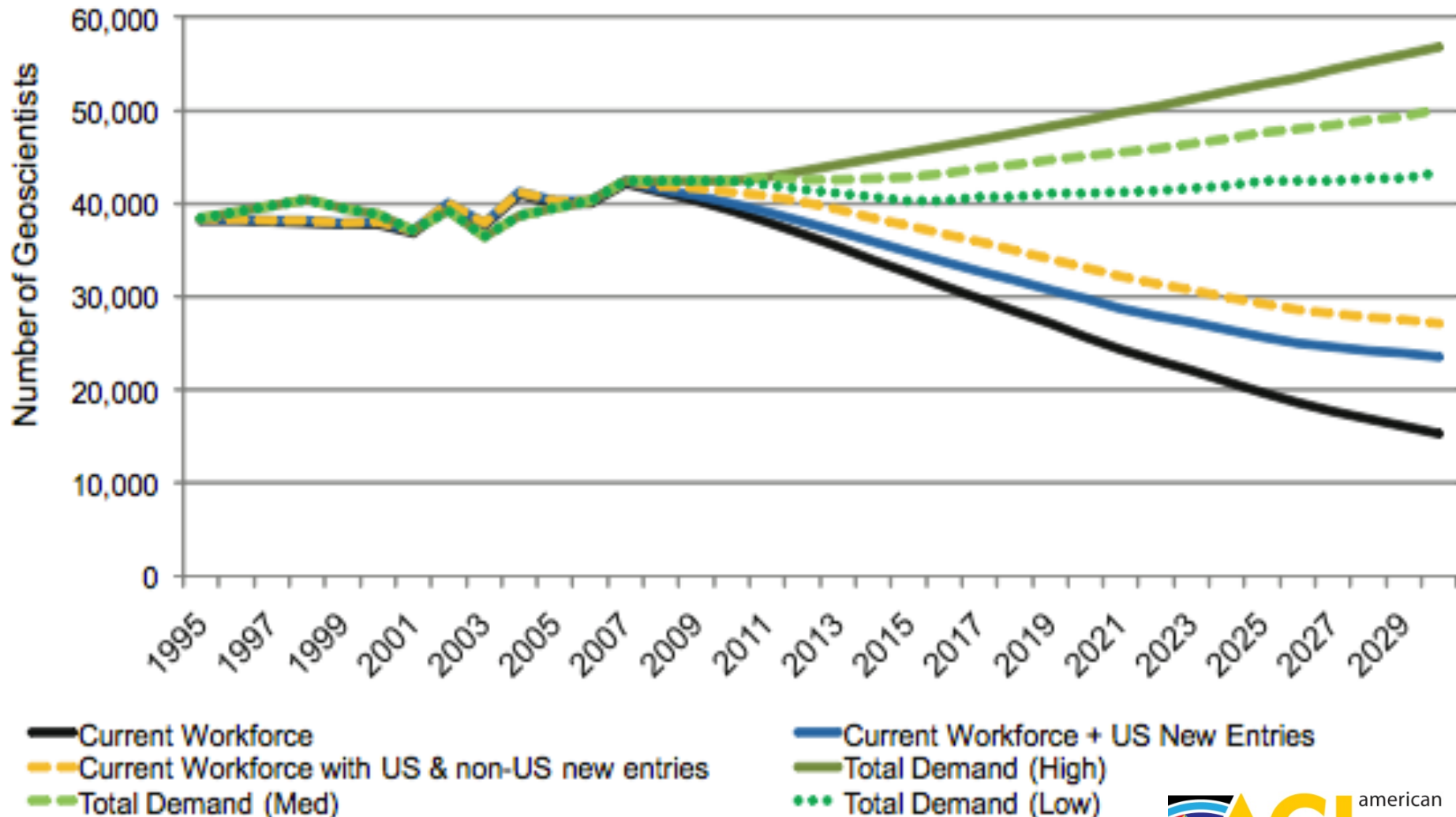
45,000 total geoscientists



Source: AGI Geoscience Workforce Program

Net deficit of over **150,000** geoscientists by 2021

U.S.-based oil & gas employers



Source: AGI Geoscience Workforce Program

IRIS Education and Outreach Program

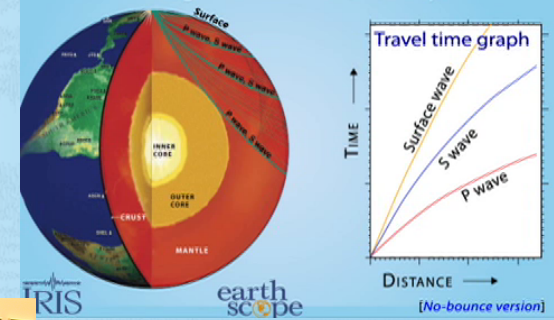
- Promote awareness and understanding of seismology and geoscience for broad audiences
 - Real time earthquake information in understandable formats for millions of users
 - Seismic Monitor
 - IRIS Earthquake Browser/3D visualizer
 - Museum displays
 - Educational resources for K12 through graduate faculty
- Provide training opportunities for the next generation of geoscientists
 - Internships and long-term mentoring of students and early career faculty
 - EarthScope Transportable Array student siting
 - 135 students, primarily undergraduates, from 50 institutions

Public Outreach and Formal Education

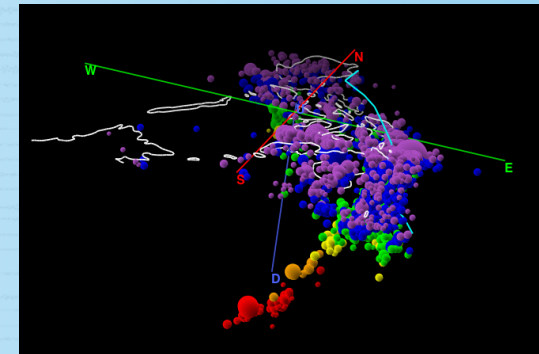
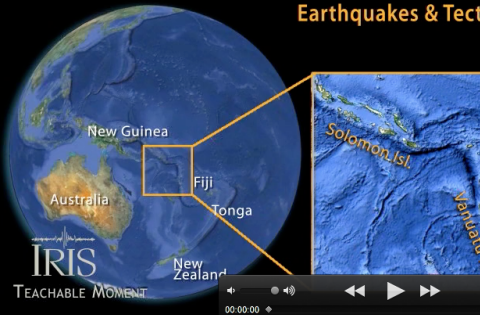


Where do the travel time curves come from?

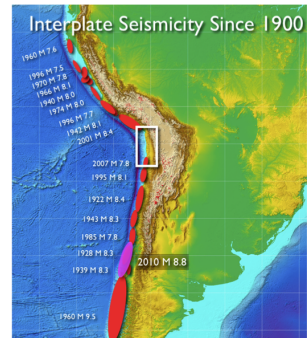
Simple model using *direct* P and S wave through the mantle & crust only



Solomon & Vanuatu Island Chains Earthquakes & Tectonics



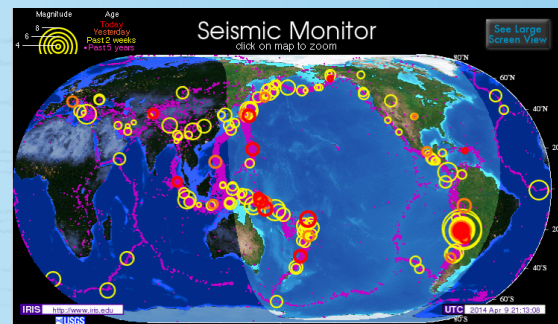
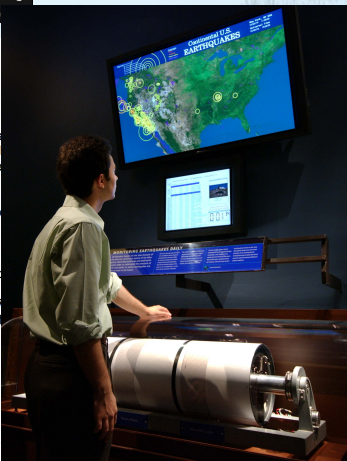
Magnitude 8.2 NORTHWEST OF IQUIQUE, CHILE Tuesday, April 1, 2014 at 23:46:46 UTC



This figure, made prior to this earthquake, shows the approximate locations of megathrust earthquake events along the boundary between the Nazca and South American plates since 1900, based on a compilation from many sources by Matt Pritchard and Richard Allmendinger of Cornell.

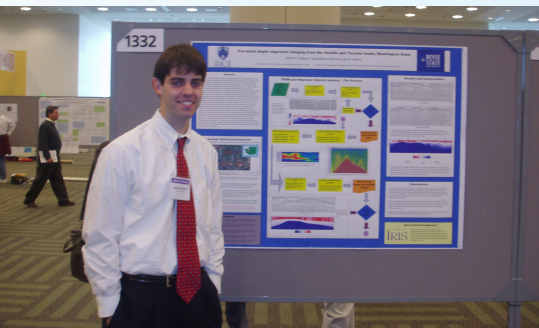
The white box highlights the *liquic gap*, which had not had a major megathrust earthquake since 1871 and thus had a high probability of rupturing.

Image courtesy Richard Allmendinger



IRIS undergraduate internship program

- Virtual Research Experiences for Undergraduates (REU) site
- 9-11 week summer program
- Students meet for 1-week orientation program
 - Seismology instruction and cohort building
- Spend summer conducting research under guidance of seismologists throughout the US
- Stay in touch with other interns via blogs, webinars, Facebook, interactions with Alumni mentor
- Present research at Fall AGU meeting and meet at intern alumni reception



Facilitate – Collaborate – Educate



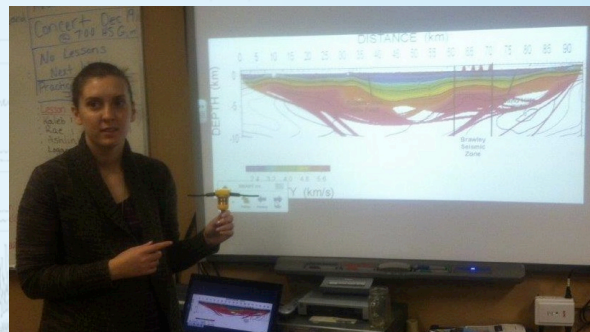
IRIS undergraduate internship program

- Highly competitive
 - This year: 82 qualified applications for 13 positions
 - 2 semesters of physics and math, 3.0 GPA
 - Most have completed their junior year
 - Students are provided with a choice of projects, from a set of submitted PI proposals
- Focus on developing relationships with HBCUs
 - Alumni minority lecture series



Undergraduate internship results

- 144 students in the past 16 years, mentored by 68 faculty members from 51 institutions
- 90% go on to graduate school and/or geoscience career
- Long term commitment
 - Former interns now hosting their own interns
 - 8th grade science project using IRIS school seismograph
 - Became IRIS intern
 - Now a geophysics grad student



Undergrad internship potential collaborations

- Apply to be a research mentor
 - Project needs to include an open data set that can be presented at AGU
- Provide funding for 1 or more students
 - We can accommodate more students than funded through our REU award



Facilitate – Collaborate – Educate



Undergraduate classroom education



- IRIS is creating, collecting, and disseminating labs and exercises for intro and upper level earth science courses
- Opportunity to distribute industry-focused modules
- Potential for training courses for seismology faculty who want to teach reflection seismology processing and interpretation

Potential Masters-level internship

- Many companies have internal MS internship programs
- An IRIS program could provide access to a larger and more diverse audience
- Could have similar structure to existing undergraduate program
 - IRIS recruits and assesses the applications
 - Industry provides the research topics and mentors
- Advantages for students
 - Gain valuable work experience
 - Learn about industry opportunities
 - Applying for an industry job after an internship shows continued interest in the field

Field experiences for students

- Many students are interested in field work
 - Hard to find opportunities if not at a research institution
- Researchers often need field assistants for projects
- Online database service planned
 - Similar to job site
 - Pis will submit projects, students will submit CVs
- Give students a taste of geophysics
- Engage students earlier in their careers
 - Two Year College students
- Encourage participation from other fields
 - Recent HBCU physics student now a geophysics graduate student



Graduate and professional training


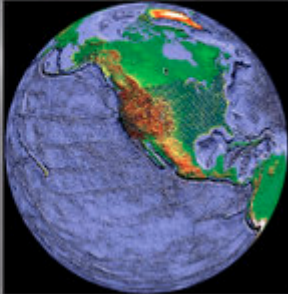
- USArray data processing short courses
 - Taught at 2 different levels
 - Incoming graduate students
 - Basic data access and processing techniques
 - Advanced graduate student and early career level
 - Goal is for students to develop new processing techniques
 - Opportunity to present industry techniques to senior grad students
- IRIS webinar series
 - Research and technical presentations
 - Up to 100 live viewers and hundreds of offline views
 - Industry research presentations welcomed



Seismic tomography and interferometry:
from shallow to deep

Fan-Chi Lin
Seismological Laboratory
Caltech

April 24, 2013
IRIS Webinar




ANTELOPE AND SAC

An overview and short tutorial from
a user's perspective

Heather DeShon
Southern Methodist University

IRIS Webinar
October 3, 2012

Facilitate - Collaborate -



Conclusions

- Changing demographics requires fostering future workforce
- IRIS Consortium reaches a broad audience through member institutions and collaborations with other organizations
- Numerous potential education/training collaborations between IRIS and industry
 - Undergraduate internships
 - Undergraduate curriculum dissemination
 - Graduate short courses
 - Webinars
 - Masters internships
 - Faculty professional development

