C9. Evaluation Plan. Evaluator **Lang** will systematically assess LEAP's educational programs, building upon scholarship in data science and interdisciplinary education outcomes [110]. Specifically, project-based exploration and discovery evaluation will be guided by the Association of American Colleges and Universities' rubrics on quantitative reasoning, problem solving, and teamwork [111]. This will grow a library of assessment tools and rubrics, as shared resources for the full LEAP community and beyond.

Type	Evaluation Methods for Student Outcomes
Formative Assessment	Feedback during the project on problem setup, methodology choice and the design of validation studies; Observational study of student questions when approaching a new Climate Data Science topic before and after the CUREs experience; peer-reviews of team collaboration.
Short-term Summative	Evaluation of the final product with designed grading rubrics on creating scientific value, presentation, reproducibility, and ethics. An ethics audit will be required as part of the final report.
Long-term Summative	Longitudinal follow-up, observational study on students' willingness to further climate data science study, willingness to apply for internships, participation in the Design Studio, participation in LEAP research.

In addition to the above assessment, LEAP's Executive Committee will semiannually and summatively evaluate convergence outcomes to both determine resource allocation and report to outside partners and stakeholders, most critically the NSF. This summative work is aided by ongoing formative project evaluations conducted by LEAP's subcommittees: the Convergence Subcommittee for research and education (Section F6), and the Knowledge Transfer Subcommittee for corporate, public, and local government engagement (Section F7). Subcommittee members will be trained in both implementation and progress evaluation, including objective definition and evaluation metric development led by **Lang**, who will be responsible for collecting formative assessments and disseminating metrics and objectives.

D. DESCRIPTION OF THE BROADENING PARTICIPATION OBJECTIVES OF THE CENTER.

(**Cogburn**, **Gentine**, **Bell**, **Burbano**, **Camargo**, **Lang**, **McKinley**, **Purdie-Greenaway**, **Revkin**, **T.Zheng**). Geoscience's lack of diversity and inclusion is one of its "*largest cultural problem[s]*" [15], garnering media coverage and handicapping its knowledge transfer capacity [112]. STEM's potential to positively impact our society's most vulnerable is inextricably linked to promoting diverse perspectives in every aspect of climate data science research, education, and knowledge transfer. Thus, "broadening participation" is not *sufficiently* achieved through diversifying talent pools (the "pipeline"); instead, this requires deep cultural and structural solutions [113]. Therefore, Center Director **Gentine** will co-lead LEAP's diversity, equity, and inclusion (DEI) initiatives alongside Chief Equity Officer and Knowledge Transfer Director **Cogburn**. LEAP's broadening participation initiatives set three objectives:

- **DEIO1:** Motivate LEAP's vision, recruitment, research, education, and knowledge transfer efforts;
- **DEIO2:** Increase representation of URMs in the burgeoning climate data science discipline; and
- **DEIO3:** Rigorously assess, review, and revise all LEAP activities through an explicitly DEI lens.

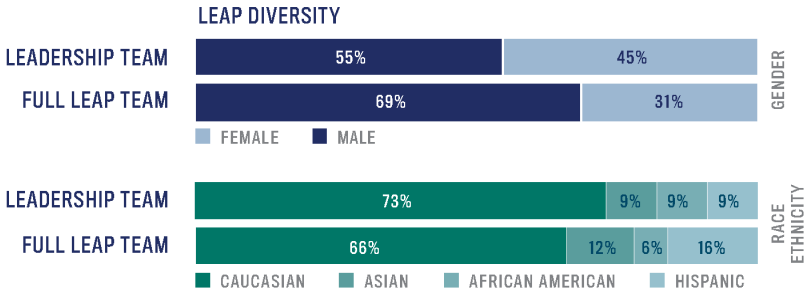

Figure 7: Diversity snapshot of LEAP's leadership and non-leadership teams.

LEAP's faculty team is designed to optimize diversity in gender, race, and ethnicity, reflected in Figure 7; the Center's DEI commitments, defined below, are evident in decisions already made to elevate members of the team into leadership positions. Ensuring a diverse faculty team enables and emboldens LEAP to reach and *exceed* the following broadening participation objectives [114].

D1. A Transdisciplinary Ethic. LEAP will be an experimental testbed for team formation, combining inputs to achieve meaningful equity outcomes, and systematically assessing DEI's causal impact on research, knowledge transfer, and education. This requires training STEM researchers and educators in approaching question and methodology design, data analysis, and communications from an ethical perspective rooted in equity and parity across all racial, ethnic, gender, (dis)ability, and other positionalities.

D2. DEI Strategy, Execution, and Reflection. All LEAP researchers, trainees, and administrators should complete three annual DEI workshops; LEAP will prioritize research seed funding, fellowships, and other support towards recipients who self-report having attended most or all. Due to application anonymization (Section D3), LEAP cannot centrally track DEI workshop participation.

- **Equity Literacy & Visioning.** Paired with LEAP's Ethics Workshop held each August (see Ethics Plan), this Workshop recognizes and re-imagines LEAP's role not *only* in addressing pipeline issues, but in more meaningfully integrating diverse perspectives into climate data science. This workshop will establish and formatively guide LEAP's Center-wide DEI commitments, supporting participants through designing and enhancing equity literacy, developing an understanding of DEI's importance to science's quality and societal utility, and exploring the contributions of structural and social inequities across race, class, gender identity, sexual orientation, (dis)ability, language, and other positionalities.
- **Equity Planning.** Each January, a second workshop will develop short- and long-term strategic plans for integrating DEI principles across all Center policies, procedures, and research, education, and knowledge transfer initiatives. LEAP will develop and critically assess the Center's recruitment and data acquisition, use, and dissemination policies, and its historic and planned future partnerships. This workshop will translate the Equity Literacy & Visioning Workshop's ideas into strategic implementation plans and policy guidelines.
- **Performance Review.** Each June, a third workshop will review the Equity Assessment's findings (see below) and revise corresponding strategic plans. Subsequent workshops will address growth areas identified through the equity assessments (Section D9).

DEIO2: Increasing Minority Representation in Climate Data Science.

D3. Integrating DEI into Recruitment and Engagement. To equitably attract top talent, the Staff Writer and Inclusive Education Assistant Director will integrate LEAP's DEI convictions into trainee recruitment materials, and form a discussion guide provided to faculty involved in recruitment and partnership formation. LEAP will quantitatively evaluate strategy effectiveness across recruitment frames, assessing the effectiveness of job postings with and without an inclusive statement, and with and without exhaustive qualification descriptions [115]. Faculty and administrators supporting personnel hiring will refine their recruitment and hiring objectives through the Literacy & Visioning and Equity Planning workshops.

D4. Candidate Evaluation. Implicit and explicit biases emerge at the delicate job application evaluation stage: by overestimating academic qualifications of candidates from elite institutions, failing to critically determine characteristics and skills needed for the position, and believing that hiring criteria must be remediated to achieve diversity goals [116]. LEAP's candidate evaluation criteria will include a multi-phase hiring process, including: 1) *blinding applicant names and institutional affiliations for all applicants* to LEAP Fellowships, postdoctoral, or REU positions, Design Studio internships, and the research seed funding program; 2) work sample tasks (where applicable); and 3) use of standardized interviews. A randomized field experiment will randomly assign applications to one of three conditions: Control (open and unstructured review); Treatment 1 (single phase: blinded CV/ resumé); or Treatment 2 (multi-phase: blinded CV/ resumé, work sample tasks determined by primary hiring unit, and standardized interviews). Findings will be published in business and psychology journals and academic magazines.

D5. Bridge Program. LEAP will partner with **Columbia**'s Bridge-to-PhD program to increase the participation of students from underrepresented groups in STEM doctoral programs. LEAP will support two cohorts of three Bridge scholars each. These postbacclaureate scholars will spend two years conducting research, taking *Certificate* courses to strengthen their doctoral applications, and receiving a salary and full tuition remission. **Cogburn** and **Purdie-Greenaway** will co-mentor Bridge scholars; Bridge staff will provide professional development and support in graduate school application writing.

D6. SOARS Integration. LEAP will closely collaborate with the **University Corporation for Atmospheric Research** (UCAR)'s *Significant Opportunities in Atmospheric Research and Science* (SOARS), one of the nation's longest-running STEM bridge programs, financially supporting and exposing underrepresented students to climate research and mentorship. Recognizing the importance for SOARS Protégés to spend their first summer conducting research at **NCAR**/ **UCAR**, LEAP will offer ten-week climate data science

summer internships to SOARS Protégés returning for their second year; this internship will be complemented by weekly workshops in professional development and research computing. In Year 1, during LEAP Fellows and postdocs' **NCAR** summer visitations, they will learn SOARS best practices and lead a workshop for perspective SOARS Protégés. In Years 2-5, LEAP Fellows and postdocs will mentor interested SOARS Protégés via monthly teleconferences; evaluator **Lang** will annually review the program. Further, SOARS alumni will be encouraged to attend the biennial AI4Earth conference in New York City with travel and lodging scholarships, and be eligible for reduced tuition for any of the Certificate's four courses.

D7. Hackathons. Partnering with the **National Society of Black Engineers** and the **New York City Office of the Mayor**, in Years 1-3 LEAP will execute a Hackathon for climate data science, rotating across the Center's Knowledge-Data Continuum and hosted by the **Trust for Governors Island**, providing life-relevant learning [117] opportunities highlighting the immediate dangers of sea level rise. LEAP faculty and Fellows will teach pre-hackathon tutorials for prospective participants. Group products will be judged by the Knowledge Transfer Subcommittee and evaluated for their innovation, technical achievement, and potential societal impact. Winning teams will be invited to present at **Microsoft**'s AI4Earth conference.

D8. Outreach and Education Alignment. LEAP will leverage **Columbia**'s Community Benefits Agreement by giving priority consideration to student, postdoc, and administrative applicants living in Harlem, whenever possible and in close collaboration with **Columbia**'s Employment Information Center. LEAP's Knowledge Transfer Subcommittee will utilize this Center's partnerships to recruit a talent pool of diverse backgrounds, life histories, and experience levels.

DEIO3: Formatively Assessing DEI Impact.

D9. Years 1-4: Equity Assessment. **Cogburn** and **Purdie-Greenaway** will annually assess and develop a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of DEI strategy implementation, gathering formative data from in-person surveys, interviews, lab-based ethnography, and the comprehensive review of recruitment, hiring, and inclusive practices. They will build an **Inclusive Science Module**, including training spanning anti-racism/ -bias awareness, the history of race and gender in STEM, implicit bias mitigation, and growth mindset. Positioning LEAP as a testbed for equitable team training and development, this Module will be published open-source to the Center website.

E. DESCRIPTION OF THE KNOWLEDGE TRANSFER OBJECTIVES OF THE CENTER.

(**Cogburn**, **Burbano**, **Revkin**, **Abernathey**, **DeFries**, **Gelman**, **McKinley**, **Lang**, **Rush**, **Uriarte**, **Zanna**).
LEAP's knowledge transfer initiative grows out of and bolsters its broadening participation commitments. Pairing these two seminal STC components – and having **Cogburn** serve the dual role of Chief Equity Officer *and* Knowledge Transfer Director – is essential for LEAP's goal achievement and the sustained impact of all Center-wide initiatives. LEAP's knowledge transfer program sets three objectives:

- **KTO1:** Establish a bidirectional dialogue between academia, industry, non-profits, and the public;
- **KTO2:** Innovate storytelling, visualization, and social media for broad stakeholder intake; and
- **KTO3:** Make all LEAP research open-source and broadly accessible.

KTO1: Bidirectional Communication.

E1. Bidirectional Transfer. The communities most vulnerable to climate change impacts have often the most limited capacity for reporting and absorbing climate news [118]. To provide public, corporate, and policy audiences access to ML-informed climate projections, and to train external audiences in navigating climate data science, LEAP will develop a two-way engagement strategy between academia, organizational stakeholders, and the individual citizenry. Administered by the Knowledge Transfer Program Manager and Staff Writer (Section F2), event programming and social media storytelling will foster mutual awareness and fluency. Initiating this bidirectional flow, in Year 1:

1. The **Council on Foreign Relations**, **Climate Central**, **Climate Matters**, and Public Engagement Director **Revkin** will co-host a workshop reviewing insights in covering climate change for American journalists whose outlets have shrinking capacity to cover climate news;