



University of Colorado **Boulder**

2017 Program Review

Department of Atmospheric and
Oceanic Sciences

Academic Review and Planning
Advisory Committee Report

Approved

A handwritten signature in black ink, appearing to read "Paul Ward".

04/18/2018

Provost and Executive Vice Chancellor for Academic Affairs: Date

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Process Overview

This review of the Department of Atmospheric and Oceanic Sciences (ATOC) was completed in accordance with the 2017 review guidelines. The Academic Review and Planning Advisory Committee (ARPAC) conducts and writes the final reviews of all Boulder campus academic units. The unit prepared a self-study during 2016, which was checked in January 2017 by an internal review committee of two CU Boulder faculty members from outside of ATOC. The internal reviewers found the report accurate and concurred with many of the self-study's concerns. An external review committee, consisting of two experts within the discipline from outside the University of Colorado, visited the unit over April 3-4, 2017, reviewed relevant documents, and met with faculty, students, staff, and university administrators. The internal and external reviewers' comments and recommendations are cited at appropriate points throughout the report. This public document reflects the assessment of and recommendations for the Department of Atmospheric and Oceanic Sciences as approved by ARPAC.

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Unit Overview

The campus's standardized description of the unit may be found on the website of the Office of Data Analytics (ODA) at <https://www.colorado.edu/oda/institutional-research/institutional-level-data/information-department/academic-review-and-planning>. ODA updates the profile annually in the fall semester. This report cites the ODA data for ATOC posted in October 2017, reflecting the state of the department as of academic year (AY) 2016-17. Other data supplied by the self-study are cited where relevant.

ATOC is a leading campus unit with an outstanding research profile and reputation. The unit launched a new undergraduate major in AY 2016-17 which today has eight majors and 64 minors. Fifty-two graduate students are enrolled in ATOC. Over AY 2016-17, ATOC generated 8,147 undergraduate student credit hours (SCH), sixth of the six units in this review cycle. The department does a great deal of service teaching; in AY 2016-17, 98% of ATOC's SCH involved non-majors. ATOC plans to hire more tenured and tenure-track faculty in line with the new undergraduate major. Another recent change involves the department's move to East Campus. The move counts as a success and gains the unit new, high-quality consolidated facilities but it also raises pressing questions about transportation for students, faculty, and staff with obligations on both campuses. The unit's five-year plan is to continue to expand the undergraduate major; build the unit's international reputation and research program, including lab and industry collaborations; and to maintain a positive graduate student climate. Overall, the department is on track to do these things.

Personnel and Governance

According to the ATOC self-study, the department counts fourteen tenured and tenure-track faculty among its personnel (including five full professors, five associate professors, and four assistant professors), as well as two instructors, one

professional adjoint, three lecturers, one research professor, two senior research associates, seven research associates, four professional research assistants, and twelve teaching assistants (TAs) and graduate part-time instructors (GPTIs). Another assistant professor joined the department in fall 2017, bringing the number of tenured and tenure-track faculty to fifteen. Ten of the fourteen tenured and tenure-track faculty are associated with institutes, including the Cooperative Institute for Research in Environmental Sciences (CIRES), the Institute of Arctic and Alpine Research (INSTAAR), the Laboratory for Atmospheric and Space Physics (LASP), and the Renewable and Sustainable Energy Institute (RASEI). Of the tenured and tenure-track faculty, six have College of Arts and Sciences appointments, five institute appointments, and four appointments split equally between the college and an institute. ATOC is aided by a single staff member and two student employees.

The department is led by a chair, elected to a four-year term and provided with one course release. The self-study requests an additional course release and a chair staff assistant. There is also an associate chair, elected to a two-year term. Department governance also includes an executive committee consisting of two members elected to three-year terms, plus the chair and associate chair. The executive committee's responsibilities include all personnel issues, including yearly merit evaluation and salary adjustments. Department governance appears to be entirely in the hands of the chair and the executive committee, while temporary committees are formed for promotion and tenure. The bylaws state that members of the core faculty (assistant, associate, and full professors) are eligible to serve on the executive committee; thus, it appears that pre-tenure assistant professors may serve in this capacity, although this is not made clear. The department has clear descriptions of

processes for merit review, and for promotion and tenure. The merit review guidelines consider the broad range of ATOC research activities. The internal reviewers note that funding requirements for promotion and tenure “are not clear to the junior faculty” and “could be formulated better.”

Other standing committees include student admissions and support, examinations, curriculum, program fees, lab and facilities, space, technology, and student concerns. A graduate student member is invited to serve on each committee.

The unit operates on an annual continuing budget of \$28,000. The self-study requests permission to double this figure. In addition, the self-study suggests more transparency from the College of Arts and Sciences and campus administrators concerning unit costs and expresses a fear that ATOC’s budgetary efficiency is subsidizing other units. Given high facilities and administration (F&A) revenues returned to the department, ATOC’s total funding for AY 2016-17, as cited in the self-study, was \$648,000. The self-study also notes that unit operating expenses for AY 2016-17 were \$194,000, and of that amount, \$109,000 was for administrative office expenses such as graduate and undergraduate student activities, educational software and information technology, office equipment, and so forth.

Office of Data Analytics statistics show that as of AY 2016-17, assistant professor salaries were above the American Association of Universities (AAU) average for cognate units at public universities, associate professor salaries were roughly on par, and full professor salaries were significantly behind. Several ATOC full professors received raises in the campus’s recent non-merit salary exercise.

The self-study describes recent ATOC research successes, including a 2017 ranking by *U.S. News and World Report* of CU Boulder geosciences—a group that includes ATOC—as second in its field. ATOC describes its contribution to this research area as integral to the campus success. ATOC has a range of research foci as befitting its interdisciplinary nature, including in the fields of atmospheric science, oceanic science, cryospheric science, and planetary science. ATOC faculty have an excellent record of external grant success. Office of Data Analytics statistics back this up, showing that in AY 2016-17, grant dollars per ATOC tenured and tenure-track faculty member, after allocation from institutes to the department, ranked the department first among six comparator units (including also APS, Applied Math, Chemistry and Biochemistry, Math, and Physics). The ATOC self-study also notes that since 2010, the year of the last program review, the department’s faculty have secured over \$100 million in external research funds and have published 393 peer-reviewed articles. ODA data ranks ATOC faculty fourth per tenured and tenure-track faculty member of nine units in this review cycle (including the aforementioned departments and also three institutes, CIRES, JILA, and LASP). in conference presentations and papers, and fifth of nine in refereed articles and chapters.

ATOC faculty are associated with Boulder federal research labs, including the National Center for Atmospheric Research (NCAR) and the National Oceanic and Atmospheric Administration (NOAA). The self-study describes faculty members as actively engaged in local outreach, as well as nationally and internationally. That said, the self-study mentions that ATOC finds its East Campus location impedes “collaboration and conversation” with CU Boulder Main Campus colleagues.

The internal reviewers describe the department's climate as productive and cordial. The external reviewers speak of the department's excellent reputation but raise concerns about disparities between regular ATOC faculty and those with institute appointments regarding grant support and management.

Finally, the self-study suggests that more investment, both from the campus and through targeted Office of Advancement fundraising, might help ATOC and its geosciences partners to further their already impressive reputational accomplishments. The department identifies better faculty recruitment and retention, closer research lab ties, more industry partnerships, and better alumni tracking as integral to these ambitions.

Undergraduate Education

ATOC is in its second year of offering an undergraduate major. The University of Colorado Board of Regents approved the degree in June 2016, and the self-study states that as of the end of fall 2016, 18 students had declared themselves majors (although the Office of Data Analytics count for that semester was eight majors). The department would like 100 majors as a near-term goal. As of fall 2016, ODA counted 64 undergraduates as ATOC minors. In the agreement for the new degree, the College of Arts and Sciences agreed to increase investments, including a new program assistant position, a new instructor position, four new TA positions, and two new tenured and tenure-track faculty hires (one for AY 2018-19, and one for AY 2020-21).

As indicated earlier, ATOC delivers a high level of service teaching, with 98% of student credit hours (8,147 in AY 2016-17) delivered to non-majors (ranking ATOC sixth out of 53 degree-granting units). ATOC points to the core curriculum's natural science requirement as the source of this volume. The

unit notes that the department's tenured and tenure-track faculty teach "roughly 35% more student credit hours per faculty member than other units." Office of Data Analytics statistics indicate that ATOC instructors, senior instructors, and lecturers teach high levels of student credit hours, but that tenured and tenure-track faculty are ranked third of six comparator units in the numbers of students they teach. In addition, as of AY 2016-17 the number of students taught per tenured and tenure-track faculty member showed a five-year decline of 29%, whereas it had increased 44% for instructors and senior instructors and 8% for lecturers. The self-study also claims that the fact that only six ATOC faculty have College of Arts and Sciences appointments impacts the tally of tenured and tenure-track faculty student credit hour production.

ATOC is working to establish an annual assessment measure for majors. The self-study reports that the department is already acting on student feedback in establishing smaller learning environments and improved laboratory training. Faculty actively work on issues of curriculum and pedagogy, including the Colorado Learning Assistant Model. ATOC also supports a new undergraduate student group and is running a First Year Seminar Pilot program. Department faculty members are also involved with the Undergraduate Research Opportunity Program (UROP), and some teach online courses.

The internal reviewers express concern with faculty feeling overburdened by work related to the new undergraduate major. The external reviewers confirm stress generated by the new major and the need for the additional faculty and staff support promised by the College of Arts and Sciences. Instructor pay is also a concern for ATOC. The self-study claims that ATOC instructors teach "more than twice as many student credit hours as the instructor average in other units," and that "the

difference between the CU Boulder average and ATOC instructors is more than 1000 student credit hours, or about 350 students per year.” ATOC says that this added workload argues strongly for instructor pay increases.

Graduate Education

The department offers MS and PhD degrees. As of fall 2016 only one student was enrolled in the MS program, and 51 were in the PhD program. The count of 52 graduate students represents a 26% decline over five years. Time to degree is 5.6 semesters for the MS and 11.8 semesters for the PhD.

The unit generated 761 student credit hours in AY 2016-1, sixth out of six comparator units, and a 17% five-year decline. Meanwhile, individual graduate instruction student credit hours have decreased by 29% in the last five years. ATOC tenured and tenure-track faculty teach 93% of graduate-level student credit hours.

Graduate student recruitment and funding count as significant strategic concerns for ATOC. The department requests more TA funding and appointments, as well as dissertation fellowships. The department points to a “challenging federal funding” environment to explain declining graduate student enrollments. The grant funding that students have to rely on after their first year (at which most TAships end) comes with considerable uncertainty and stress.

Office of Data Analytics statistics show roughly 40% of ATOC graduate students are women, 15% have minority status, and 7% are members of underrepresented minorities. International students comprise 15% of the group. The self-study claims success at achieving graduate student diversity. The AY 2015-16 move to the Sustainability, Energy, and Environmental Community (SEEC) building appears to have benefited graduate

student cohesion and the self-study found the overall climate for graduate students is positive. Boulder federal research labs offer ATOC graduate students unique and important opportunities and lab scientists serve as thesis advisors, committee members, and guest lecturers. The department plans to establish an industry advisory board that would offer student advising and internships. In parallel to its annual undergraduate student assessment, ATOC plans to ask graduate students for feedback and to build on efforts already underway to respond to graduate student input. The self-study reports that ATOC MS and PhD graduates “successfully obtain jobs in industry, academia, and national laboratories” but excludes specific student placement details.

In addition to reinforcing the unit’s call for more TA positions, the internal reviewers citing their survey results raise as graduate student concerns questions about East Campus parking and transportation, faculty mentoring quality, and graduate student body diversity. The external reviewers concur on two counts, noting serious issues with parking and commuting, as well as with TA funding.

The 2017 review documents (self-study and internal and external review reports) do not have a consistent message regarding the ATOC graduate student climate. The self-study reveals that ATOC faculty appear surprised at the level of graduate student dissatisfaction expressed by the department’s climate study. The results noted a lack of respect for graduate students from their advisors; a climate of humiliation and intimidation by both other graduate students and faculty; concerns over incivility at both graduate and faculty levels; and the lack of a supportive/cordial environment. Indeed, 29% “disagree” or “strongly disagree” that “there is a positive sense of community in my department,” and 34% “disagree” or

“strongly disagree” with the statement “I feel like a valued member of my department.”

The internal reviewers’ graduate student survey by contrast presents mostly positive results. Graduate students report general satisfaction with courses, electives, program requirements, finding advisors, advising quality, determining a research topic, attending conferences, publishing, financial support, and supplementary resources on campus. Narrative responses to what students would “change or add” to the program, the “best part” of the program, and “concerns” about the program are thoughtful and detailed.

The external reviewers have the impression that ATOC’s graduate students are engaged, happy, and impressed with their internationally competitive work. However, they also report that at least one graduate student they spoke with felt intimidated or humiliated but surmise that this is not representative of the overall graduate student experience.

Space
and
Infrastructure

As already discussed, the department’s recent move to the Sustainability, Energy, and Environmental Community (SEEC) building and associated lab complex (SEEL) has proved a mixed experience. The external reviewers make a note of the quality and amount of SEEC/SEEL space available to ATOC; the unit now has 27,059 net assignable square feet, seventh of the nine units in this review cycle. The move has been a tremendous boon to the unit and has done much to bring its personnel together, but the complexities are considerable, too, including:

- *Teaching resources:* SEEC classrooms have a forty-person limit, which does not work for larger ATOC classes. SEEC also does not have classrooms with required computer

technology, or an Office of Information Technology (OIT)-staffed computer room (such as Eaton Humanities Room 1B35). The self-study identifies a sufficient computer room as ATOC's most pressing need.

- *Bus Service:* Bus service to East Campus ends earlier than do ATOC courses. The self-study requests bus service run until at least 7:30 pm. The self-study also requests better service continuity between the campuses; as is, buses take lengthy pauses.
- *Parking:* Parking costs are an issue for graduate students and visitors and can be an issue for staff members when they need to travel to the main campus for meetings.
- *Federal Labs Shuttle:* ATOC requests shuttle service from SEEC to the National Center for Atmospheric Research (NCAR) and the National Oceanic and Atmospheric Administration (NOAA).
- *Café:* While ATOC personnel appreciate the proximity of a food vendor in SEEC they also hope for more vendors and longer operating hours (the current vendor only operates from 7:30 am until 3:00 pm and not on every work day throughout the year).

Both the internal and the external reviewers echo the department's concerns that distance and a lack of Main and East campus connections pose significant and consequential strategic challenges, including the possibility of losing undergraduate majors. Both review committees also note graduate student concerns with parking and commuting, including the approximate thirty-minute walk time between the two campuses.

The ATOC self-study notes that the East Campus location makes library access difficult, and requests an East Campus satellite branch or, at a minimum, a book drop-off box. The study also notes the expiration in 2018 of Petalibrary and a lack of University Libraries' subscriptions to journals in ATOC's fields.

Inclusive Excellence

ATOC's inclusive excellence planning has five components: professional development workshops for faculty and grad students, the creation of a graduate mentoring program, the creation of a new course on science-community engagements, the creation of a standing committee on inclusive excellence, and "engag[ing] with broader campus efforts" on inclusive excellence.

Office of Data Analytics statistics indicate that as of fall 2016, seven of fourteen tenured and tenure-track faculty members were female, zero were international, two had minority race/ethnicity status, and one was a member of an underrepresented minority. Of the eight undergraduate majors counted by ODA, 88% were female, but none had minority or underrepresented minority status. ATOC's roughly 40% female population among graduate students is better than average.

The internal reviewers note of a lack of ATOC graduate student diversity. The external reviewers likewise note a lack of unit diversity.

Climate

ATOC's self-study asserts an overall positive unit climate but mentions areas of concern. The department administered a climate survey as part of its self-study preparations. While the survey had a low response rate, the responses received indicate a faculty contingent that is more positive about the department than graduate students. Six of thirty-three graduate

student respondents stated that they did not feel respected by their advisors. Survey responses cite intimidation, humiliation, and incivility, as well as complaints about the lack of a friendly/positive sense of community. The self-study's reflection on these results recognizes the need to obtain more data and to effect change on identified issues.

Graduate student narrative responses to the internal reviewers' survey presented thoughtful considerations about climate matters. Two students wrote at length about climate issues for minority students, including concerns about faculty apathy. Relatedly, one student wrote of campus-wide stigmatization of "straight white men" in favor of "traditional minorities." It is clear from this range of responses that the department is in need of attention to climate issues in terms of both program structure (e.g., student recruitment, faculty, etc.) and community training on building a supportive environment for all members, but especially members of minority groups.

Despite the concerns, the internal reviewers call ATOC an "upbeat, collegial" department. The external reviewers likewise refer to the unit as a "collegial, collaborative community." It will be important for ATOC to build on these strengths to address shortcomings as soon as possible.

Past Reviews

ATOC was last reviewed in 2010. At that time, a number of recommendations focused on establishing a unified space for department personnel who at the time were dispersed across nine buildings. ARPAC urged the unit, the college, and campus administrators to “clarify plans for a geosciences building;” happily, this was accomplished. ATOC has also since succeeded in gaining an undergraduate major; another recommendation stemming from that review and again happily fulfilled. Among needs identified in 2010 that carry over to 2017 are for ATOC to develop a clear hiring plan, for increased staff, and for concerns to be resolved relating to how split appointments between departments and institutes create perceived disparities among ATOC faculty with institute appointments and those without. Concerns over junior faculty mentoring raised in the 2010 ARPAC review appear to have been resolved.

Campus Context

While the department serves a relatively small student body, the collaborative and interdisciplinary nature of its research gives ATOC a prominent campus presence. In the time since ATOC's founding in 2005, the department's faculty have developed strong interdisciplinary ties to the Cooperative Institute for Research in Environmental Sciences (CIRES), the Institute of Arctic and Alpine Research (INSTAAR), the Laboratory for Atmospheric and Space Physics (LASP), and the Renewable and Sustainable Energy Institute (RASEI).

Disciplinary Context

As previously noted, the 2017 *U.S. News and World Report* ranking of institutions contributing to geoscience scholarship listed CU Boulder as second nationally. ATOC argues their program is key to this ranking. In addition, given the strength of CU Boulder's geosciences scholar community and the presence of national labs in Boulder, the self-study argues that with investment, CU could rank at the top of its field nationally. The external reviewers concur, citing the productivity and renown of its faculty and the quality the department's graduate students.

Analysis

The 2017 review shows that the Department of Atmospheric and Oceanic Sciences is capable of expanding on its already impressive success in cultivating a productive and collegial research environment. ATOC is in a challenging period of transition with a new undergraduate major. As promises of new faculty, staff, and TA positions materialize, the stresses of this change on the department's personnel should become more manageable. ATOC must continue to evaluate its teaching needs as the major grows, and the college should fully support ATOC on this journey. ARPAC recognizes ATOC's strength and promise, a promise that will only be realized by strong department planning and necessary support from the campus.

As already noted, the department's move to the Sustainability, Energy, and Environmental Community building and associated Lab (SEEC/SEEL) has, for the most part, been positive. Housing all faculty and graduate students in one building has proved a valuable assist to community-building and collaboration. Nonetheless, concerns about facilities and transportation have grown. Pressing worries include a lack of frequent bus service between the Main and East campuses, especially over longer hours, and a lack of supportive parking rules for ATOC staff and faculty who must frequently travel between the two locations to teach or attend meetings. Both the ATOC self-study and the internal and external reviews note these as serious strategic impediments. ATOC also lists a lack of a computer classroom with at least twenty computers staffed by a dedicated technologist as another urgent matter. The department indicates a need to run these machines with specific software and a dedicated link to off-site supercomputers. ARPAC urges college and campus administrators to address these needs without delay.

ATOC appears to be doing many things right and is to be commended for its strong work. ARPAC is concerned, however, that further success will be impeded unless a series of changes occur. First, ATOC requires a plan to address low numbers of underrepresented faculty and graduate students. ARPAC asks the department to attend to these concerns with detailed study and attention. Second, stable funding is an issue in several domains: a low college-approved continuing ATOC operating budget presents ongoing stress, as does the lack of reliable, substantive graduate student support; so too, perceived inequities between institute-appointed faculty and those without such appointments regarding staff support and grant management invite questions of fairness. ATOC also expresses concern about the status of its instructors; they feel that instructor loads are too high and compensation too low. The department's record of excellence and growth plans merit serious consideration and expanded support. As is, ATOC relies mostly on faculty grant awards for funding, and ARPAC agrees that without significant and more stable investment, the department's hard won gains might prove at risk.

Research The success of ATOC faculty members in gaining external grants and publishing and presenting research are noteworthy, as already described. Recent gains in space and research facilities have also helped the unit move its research agenda forward.

The internal reviewers note that ATOC junior faculty receive "considerable" mentoring, an improvement since the last ARPAC review. However, the internal reviewers report continued uncertainty among junior faculty around the evaluation of grants at the time of promotion and tenure.

The external reviewers call for ATOC to pay more attention to “mutually beneficial relations” with institutes, specifically claiming “academic programs should remain under the control of colleges and departments.” This comment appears to be in relation to the external reviewers’ concern with the care needed to maintain a good “balance” between ATOC and the institutes so that the department’s needs are not subsumed under institute priorities.

The external reviewers call on ATOC to develop a concrete hiring plan. Thus far, the department has only articulated a possible range of hiring interests. ARPAC concurs with the external reviewers that a hiring plan should be part of a larger strategic plan that articulates, among other things, the relationship between ATOC and the other geoscience units. The plan could address how these units can collectively move forward.

Undergraduate Education

ARPAC encourages the department to pay close attention to the development of its new major, including taking care that curricular issues, classroom needs, faculty and staffing needs, outcomes assessment, and alumni tracking are addressed. ATOC should also study how to recruit more majors. The department’s large introductory core curriculum courses might present such opportunities, as might encouraging students pursuing the minor to join the major. New courses may also help to attract majors. The self-study suggests the creation of a departmental newsletter; ARPAC concurs that this could draw both alumni and student attention, and there may be other ways to advertise the new degree track. ATOC should also consider whether a bachelor’s/accelerated master’s degree might attract more majors.

The unit should attend to its faculty teaching loads. ARPAC is concerned that a great deal of teaching seems to be covered by lecturers rather than tenured and tenure-track faculty or instructors.

The external reviewers suggest that ATOC advocate for gaining a Main Campus gathering space; something the department could broach with the college. Large classes are taught on the Main Campus, which is usually “home” to many undergraduate students. Securing a Main Campus satellite location could help ATOC to better facilitate a sense of community among faculty, students, and prospective students.

Graduate Education

Since the 2010 review, the department has seen graduate student enrollments decline. ARPAC encourages the department to determine the graduate program’s optimal size and for the college to marshal the financial resources necessary to stabilize enrollments. ARPAC supports the unit’s request for more TA positions, and also encourages the ATOC executive committee to offer graduate students multi-year funding; as is, an offer of a one-year TAship and the uncertain promise of grant funding beyond that year appears too tenuous and uncertain for some students. Given the reasonable average times to degree in ATOC for both MS and PhD students, the college should support department efforts to provide its students stable funding.

The department’s intellectual connections and collaborations with Boulder area national labs and industry are a boon to the graduate program. ARPAC encourages ATOC to continue to think creatively about how these institutions might be sources for funding as well as graduate student training.

Graduate students' climate concerns, including with advisor/advisee relations, need the department's attention and follow-up action. ARPAC wonders whether climate explains any part of the graduate student enrollment decline. The record, including student surveys, suggests that discrimination needs to be addressed beyond what the external reviewers' reported as a single incident. ARPAC also asks that the department continue to improve communication between advisors and advisees, as well as to improve graduate student mentoring, particularly for students seeking non-academic careers.

The self-study does not address the standing of postdoctoral fellows. Such data would better assist ATOC to improve mentoring, set strategic hiring goals, and analyze space needs.

Space
and
Infrastructure

ATOC's recent consolidation in the Sustainability, Energy, and Environmental Community building and its associated lab complex (SEEC/SEEL) suggests a promising future for the department and for the establishment of the East Campus as a co-equal space to the Main Campus. As repeated earlier, the move nets ATOC considerable advantages as it charts its future but it also comes with challenges that the university must recognize as strategically vital and requiring attention. The frustrations that ATOC notes in securing appropriate computing facilities and addressing concerns related to parking and transportation are perhaps indicative of the two-campus challenge about to dawn more fully. ARPAC encourages ATOC and college and campus administrators to find sustainable solutions to these and other logistical considerations that derive from CU Boulder's move east.

Inclusive Excellence

ARPAC urges the department to implement its inclusive excellence plan and to pay ongoing attention to further improvements. While the numbers reported for ATOC female

faculty and students are encouraging, participation in ATOC by members of other historically underrepresented populations remains poor.

Climate While the information in the report on climate has some encouraging news, it also suggests needed improvement. ARPAC endorses the department's self-study conclusion that more data collection needs to occur and more strategies developed for improving climate in dimensions where shortfalls are found.

Recommendations

The members of the Academic Review and Planning Advisory Committee (ARPAC) address the following recommendations to the Department of Atmospheric and Oceanic Sciences, and to the offices of responsible administrators:

- To the Unit:
1. Develop a strategic plan setting forth ATOC's aspirations as an integral contributor to campus efforts in the geosciences. The plan should detail a hiring strategy that looks to collaborations with appropriate institutes, sets hiring goals, and analyzes space needs.
 2. Assess faculty teaching loads to find the appropriate balance among tenured and tenure-track faculty, instructors, graduate students, and lecturers. New tenured and tenure-track faculty proposals will need to show how these additions will contribute to the ATOC teaching mission.
 3. Work with the college to request an additional staff position. Possible duties might include support for faculty grant writing and graduate student support.
 4. Search for ways to foster growth in the new undergraduate major, looking to students who are in large introductory courses or who are pursuing minors as possible recruits. Consider new courses and an accelerated bachelor's/master's degree as means of attracting students. Pursue opportunities for advertising. Link purposeful growth of the undergraduate major to TA positions as funding opportunities for graduate students.

5. Analyze recent graduate student population declines and how these might relate to inadequate funding (as well as climate). Formulate a strategy to address inadequate funding and determine an optimal graduate student body size.
6. Learn from graduate student mentoring practices employed in other units (an example might be found in the Department of Astrophysical and Planetary Sciences). Focus on graduate students' expectations for advisor/advisee communications and career mentoring, including for non-academic careers.
7. Collect information about outcomes and placement for both graduate students and postdoctoral fellows so that the department may improve mentoring. Work with the Office of Data Analytics on this effort.
8. Commit to annual undergraduate and graduate student outcomes assessments and implement a process to review and respond to feedback. Work with the senior vice provost and the quality initiative leader to develop formal mechanisms for articulating learning outcomes and measuring student success.
9. Create a standing committee on inclusive excellence in consultation with ODECE.
10. Work with ODECE to develop a concrete faculty recruitment plan for women and members of underrepresented minorities, using tools such as the Strategic, Targeted, and Accelerated Recruitment (STAR) program and the Chancellor's Postdoctoral Fellowship program. In reporting progress on this recommendation, include the makeup of

the finalist pools for each faculty recruitment. Aim for finalist pools that include multiple diverse candidates.

11. Create a clear plan for recruiting graduate students from underrepresented minorities. Work with ODECE to obtain funding for PhD applicants through the Colorado Diversity Initiative (CDI).
12. Work to address known climate issues, especially regarding graduate students and advisors, and initiate regular assessments of climate for faculty, staff, and students. Consider working with the faculty relations director on a detailed climate analysis.
13. Create a regular communication strategy to reach out to alumni, students, staff, and faculty.
14. Create an external advisory board, with members from government laboratories and industry, to take advantage of local learning, internship, and employment opportunities for undergraduate majors, graduate students, and postdoctoral fellows.
15. Make use of the University Libraries book drop available at INSTAAR.
16. Provide ATOC with the tenured/tenure-track faculty and instructor hires promised as a support for the new undergraduate major. Consider ATOC's claims regarding instructor workload and pay scale.
17. Consider ATOC's proposals for hiring additional tenured and tenure-track faculty, based on a well-argued hiring plan that indicates how new faculty lines will contribute to the

To the Dean of the
College of Arts and
Sciences:

research and teaching mission of the unit and strengthen alliances with cognate units.

18. Consider ATOC's request for an additional staff position. Possible duties might include support for faculty grant writing and graduate student support.
19. Consider ATOC's request for additional TA positions, assuming the undergraduate major continues to grow.
20. Help ATOC solidify graduate student offer packages beyond one-year commitments, given student concerns about uncertain funding.
21. Consider inequities in faculty research support solely in the department versus those with institute appointments, including a campus-wide policy for addressing such inequities.
22. Work with ATOC to determine the department's requirements for computer-enhanced education. Determine the best means to meet ATOC's technological needs.
23. Investigate the financial and programmatic issues associated with allocating faculty positions to institutes rather than via the College of Arts and Sciences. Assist ATOC in working with institutes to minimize problems and maximize benefits. Consider inequities in research support for faculty solely in the department versus those with institute appointments, including a campus-wide policy for addressing such inequities.

To the Dean of the
College of Arts and
Sciences and to the
Provost:

To the Vice Chancellor for
Research and Innovation:

To the Provost: 24. Work with ATOC and Parking and Transportation Services to address visitor and dual-campus parking needs and optimize transportation to and from East Campus.

Required Follow-Up

The chair of the Department of Atmospheric and Oceanic Sciences shall report annually on the first of April for a period of three years following the year of the receipt of this report (i.e., April 1st of 2019, 2020, and 2021) to the dean of the College of Arts and Sciences and to the provost on the implementation of these recommendations. Likewise, the dean shall report annually on the first of May to the provost on the implementation of recommendations addressed to the college. The provost, as part of the review reforms, has agreed to respond annually to all outstanding matters under her/his purview arising from this review year. All official responses will be posted online.