<table>
<thead>
<tr>
<th>USGS Project Scientist</th>
<th>James (Jamie) Shanley</th>
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<tbody>
<tr>
<td>Project start date</td>
<td>5/25/2020</td>
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<tr>
<td>Duration</td>
<td>12 weeks</td>
</tr>
<tr>
<td>Location</td>
<td>Montpelier, VT</td>
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<tr>
<td>Type of Intern</td>
<td>Any</td>
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<tr>
<td>Title of Project</td>
<td>Mountains to sea – fluvial transport of carbon and nutrients and effects on ecosystems and people</td>
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**Background**

Terrestrial to aquatic movement of dissolved organic carbon (DOC) and subsequent stream transport is one of the largest uncertainties in the global carbon budget, and estimates of this flux have increased severalfold in the past decade. Our team seeks to identify the origin and compositional shifts in DOC as it moves from forested headwaters to larger river systems. Using in-stream optical sensors and sampling, we quantify stream DOC fluxes and how they change with scale and land use.

**Objectives**

Core research question: How will changing land use and climate, including extreme floods and drought, affect quantity and quality of fluvial carbon (and N and P) export to receiving water bodies?

1. At existing well-characterized sites, use historical and ongoing measurements to assess how C and nutrient export change with (a) climate, assessing wet and dry, and cold and warm periods as analogs for climate; and (b) land use, using sites across a range of land use and basin scale.
2. Identify the underlying processes driving C and nutrient export. Is there a tipping point, i.e. disproportionately large export during extreme high flows?
3. Model shifts in hydrology and biogeochemical cycles for the range of anticipated future climate scenarios.

**Intern Tasks**

- Collect streamwater and other water samples at base flow and high-flow conditions
- Prepare, preserve, and ship samples to off-site laboratories
- Service, maintain, and troubleshoot field sensors and data acquisition systems
- Collect and quality control electronic data, downloaded from the internet or directly at field sites, and import to USGS databases
- Perform preliminary data analysis using spreadsheets and plotting programs
- Participate in field vegetation and water sampling surveys.
- Assist in installation of field hydrological and meteorological instrumentation
- Assist researchers with preparation of scientific presentations and journal papers
- Intern with GIS skills will have ample opportunity to enhance GIS products for the project
- Intern is highly encouraged to develop own research ideas within the context of the
### Expected Results and Benefits to the Intern

This opportunity offers the intern a well-rounded experience that mixes field work with office time and a minor amount of laboratory work. The intern will learn or reinforce proper water sampling collection and processing protocols, as well as how water quality sensors and automated samplers function. The intern will gain familiarity with the research process and learn data analysis and scientific writing and communication skills by working closely with the project leader, who will mentor development of a self-standing project if desired. The intern will gain field skills working with two experienced technicians. For geology students, we offer the opportunity to spend some days assisting with an unrelated geologic mapping project run out of our office. We also have GIS expertise in the office, which an intern with GIS skills could utilize to meet some important project GIS needs. A highlight of the summer is the annual Hubbard Brook meeting in July, where the intern will meet other regional researchers and interns while soaking in two days of environmental science and fun activities. The project is conducted in a small collegial office setting in the nation’s smallest state capital, with most field work in a mountainous research watershed within an hour’s drive, and occasionally farther afield. Northern Vermont, with its mountains, lakes, vibrant towns, and festivals, has a lot to offer. Join the natives in making the most of short summer.

### Skills and Interests of Candidates

- Interest/ability to spend 2 or more days per week in the field under a range of conditions, with moderate physical activity (walking over irregular ground in hilly terrain), while carrying weight
- Familiarity with dataloggers and basic electronics desired but not required
- Familiarity with Microsoft Office suite (Word, Excel, Powerpoint)
- GIS skills optional (but would be put to good use!)

### Project Type
Field Work; Office Work;

### Project Discipline
Carbon cycle science; Groundwater; Surface Water; Climate Science;