

**CRESCENT SEED GRANT PROGRAM 2023-2024**  
*Innovative science for a resilient society*

**OVERVIEW & PROGRAM GOALS**

**BACKGROUND**

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 to diversify and train the next-generation of geoscientists ;
- 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 \(S\)](#), ii) [Geoscience Education and Inclusion \(GEI\)](#), and iii) [Partnerships and Applications \(PA\)](#). *Proposals that respond to one or more of the priorities in each of these pillars, as outlined below, will be considered for funding.*

**CRESCENT's PILLARS**

***Science: Understanding earthquakes and their hazards***

Subduction zones host the largest earthquakes on the planet. Their cascading consequences — strong shaking, tsunamis, landslides, liquefaction, etc. — make them some of the most devastating natural hazards. As scientists, we strive to understand the important physical processes that drive convergent plate boundaries, like the Cascadia Subduction Zone. While these lines of inquiry have yielded some of the most important advances in solid Earth geosciences to date, subduction zones are complicated physical systems and understanding their dynamics, past, and future behavior is challenging. CRESCENT's science program focuses broadly on developing a better physical understanding of the Cascadia Subduction Zone through focused collaborations between teams of scientists that can lead to predictive models of its hazards.



### ***Geoscience Education and Inclusion (GEI): Expanding access to careers in geosciences***

Progress on the challenges facing earthquake hazards research, both in the short- and long-term, requires concerted focus on preparing and diversifying the next generation of geoscientists. The Geoscience Education and Inclusion Committee plans to contribute to building that capacity by providing research and training opportunities for aspiring geoscientists from underrepresented minorities and other groups. Research, training experiences, and summer schools create opportunities for students to participate in subduction zone science, to build skills essential to research, and to position themselves for meaningful careers in science and beyond.

### ***Partnerships and Applications (PA): Creating a collaborative pipeline from science to society***

Building partnerships and applications with stakeholders, community leaders, and educational efforts, ensures that center-derived products and information lead to societal resilience. The PA pillar will develop, strengthen, and expand center “science-to-society pipelines” in the Pacific Northwest. To achieve this, the PA leverages existing efforts such as the Cascadia Lifelines Program (CLiP) and Cascadia Coastline and Peoples Hazards Research Hub (CoPes Hub) as well as builds partnerships with the private sector, the communities affected by hazards, and local, state and federal agencies all with the purpose of creating more a more resilient and prepared society throughout the Pacific Northwest.

## **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:** We are interested in research on tsunami models for Cascadia, that account for often ignored but interesting complexities such as multi-fault ruptures, splay faults, dynamic effects, 3D deformation, plasticity, etc. Of special interest are models or approaches that explore inundation, sediment transport, debris modeling, etc.

#### **Community Fault Model (CFM) Priorities:**

- **CFM1:** Conduct research that develops compatibility between CRESCENT and SCEC products
- **CFM2:** 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)
- **CFM3:** Address gaps in existing on- and off-shore fault and fold databases and slab models for incorporation into CFM (especially northern and southern Cascadia),
- **CFM4:** Develop tools that facilitate compatibility between the CFM and CRESCENT working groups (i.e. DET, C3S, CVM)

#### **Cascadia Paleoseismology (CPAL) Priorities:**



- **CPAL1:** We are interested in proposals that advance understanding (slip rates, recurrence, recency of activity) of specifically identified (or yet to be recognized) crustal faults in the forearc or backarc of the Cascadia subduction zone. Example proposals would be investigation of an upper-plate fault or faults that may connect to rupture of the seismogenic portion of the mega thrust, investigation of faults in the forearc previously unrecognized or for which there is sparse to no paleoseismic history or active backarc faults that may overlap in age to arc magmatism or provide a kinematic tie to behind-the-arc basin-and-range extension or crust block rotation. In all cases, blind structures for which there is surface manifestation of Quaternary tilting or folding would be considered.
- **CPAL2:** Tsunami inundation field studies in localities that provide constraints on hazard evaluation will be considered. Of particular importance are studies directly relevant to sites proximal to at-risk infrastructure.

#### 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: Crustal Dynamics:** Interplay between North American plate and the Cascadia subduction zone.
- **C3S3: Seismicity:** Novel approaches for more complete event catalogs and constraining source physics processes.
- **C3S4: Slow slip:** Characterizing transient slow slip over all temporal and spatial scales.
- **C3S5: Data collection:** We encourage investigations on the use of other available datasets to constrain earthquake cycle processes (InSAR, tide gauge, leveling, strain meters, gravity, dendrochronology, paleoseismology, etc.)

#### Community Velocity Model (CVM) Priorities:

- **CVM1: Tools:** We encourage proposals that develop ready-to-use tools or software to merge seismic velocity models of multiple scales and resolutions.
- **CVM2: Projects –** We encourage proposals that produce higher resolution merged seismic velocity models using existing datasets, that either extend the geographic domain of existing models (such as the Stephenson 2017 model) or generate regional models for use in applications such as seismic event relocation.

#### *Science Special Interest Group Priorities:*

CRESCENT also includes several “[Special Interest Groups](#)” (SIGs) on Ground Motion Modeling (GM), Cascadia Fluids Model (FL), Offshore Observations (OO) and Liquefaction, Landslides, and Failure (LLF). 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 between CRESCENT and the ground-motion modeling community for Cascadia-specific ground-motions from crustal faults
- FL1: 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.
- OO1: Quantitative studies to design offshore observational networks that go beyond what might reasonably be done without support in preparation for an NSF proposal to make those observations. For example, sensitivity tests to evaluate the number and distribution of offshore stations/observations that are needed or studies to understand how different types of observations can complement each other (e.g., strain, gravity and seafloor pressure for slow slip event detection)
- OO2: Studies that explore novel approaches for mitigating oceanic noise sources in seafloor geophysical observations. For example, correcting water column signals in GNSS-acoustic observations or seafloor pressure, or correcting seafloor seismometer data for ocean current generated noise.
- OO3: Studies that explore novel technologies that cross shorelines 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).
- LLF1: Inversion and analysis of databases of shaking proxies. Example proxies could be from the 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.
- LLF2: 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.

### ***Partnerships and Applications Priorities:***

The P&A pillar of CRESCENT is interested in proposals and projects that encourage collaborations and partnerships between community entities or agencies, and CRESCENT, to compile case studies relevant to CRESCENT's mission and support CRESCENT science. We invite proposals that respond to the following broad goal.

- PA1: Studies that include, but are not limited to, data collection, hazard mapping, interactive informational websites, social science research, or questionnaires to determine what communities are doing/want to do in response to and in preparation for earthquake



hazards. Proposals should recognize the regional nature of Cascadia and represent the diversity of populations and problems that communities face.

### ***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:** Pursue place-based research that explores the intersection of traditional ecological knowledge and questions that align with CRESCENT Working Group science priorities;
- **GEI2:** Conduct research and into developing products and content that increases access for persons with disability or for whom English is not their first to CRESCENT science products;
- **GEI3:** Develop or adapt geoscience curricula to reflect the local geology and cultural heritage of communities within the CRESCENT region.

**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**

<b>Dates</b>	<b>Item Due</b>
<b>February 1, 2024 by 11:59 pm PST</b>	<b>Application Deadline</b>
<b>Early February</b>	Proposal Review
<b>Late February – Early March</b>	NSF Program Manager Approval
<b>March 15</b>	Award Notifications
<b>May1, 2024 – May 1, 2025</b>	<b>Start Date for Projects</b> Project Period: <i>Project length is 1year.</i>
<b>May 30, 2025</b>	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 the principles of Findability, Accessibility, Interoperability, and Reuse of digital assets ([FAIR](#)).

#### 3. Project Reporting

Each grant recipient will be required to submit a final report by May 30, 2025.

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 did you 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 CRESCENT.

### **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

### **APPLICATION COMPONENTS**

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

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

- 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).
- Abstract** (250 words or less): A summary of the project goals and activities. Please write on a separate page from the Narrative.
  - 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.
  - References Cited** (no page limit)
  - Biographical Sketch or CV:** Please submit the NIH or NSF biosketch generated by [SciENcv](#).
  - Current and Pending Support:** Please submit the NIH or NSF Current and Pending Support generated by [SciENcv](#).
  - Budget:** Please use the CRESCENT Seed Grant Budget Summary [TEMPLATE](#) available on the CRESCENT website.
  - Budget Justification:** Please use the Budget Justification [TEMPLATE](#) at the end of this document to complete this component of the application.

**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 24 CRESCENT Seed Grant*.

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



## 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 knowledge and understanding within the identified priorities of CRESCENT's pillars?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
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](mailto:cascadiaquakes@uoregon.edu).





## **Budget Justification** **(no page limit, delete blue text)**

Describe each budget line item listed in the budget template, breaking out costs by unit as applicable. Giving clear details will help the reviewers understand the reasonableness of your request. No page limit enforced, so please expand sections as necessary.

### **Personnel**

In this section describe the effort from career research faculty, graduate students, undergraduates, and/or technical personnel under the supervision of the principal investigator, as well as faculty summer stipend and/or course release.

#### *Principal Investigator Support*

Detail requested course release and/or summer stipend effort.

#### *Technical/Non-Tenure Track Faculty Salary*

Provide the names of the faculty and other personnel for which funding is requested, as well as a brief description of % effort and role/responsibility.

#### *Graduate Student*

Provide the number and % FTE of graduate student(s).

#### *Undergraduate Student*

Provide the number of student hours anticipated.

### **Outside Collaborators/Consultants**

### **Equipment (stand-alone pieces over \$5K)**

### **Materials & Supplies**

When anticipated, the proposal budget justification must indicate the general types of expendable materials and supplies required.

### **Travel**

Travel activities must be specified, itemized, and justified by destination and cost. Funds may be requested for fieldwork, attendance at meetings and conferences, and other travel associated with the proposed work, including subsistence.

### **Other Direct Costs**

E.g., core/shared user facility use, speaker stipend, publication/documentation/dissemination costs, computer services, etc.