Geoscience COVID-19 Impacts Study

Impacts of COVID-19 on the Geoscience Enterprise: How Permanent Will Academic Program and Workforce Changes Be?

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American Geosciences Institute
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Rationale

• COVID-19 pandemic - unique event that required rapid structural changes to the geosciences
• Assess short-term and long-term impacts of pandemic
• Establish a baseline of pre- and post-COVID-19 workplace and instructional environments
• Assess the magnitude and permanency of changes to workplace and instructional environments
• Inform response and recovery planning for future disasters and disruptions to work and instructional environments
Survey Cohorts & Pathways

- Participant Consent
  - Employer
  - Academic Dept
  - Academic faculty
  - K-12 faculty
  - Student
  - Post-doctoral fellow
  - Non-academic geoscientist
  - Unemployed
  - Retired

- Benchmark (Feb 2020)
  - Employer
  - Academic Dept
  - Individual

- Next Update
  - Employer
  - Academic Dept
  - Individual
<table>
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<th>Data Type</th>
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<th>Benchmark</th>
<th>Next Update</th>
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<td>Employment / Enrollment Status</td>
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<td>Retiree Activities</td>
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Survey Design

Multi-cohort longitudinal survey

Continuous onboarding
May 2020 – Jan 2022

Participants are not required to answer every survey

Survey sent every 2 weeks
Survey participation by major cohort

Participants by major cohort

<table>
<thead>
<tr>
<th>Participants</th>
<th>Academic Departments</th>
<th>Geoscience Employers</th>
<th>Individuals</th>
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<tbody>
<tr>
<td>Total number of participants</td>
<td>94</td>
<td>112</td>
<td>1,563</td>
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<tr>
<td>Active participants</td>
<td>83</td>
<td>92</td>
<td>1,314</td>
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</table>
Response rates

Chained response rate (CRR)

CRR = AP / C

AP: Number of active participants
C: Total number of consent surveys

Chained response rates per major cohort

- Academic Departments: 88%
- Geoscience Employers: 82%
- Individuals: 84%
Employers

Representation similar to federal data on major geoscience employment sectors

Over-representation in non-profit sector (i.e., other services except public administration).

AGI promoted the study to its member societies, all of which are non-profits, so the over-representation is not unexpected.
Employers

Geographic coverage includes 34 states and Puerto Rico (not shown on map).

Still collecting data on employer size (i.e., number of employees). Currently only 19% of employers have provided data.
Departments

Approximately 1/3 in each major classification category.

Baccalaureate / Associates: 34%
Master’s Colleges: 32%
Doctoral Universities: 34%
Departments

Similar representation
HSI (Hispanic Serving Institutions)

Under-representation
HBCU (Historically Black Colleges & Universities)
AANAPISI (Asian American Native American Pacific Islander-Serving Institutions)
NASNTI (Native American-Serving Non-Tribal Institutions)
ANNH (Alaska Native / Native Hawaiian Serving Institutions)

No representation (Study and DGD)
TCU (Tribal Colleges and Universities)
PBI (Predominantly Black Institutions)
Departments

Geographic coverage includes 35 states.
Individuals

Good representation among non-academic geoscientists and university/college faculty.

Low participation from post-doc cohort.
Individuals

Most non-academic geoscientists working in core geoscience occupations (91%).

Those in non-core occupations:
1. Are usually using their geoscience knowledge and skills in the job
2. Are working within the profession in a non-core occupation.
Individuals

Representation across employment sectors of non-academic geoscientists

Over-representation
Public Administration (state government)
Educational services (post-secondary staff)
Other services (non-profits)

Under-representation
Professional, scientific, technical services
Admin, support, and waste management
Management of companies and enterprises
Manufacturing
Individuals

Relatively even distribution across age groups that tracks occupational categories.

Participants by occupational category at time of survey consent:
- Academic faculty: 25%
- Students: 14%
- Post-doctoral fellows: 2%
- Unemployed: 5%
- Retired geoscientists: 11%
- Non-academic geoscientists: 38%
- K-12 faculty: 5%

Age of survey participants:
- 70+ yr: 10%
- 60-69 yr: 21%
- 50-59 yr: 15%
- 40-49 yr: 17%
- 30-39 yr: 17%
- 25-29 yr: 10%
- 18-24 yr: 8%
- Unknown: 3%
Individuals

National data on participation of women

2019 geoscience enrollments (AGI):
46% undergraduate, 44% graduate

2019 geoscience degrees conferred (AGI):
46% Bachelor’s and Master’s, 40% Doctorates

33% Environmental scientists and geoscientists
   - rate of increase in participation in occupation is outpacing other broad S&E categories.

2019 population data (U.S. Census Bureau):
50% working population (18 – 64 yr)
Individuals

National data on underrepresented minority participation

2019 geoscience degrees (IPEDS)
Bachelors: 12% Hispanic, 3% Black / African American
Masters: 7% Hispanic, 3% Black / African American
Doctorate: 5% Hispanic, 2% Black / African American

Environmental scientists and geoscientists
12% Hispanic, 5% Black / African American

2019 population data (U.S. Census Bureau)
Working population (18 – 64 yr)
19% Hispanic, 14% Black or African American

Native American and Pacific Islander comprise < 1% of degrees and occupational representation
Individuals

Survey analysis is only performed on data from U.S. citizens, permanent residents, or non-permanent residents.

Unknown category is those participants whose status for inclusion in the survey is still under determination, but cannot be definitively excluded from the analyses.
What we’ve learned so far...

• How have business and department operations changed?
• How have workplace / instructional modes changed?
• Where are we now relative to last year?
• What are the top concerns going forward?
Since November, financial performance is recovering.

Just over 1/3 of employers reported receiving financial assistance between June and August 2020, primarily from federal aid (i.e., PPP, EIDL, SBALF, etc.).
Employers: Operations

Equal to higher work-to-capacity ratio reported by ~60-75% of companies.

Overall, ~1/3 of companies reporting less work than capacity throughout pandemic period.

Related influences
PPP job protection restrictions end in 2020

Level of work relative to capacity

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<tr>
<td>12%</td>
<td>59%</td>
<td>33%</td>
<td>31%</td>
<td>38%</td>
<td>37%</td>
<td>35%</td>
<td>36%</td>
<td>28%</td>
<td>26%</td>
<td>16%</td>
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<tr>
<td>29%</td>
<td>33%</td>
<td>33%</td>
<td>28%</td>
<td>37%</td>
<td>35%</td>
<td>28%</td>
<td>28%</td>
<td>48%</td>
<td>26%</td>
<td>37%</td>
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Employers: Operations

General trends point to recovery in progress.

- Termination / amendment of contracts generally down from Summer 2020.
- Supply chain disruptions and contractor availability issues improving.
- Facility access restrictions easing, with increasing trend since Sept 2020.
- Reporting of no impacts up since June 2020 (except March 2021).
- Furloughs down, but layoffs reported by ~10% of employers.
Employers: Staffing

Expectations for permanent and temporary / contract staffing nearing pre-pandemic levels.

Lingering expectations for decreased staffing which are higher than pre-pandemic levels (more so for permanent staffing than temporary / contract staffing).
Employers

Shift to increase in telework and part-time in-office work.

Declines in full-time office attendance.

Increased lab, field, and client sites/remote office attendance.
Employers

October hiring echoes trends in recent geoscience graduates gaining employment at the same time.

30%-40% of employers are seeking geoscience talent.

20%-30% of employers have hired geoscience talent.
Employers

Declines across the board for concerns moderately to extremely driven by COVID-19.

Workplace safety still top concern.
Employers - What we’ve learned so far...

Business operations
• Financial performance and productivity are improving.
• Business impacts lessening overall.
• Some layoffs and furloughs still occurring.
• Expectations for permanent and temporary / contract staffing nearing pre-pandemic levels.
Employers - What we’ve learned so far...

Workplace environments and staffing
• Permanent telework and limited in-office attendance continue as primary work modalities.
• More employees in the lab, field, and at client sites / remote offices.
• Increase in employees not on travel or in the field due to personal decisions and organizational policies.
• 30%-40% of employers are seeking geoscience talent.
• 20%-30% of employers have hired geoscience talent.
Dept Operations

Budget cuts less severe than expected for most departments.

~1/3 of departments reported no budget cuts.

16% of departments reported cuts worse than expected.
Dept Operations

Staffing impacts primarily occurred in Summer 2020.

Most impacts centered on reduced hours and furloughs of staff and non-tenured faculty.

Current impacts:
• hiring freezes
• reduced hours (staff and non-tenured faculty)
• layoffs (staff)
• termination of summer contracts
~50% of departments changed promotion and tenure guidelines.

Most common change was extension of promotion clock by one year. In most departments, faculty were required to request the extension.

13% of faculty opted to take advantage of the changes to guidelines.
Dept Operations

Increase in departments with active faculty searches since November.

Departments with active faculty searches

<table>
<thead>
<tr>
<th>Month 2021</th>
<th>Percentage</th>
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<tr>
<td>Jan</td>
<td>48%</td>
</tr>
<tr>
<td>Feb</td>
<td>40%</td>
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<tr>
<td>Mar</td>
<td>33%</td>
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<tr>
<td>Nov 2020</td>
<td>29%</td>
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<td>Dec 2020</td>
<td>22%</td>
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<tr>
<td>Oct 2020</td>
<td>18%</td>
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<tr>
<td>Sep 2020</td>
<td>23%</td>
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<tr>
<td>Aug 2020</td>
<td>12%</td>
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<td>Jul 2020</td>
<td>11%</td>
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<td>Jun 2020</td>
<td>15%</td>
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<td>Spring 2020</td>
<td>13%</td>
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Enrollments generally down at institutions but similar to or higher than last year for geoscience courses.
Dept Operations

Increasing expectations to open as normal for the Summer and Fall 2021 terms.
Instructional Formats

Course instructional formats are still predominantly online.

Some downward trending since December and January for online and hybrid formats.
Instructional Formats

Lab sections continue as mix of virtual, in-person, and at-home activities.

Are virtual labs here to stay?
Not as replacements for in-person lab sections / courses. Plans for incorporation into existing courses as supplemental material.

Changes to lab section / course formats
Spring 2020 term

- Continued as virtual/at-home activities: 93%
- Continued as computational approaches: 31%
- No change: 5%
- Terminated with then-current grade or pass/fail: 4%

Lab section / course formats
Instructional Formats

Field instruction a mix of virtual and local instruction, often self-guided local fieldwork.

Recent uptick in cancellation or lack of field instruction offerings.

Are virtual field experiences here to stay? Not as replacements, but plans for use in courses as supplemental activities.

Changes to field instruction, Spring 2020

<table>
<thead>
<tr>
<th>Academic Departments</th>
<th>61%</th>
<th>9%</th>
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<td>Changed to virtual experience</td>
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<tr>
<td>Changed to local area activities</td>
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<tr>
<td>Cancelled with waiver of credit requirement</td>
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<tr>
<td>Cancelled with students needing credit later</td>
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<tr>
<td>No impact</td>
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Field instruction format

Academic Departments

- Virtual
- Local
- Remote
- Cancelled or not offered

Graph showing changes in field instruction format from June 2020 to March 2021.
Departments - What we’ve learned so far...

• Budget cuts were less severe than expected
• Most staffing impacts occurred in Summer 2020
• Recent staffing impacts minimal, but center on hiring freezes and impacts to staff and non-tenured faculty.
• Increase in faculty searches through Fall 2021
• Looking ahead to opening up as normal in Summer/ Fall terms this year
• Concerns center on staffing and student retention/enrollments
Departments - What we’ve learned so far...

• Promotion clock extensions by half of departments, with most requiring opt-in by faculty.

• About half of departments report faculty are on travel or in the field in limited locations.

• Instruction still predominantly online, with some in-person components

• Enrollments up in departments, and down at institutions. Department trend may be due to class caps / smaller classes.
Individuals – Work environments

Over half of participants report that working at the office either not necessary or only slightly necessary.
Individuals – Work environments

Students more likely to be using a shared workspace with others than faculty or non-academic geoscientists.
Individuals – Work environments

Non-academic geoscientists more productive with collaboration and with meetings.

Faculty very productive with teaching activities.

Students least productive with focus, research, study time, and collaborative activities.
Individuals – Work environments

Challenges

• Work-from-home environment is not always ideal (technology, distractions, etc.)
• Increased teaching workloads for multiple instructional formats
• Facility restrictions impeding research and work
• Students needing more attention
• Lack of informal discussions, networking, and business prospecting
• Difficulty with supervising employees
• Online meeting fatigue
Individuals – Work environments

Benefits

• Less commute time and less cost
• More time to focus on research, work, writing
• Increased access to conferences and meetings
• Increased international collaboration
• Increased productivity
Employment status

Over 90% of working participants remained employed.

Over 90% of students either remained in school or gained employment.

Post-docs and students had highest rates unemployment (8%), followed by non-academic geoscientists (3%).

Those that remained unemployed comprise 2% of all study participants.

Unemployed individuals are predominantly seeking work within the geosciences.
Students - Enrollment intention

Most students plan to return full-time.

Those returning part-time are usually in the last part of their graduate studies.
Facility access

Increase in reduced staffing at facilities.

Field activities and lab activities deferred more by academic faculty than by non-academic geoscientists.

Majority of facilities still have access restrictions.
Health & safety

Health & safety restrictions relatively steady for non-academic geoscientists. Increased protocols for academic faculty for COVID-19 testing and use of facemasks outside.
Meetings & travel

Meeting and travel restrictions relatively steady.

Travel restrictions are easing, but limitations still exist.

Increase in isolation before departure for academic faculty.

Other restrictions often mention include vehicle usage.
Concerns

Overall, COVID-19 driven concerns easing, or at least not increasing.

Workplace safety is a top concern.
Concerns

Top concerns for post-docs and students: employment opportunities and workplace safety.

Post-docs – increase in concerns over employment opportunities.
Concerns

Workplace safety still top concern.

Non-academic geoscientists
Declines in concerns over employment
Increases in concerns over education
Individuals - What we’ve learned so far...

• Over 90% of study participants remained employed or in school or gained employment during this period.
• 5% of study participants became or remained unemployed.
• Students planning to return full-time for next academic term.
Individuals - What we’ve learned so far...

- Primary work locations are at home for most individuals, with increasing amounts of splitting time between home and employer facilities.
- No major changes in how work and research activities are being conducted.
- High proficiency on virtual platforms across all cohorts
Individuals - What we’ve learned so far...

• Most participants report not needing to be at the office to do their jobs.

• Biggest drawbacks to virtual work - lack of informal in-person communication

• Work-at-home set up is very important for successful remote working and learning experiences.
Individuals - What we’ve learned so far...

- Work and research restrictions still in place, no signs of easing.
- Top concerns are still workplace safety for all cohorts
- Academic faculty and non-academic geoscientists also concerned about educational programming.
- Post-docs and students also concerned about employment opportunities.
Looking ahead

• Study has been extended through March 2022
• New round of study recruitment to increase participation
  • Employers – environmental services
  • Departments – more departments in MSIs
  • Individuals – more students, early-career geoscientists, post-docs, environmental services sector, improved engagement with diverse populations
• Continue bi-monthly surveys of all cohorts
• Intensify surveying of students and recent graduates to assess “lost year” impacts
Looking ahead

• Monthly data briefs
• Data brief primary focus will be on departments, faculty, students, and recent graduates
• Employment briefs will focus on hiring, business operations, and workplace policies
Looking ahead

Questions to explore:

• How have work and instructional environments changed permanently?
  • Incorporation of virtual teaching/learning modes?
  • Higher percentages of employees working remotely?
  • Changes in hiring and onboarding of employees?

• Has there been a skills/knowledge gap from the pandemic period on students and graduates?
  • Impacts to academic achievement and progress, career trajectories
  • Strategies being implemented by departments and employers to address these impacts
Questions?
Additional Data
Employers: Staffing

Since November, increasing percentage of employees not on travel or in the field due to personal decision and institutional policies.
Employers

Permanent telework and limited in-office attendance continue as the primary work modalities.

Fieldwork and lab access improved since June 2020.
Employers - What we’ve learned so far...

Concerns

• Concerns moderately to extremely driven by COVID-19 are decreasing.

• Workplace safety, however, is still top concern for over half of employers.
40%-50% of faculty are on travel or in the field in limited locations.

Lack of travel and field activities primarily driven by institutional / personal decisions.
Increasing concerns about staffing and ability to hire new employees and retain students.

Decline in concerns about workplace safety and the ability to shift to new methods of instruction.