CRESCENT SEED GRANT PROGRAM 2024-2025
Innovative science for a resilient society
Request for Proposals

In 2023, the National Science Foundation awarded $15 million dollars to establish the Cascadia Region Earthquake Science Center (CRESCENT). This is the nation's first subduction zone earthquake hazards center and is meant to be a nexus for basic and applied research with three overarching goals:

- To develop a better foundational understanding of Cascadia Subduction Zone earthquakes and their associated hazards;
- To promote access to careers in the geosciences and train the next-generation of geoscientists from a diversity of backgrounds;
- To provide a systematic approach to collaboration between researchers in academia and those in agencies or organizations that have mandates to produce hazard information that stakeholders, practitioners, and the public at large can trust and use.

CRESCENT represents a grassroots effort on the part of scientists, educators, and community members to organize efforts to increase the strength and resilience of our lifelines, of our infrastructure, and our communities.

SEED GRANT PROGRAM GOALS

The CRESCENT Seed Grant Program has the dual goals of broadening community participation and increasing the breadth of scientific investigations related to the center's scientific goals.

Achieving these goals relies, in part, on inviting the community to participate in addressing key challenges identified through three major pillars: i) Science (S): Understanding earthquakes and their hazards, ii) Geoscience Education and Inclusion (GEI): Expanding access to careers in geosciences, and iii) Partnerships and Applications (PA): Creating a collaborative pipeline from science to society.

Each year, the members of each Pillar, Working Group, and Special Interest Group identify their current research needs and provide priority topics for the seed grant program. *Proposals that respond to one or more of the priorities in each of these pillars, as outlined below, will be considered for funding.*

Pillar Priorities

Science Working Group Priorities:

CRESCENTs science program focuses broadly on developing a better understanding of the Cascadia Subduction Zone through focused collaborations between teams of scientists. There are five working groups: Dynamic Rupture, Earthquake Cycle, and Tsunamis (**DET**), Community

Fault Model (**CFM**), Cascadia Paleoseismology (**CPAL**), Coupling, Seismicity, and Slow Slip (**C3S**), and Community Velocity Model (**CVM**).

Dynamic Rupture, Earthquake Cycle, and Tsunamis (**DET**) Priorities:
- DET1: Tsunami models for Cascadia that account for often ignored but potentially important complexities such as multi-fault ruptures, splay faults, dynamic effects, distributed inelastic yielding of sediments, seismic, acoustic and gravity wave interactions etc. Of special interest are models or approaches that explore inundation, sediment transport, debris modeling, and which ideally connect with paleoseismic constraints.
- DET2: Modeling approaches that extend dynamic rupture models for Cascadia megathrust events to better characterize strong ground motion characteristics including but not limited to locally low event terms, high frequencies, or long-period pulses.
- DET3: Models exploring the relation between megathrust rupture extent and along-strike and along-dip variations in geology, rheology, and tectonics.
- DET4: Dynamic rupture and/or earthquake cycle models exploring the down-dip extent of slip in megathrust ruptures and interaction with the region of slow slip and tremor and implications for seismic hazard.

Community Fault Model (**CFM**) Priorities:
- CFM1: Develop new data and/or analytical methods that constrain on- or off-shore crustal fault activity in space and time (especially northern and southern Cascadia)
- CFM2: Address gaps in existing on- and off-shore fault and fold databases and slab models for incorporation into CFM (especially northern and southern Cascadia),
- CFM3: Develop tools that facilitate compatibility between the CFM and CRESCENT working groups (i.e. DET, C3S, CVM)

Cascadia Paleoseismology (**CPAL**) Priorities:
- CPAL1: Advancing Understanding of Crustal Faults in the Cascadia Subduction Zone- Investigations focused on enhancing knowledge of slip rates, recurrence intervals, and recency of activity associated with crustal faults, particularly within the Cascadia forearc and backarc regions are encouraged. Example proposals include studies of upper plate faults potentially connected to rupture of the seismogenic megathrust, studies on unrecognized forearc faults, and analysis of faults in the backarc region, exploring overlaps with arc magmatism or connections to crustal extension and block rotation.
- CPAL2: Tsunami Inundation Studies- Investigations focused on tsunami inundation in locations crucial to hazard evaluation are sought, with an emphasis on research near at-risk infrastructure. Priority will be given to studies that provide new data on tsunami inundation limits for hazard assessments and/or enhance understanding of site-specific vulnerabilities proximal to key infrastructure.
- CPAL3: Seismogenic Rupture Characteristics and Megathrust Behavior- Studies aimed at improving the understanding of Cascadia megathrust rupture dynamics are encouraged. Priorities include: studies on along-strike and down-dip extents and deformation characteristics of past ruptures, studies that address dating and quantitative coseismic subsidence estimate deficiencies, particularly for events that precede 1700 CE, studies that apply high-resolution dating techniques, such as tree rings, to refine seismic chronology,

and proposals connecting seismic activity to landscape change, particularly using geomorphological constraints, are encouraged. We especially encourage proposals that connect geological techniques and data to geophysical approaches.

Coupling, Seismicity, and Slow Slip (**C3S**) Priorities:
- C3S1: Coupling: Investigations of coupling on the megathrust, and the role of viscoelastic deformation in the Cascadia Earthquake Cycle.
- C3S2: Seismicity: Novel approaches for more complete event catalogs and determination of earthquake source parameters.
- C3S3: Slow slip: Characterization slow slip over all temporal and spatial scales and explorations of the mechanisms responsible.

Community Velocity Model (**CVM**) Priorities:
- CVM1: Projects – Projects that image mid- to shallow crustal and near surface structure, specifically in poorly characterized regions (e.g., populated areas, offshore, shoreline crossing), which may impact ground motions and seismic event relocation. Models that can be incorporated with existing CVM efforts via merging and other collaborative methods are especially welcome.
- CVM2: Tools – Development of tools that implement scoring and validation schemes for CVMs that can be used iteratively with updates.
- CVM3: Beyond Elasticity – Novel techniques and approaches that quantify seismic attenuation (e.g., Q_p, Q_s) in critical parts of, or throughout, Cascadia with the aim of improving ground motion modeling and estimation.

Science Special Interest Group Priorities:

CRESCENT also includes several "Special Interest Groups" (SIGs) on Ground Motion Modeling (**GM**), Cascadia Fluids Model (**Fluids**), Offshore Observations (**OO**) and GroundFailure (**GF**). We invite proposals that respond to the following priorities:

- GM1: Proposals that develop computational and data infrastructure for the community with ready-to-use containers, notebooks and code for physics-based wave propagation modeling and ground motion simulations
- GM2: Proposals that analyze the greatest sources of uncertainty in the NSHM with respect to Cascadia-related source and ground motion hazard parameters
- GM3: Proposals that pursue and develop collaborations and organize researchers between the CRESCENT Ground-Motion Modeling SIG (SIG2) and the broader ground-motion modeling community, including but not limited to studies or workshops focused on Cascadia-specific ground motions from crustal, intraslab, or megathrust events.

- Fluids1: Development of models of temperature distribution in Cascadia, to be used for (i) calculating dehydration reaction fluid release, (ii) determining friction law parameters, (iii) determining effective viscosity for viscous flow laws (to be used in viscoelastic coupling inversions and viscoelastic earthquake cycle modeling). Models can be multiple 2D vertical cross-sections at different locations along strike or 3D models.

- <u>OO1</u>: Preparatory work for a major proposal to study an aspect of the structure or deformation of the Cascadia Subduction Zone that goes beyond what might reasonably be done without support. For example, demonstrating a new approach with real or synthetic dataset or conducting sensitivity tests to evaluate the number and distribution of offshore stations/observations that are needed to test a hypothesis.
- <u>OO2</u>: Studies that seek to reanalyze or integrate existing offshore data sets that bear on our understanding the Cascadia Subduction Zone. For example, relocating offshore earthquakes relative to new images of the plate boundary or incorporating physical oceanographic data and models into the analysis of GNSS-acoustic or seafloor pressure geodetic data.
- <u>OO3</u>: Studies that explore novel approaches that span the shoreline that are presently not in the crosshairs of either the terrestrial or ocean communities. Examples might include mapping topography/bathymetry across the coastline and sensing tsunamis from the coast (e.g., radar or infrasound).

- <u>GF1</u>: Inversion and analysis of databases of shaking proxies, such as landslides and liquefaction deposits. Example proxies could be from laboratory, or terrestrial, lacustrine, or marine environments and use observations from cores, trenches, and geomorphic characteristics. We are interested in enabling weighting structure and comparison to non-Cascadia Subduction Zone controls (e.g. rainstorms, crustal events) and null events to potentially facilitate more in-depth, multidisciplinary analysis to constrain Cascadia shaking.
- <u>GF2</u>: Analysis of landscape/site response to historical and modern earthquakes (e.g. Nisqually, Scotts Mills, Klamath Falls earthquakes, etc.) – we invite proposals that address what we can learn from comparisons between observations of the responses to shaking.
- <u>GF3</u>: Leveraging CRESCENT products to better constrain potential ground failure hazards, ground failure hazard chains or create refined models of ground failure hazard from a Cascadia Subduction Zone Event.

Partnerships and Applications Priorities:

The P&A pillar is interested in proposals that address the three core priorities listed below and contribute to CRESCENT's broad mission to increase the seismic resilience of the Cascadia region. Projects should encourage collaborations and partnerships between community entities, educational institutions, agencies, existing research hubs (e.g. Cascadia Coastlines and Peoples Hub - CoPes, Statewide California Research Center - SCEC, Cascadia Lifelines Program - CLiP, Cascadia Region Earthquake Workgroup - CREW), public/private sector organizations, and CRESCENT. Projects may include, but are not limited to, data collection, hazard mapping, interactive science communication, social science research, and community surveys.

- <u>PA1</u>: **Equitable and Inclusive Resilience Planning**: projects that emphasize equitable preparedness, warning systems, and resilience efforts, particularly involving First Nations, tribal communities, and underserved groups. Projects should include co-designed research with regional organizations, centering or integrating traditional knowledge where appropriate.

- PA2: **Effective Communication and Cross-Border Collaboration**: social science research and products that prioritize clear, consistent, jargon-free communication of scientific and/or engineering findings related to the Cascadia Subduction Zone (CSZ). Projects should consider cross-border collaboration and be tailored to the varied needs of different stakeholder groups (e.g. public, policymakers, emergency managers, planners, utilities) across the region.
- PA3: **Translating Science into Action:** co-designed research and/or product development focusing on practical applications of CRESCENT-related research, including, but not limited to, loss modeling, scenario development and resilience-building for the built environment. Research should be action-oriented, demonstrating how scientific insights can be applied to deliver tangible community benefits, with clear representation from community partners in the project design.

Geoscience Education and Inclusion Priorities:

The Geoscience Education and Inclusion pillar of CRESCENT is tasked with increasing access of minoritized groups to careers in the geosciences. We are interested in proposals that make meaningful contributions to this goal that focus on earthquake hazards and subduction zone issues defined in a very broad sense. Specific goals are:

- GEI1: Explore ways to bridge/merge/expand CRESCENT GEI efforts with COPES, SCEC or other organizations.
- GEI2: Conduct trust building, listening sessions or other activities that foster potential partnerships between Tribal secondary schools or community colleges and CRESCENT.
- GEI3: Pursue place-based research that explores the intersection of traditional ecological knowledge and questions that align with Working Group science priorities.
- GEI4: Partner with active science educators to develop or adapt geoscience curricula that pairs local geology and cultural heritage of communities within the CRESCENT region.
- GEI5: Adapt the CRESCENT Undergraduate Twinning Research Internship to increase participation by and relevance to underrepresented or underserved students.

Proposals that respond to one or more of the priorities in each of these pillars as outlined above will be considered for funding.

PROGRAM AWARD PROCESS

A panel of external reviewers will be recruited to evaluate the proposals using the NSF criteria for intellectual merit and broader impacts. The panel will consist of a broad cross section of scientists and professionals across disciplines and career stages. The panel of external reviewers will make funding recommendations to CRESCENT's Executive Committee, who will make final award decisions in consultation with the NSF.

TIMELINE

Dates	Item Due
November 2024	RFP Released

Wednesday, January 15, 2025 by 11:59 pm PST	Application Deadline
Late January	Proposal Review
February	NSF Program Manager Approval
March 15	Award Notifications
May 1, 2025 – April 30, 2026	**Start Date for Projects** Project Period: *Project length is 1year.*
Due 30 days after end of project period	Final reports Due

ELIGIBILITY

Principal Investigators: Eligible principal investigators (PIs) are any researchers in the US that are part of an institution or organization that is eligible for regular National Science Foundation funding (see details here).

Investigator Responsibilities: By submitting a proposal to CRESCENT, investigators agree to all four conditions below. Investigators who fail to meet these conditions may (a) not receive funding until conditions are satisfied, and/or (b) become ineligible to submit a future proposal to CRESCENT.

1. Community Participation
Principal investigators will interact with other CRESCENT scientists on a regular basis and contribute data, results, and models to the appropriate CRESCENT resource.

CRESCENT is committed to providing a safe, productive and inclusive environment for all center-related activities, and therefore expects all participants to abide by the Code of Conduct.

2. FAIR
All research should be conducted in accordance to FAIR (Findable, Accessible, Interoperable, and Reusable) principles for data management and stewardship.

3. Project Reporting
Each grant recipient will be required to submit a final report by May 30, 2026.

Final reports should be no more than 5 pages (including text and figures) and describe the following:
- Did you accomplish what you set out to with this project?
- If not, what did you do differently and how did you account for the changes?
- What is the next step for development of this project/ priority?
- Where do you plan to publish/ present on this work?

Final reports will be made available on the CRESCENT website.

4. Registration of Publications

Principal investigators will notify CRESCENT of publications resulting entirely or partially from CRESCENT funding. Publications resulting from CRESCENT funding should acknowledge the work is fully or partially funded by NSF EAR- 2225286 and include the CRESCENT ID number. Please use this form to submit details of any publication you produce as part of the CRESCENT community, including journal articles, books, chapters, white papers, etc.

APPLICATION COMPONENTS

CRESCENT Seed Grant applications must be submitted using the online submission form.

1. ***Application Form*** *(online)*:

    a. Provide basic information in the form's text boxes. (Note that the form cannot be saved part way through.)

2. ***Proposal Documents:*** (single-spaced text, Times New Roman font in 11-point or larger, and 1" margins).

    a. **Abstract** (250 words or less): A summary of the project goals and activities. Please write on a separate page from the Narrative.

    b. **Proposal Narrative** (up to 1750 words and 2 figures): Clearly describe the research problems or questions addressed by the project, being sure to specify a gap in the research to be addressed. Specify to which CRESCENT pillar priority (or priorities) the project is aimed and describe how the project goals advance the priority (or priorities). Proposals that exceed these length restrictions will be considered ineligible.

    c. **References Cited** (no page limit)

    d. **Biographical Sketch or CV**: Please submit the NIH or NSF biosketch generated by SciENcv.

    e. **Current and Pending Support**: Please submit the NIH or NSF Current and Pending Support generated by SciENcv.

    f. **Budget:** Please use the CRESCENT Seed Grant Budget Summary TEMPLATE excel file available on the CRESCENT website.

    g. **Budget Justification:** instructions included as an additional tab on the CRESCENT Seed Grant Budget TEMPLATE available on the CRESCENT website.

Submission Instructions: Complete all components of the application and combine them into a single PDF *in the order listed above*, with each component on its own page. Save with the naming convention *[Contact PI Last Name] FY 25 CRESCENT Seed Grant*.

1) Fill out the basic information in the online application form.
2) Upload the complete PDF.
3) Submit the form.

For joint proposals (with PIs from more than one institution), please submit identical proposals (with the same title) with your respective budgets (individual budgets for each PI/institution). The combined total budget for joint proposals should not exceed $30,000.

Letters of support are allowed as additional attachments (adhere to NSF PAPPG format).

BUDGET & USE OF FUNDS

Expected Funding Amount per grant: up to $30,000

Allowable Costs: Funds may be used for costs necessary to plan and execute the proposed research project (consistent with university and state rules) including:
- Travel, which may include funds to support a planning workshop or faculty retreat, to host a distinguished speaker who will help you initiate your project, to visit key resources and/or archives, or to visit a program officer to discuss your project.
- Equipment
- Materials and supplies
- Contractual services
- Salary for career research faculty, graduate students, undergraduates, and/or technical personnel under the supervision of the principal investigator.
- Other direct costs: core/shared user facility use, speaker stipend, etc.
- Faculty summer stipend and/or course release (as per departmental policies and guidelines)
- Indirect cost/ general administrative cost at the federally negotiated rate for the PI's institution

Unallowable Costs:
- Replacing current funding from another internal or external source
- Renovation, remodeling, or alteration of research laboratories or core/shared facilities

REVIEW PROCESS & CRITERIA

CRESCENT staff will conduct an initial review of applications to ensure that proposals comply with all guidelines. A panel of external reviewers, convened by CRESCENT, will conduct a peer review to evaluate the grant proposals and recommend proposals for funding to the Executive Committee who makes the final funding decisions, and will inform applicants of their funding status.

Criteria: Below are the criteria used by the review committee when scoring proposals (adapted from NSF's [criteria for proposal review](#)).

1. What is the potential for the proposed activity to advance the identified priorities of CRESCENTs pillars: Science, Geoscience Education and Inclusion, and Partnerships and Applications?
2. To what extent do the proposed activities suggest and explore creative or original approaches to CRESCENT's priorities?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

AWARD PROCEDURE

The University of Oregon (UO) is the lead institution for CRESCENT and receives annual funding from the NSF and other sources. Funded proposals are matched to the most appropriate funding source based on research priorities.

Within 30 days of receiving award notification, investigators must submit a formal request for a subaward through their sponsored research office. CRESCENT/UO reviews the submitted statement of work, budget, and budget justification for each project to ensure they reflect the approved scope. Before the final subaward can be established, CRESCENT/UO submits the complete subaward request to the NSF for final approval.

CRESCENT research awards are funded as subcontracts between UO and the investigator's institution. The budget period for each project/task is set for one year. Carry-over of funds is not allowed, since each budget period represents that year's project task(s) only.

INQUIRIES

Questions about the CRESCENT Seed Grant program or submission process may be directed to cascadiaquakes@uoregon.edu.