

CRREL's Hydrology and Hydraulics Mission

To provide assessments of, and technology for, winter impact on Corps structures, ice jam mitigation, cold regions hydrology, and river restoration.

H&H Challenges

H&H provides a continuum of fundamental research through applied cold regions hydrology and hydraulics.

- Demonstrated ability to align snow and ice science and engineering with operational needs to develop effective tools for direct civil and military operational use.
- Extensive experience in hydrologic analyses and regional watershed and basin management.



Mission Relevance

- Potential loss of life
- Flooding
- Navigation
- Structural damage
- Operational planning
- Supplies/transport
- Flood forecasting
- Water supply



CRREL's H&H Research Facilities

- Ice Engineering Facility
- Ice Engineering Model Room
- Ice Engineering Test Basin
- Ice Engineering Flume
- Large Physical Models

The Cold Regions Research and Engineering Laboratory (CRREL)

The Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire and Anchorage and Fairbanks, Alaska is part of the US Army Corps of Engineers Engineer Research and Development Center (ERDC). Our mission is to solve interdisciplinary, strategically important problems of the US Army Corps of Engineers, Army, Department of Defense, and the Nation by advancing and applying science and engineering to complex environments, materials, and processes in all seasons and climates, with unique core competencies related to the Earth's cold regions.



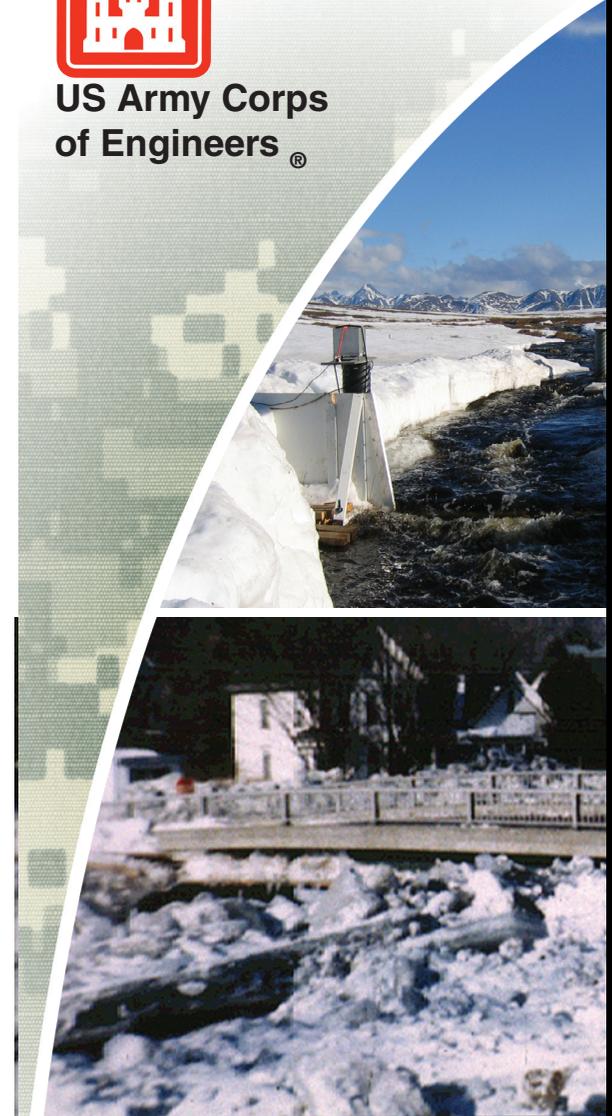
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Contact

Chief, Remote Sensing/GIS and Water Resources Branch
Cold Regions Research and Engineering Laboratory
72 Lyme Road, Hanover, NH 03755-1290
Phone: 603-646-4296, Option 8
Email: CRREL-H&H@usace.army.mil
<https://www.crrel.usace.army.mil>



**US Army Corps
of Engineers®**



Ice Hydraulics & Engineering

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Snow Hydrology

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Operational Support

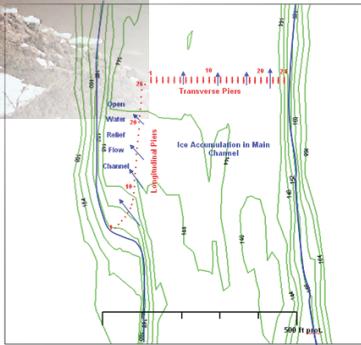
**U.S. Army Engineer Research
and Development Center
Cold Regions Research and
Engineering Laboratory**

Ice Hydraulics and Engineering

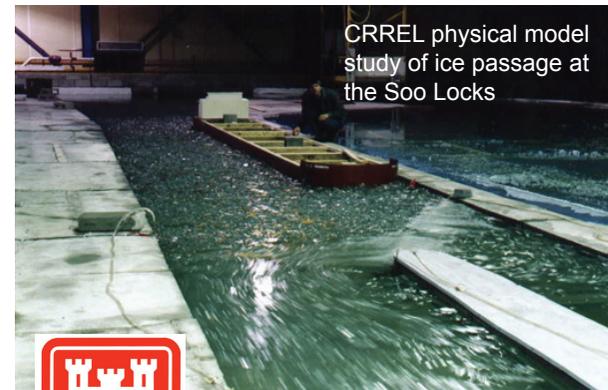
- Understand the physics of river ice processes.
- Develop simulation tools to resolve emerging issues.
- Model ice control for hydroelectric production.
- Research ice forces on structures and vessels.
- Provide guidance for ice jam flood control.
- Develop lock ice control methods and design tools.



Ice jam flood control



In-channel relief flow concept developed for sites lacking floodplains to bypass flow around the ice accumulation

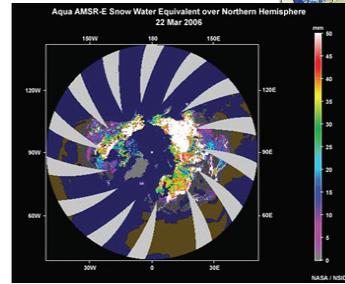
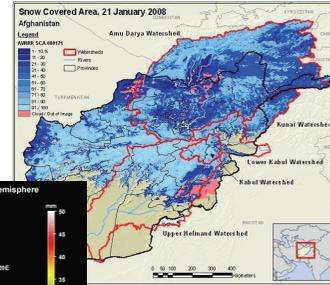


CRREL physical model study of ice passage at the Soo Locks



Snow Hydrology

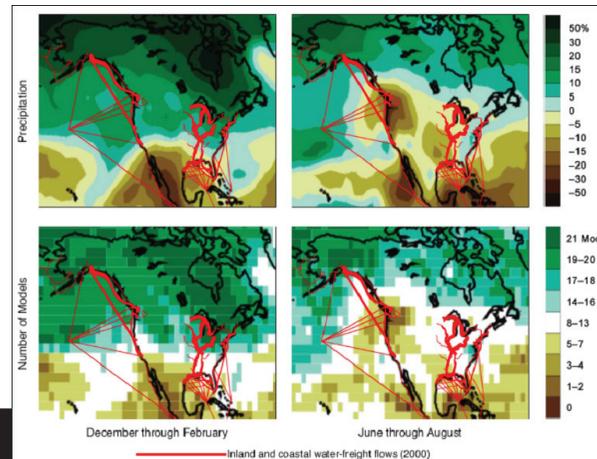
Satellite passive microwave imagery provides Snow Covered Area (SCA) . . .



. . . and Snow Water Equivalent (SWE) data

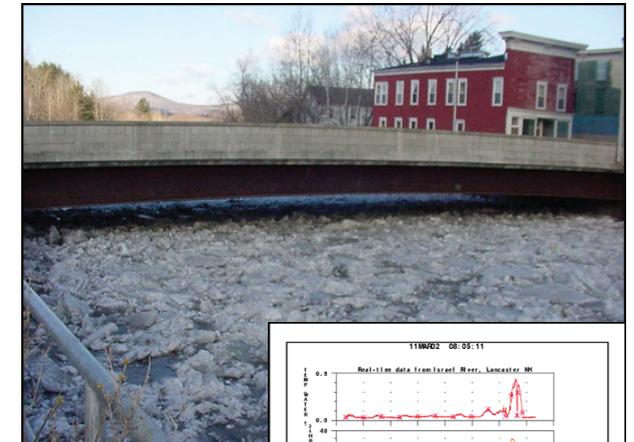
- Understand climate variability impacts on snowmelt runoff patterns.
- Provide complex snow models.
- Conduct remote snow assessments for snow-water equivalence and snow coverage area.
- Combine satellite data, ground observations, and snow modeling for hydrologic analyses of flooding.

Climate variability impacting snow-dominated watersheds

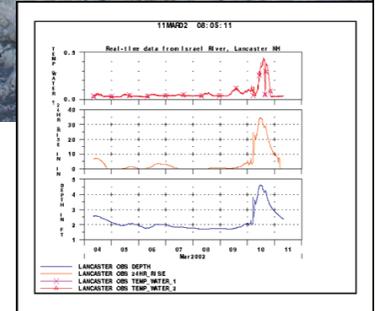


Operational Support

- Provide operational support across the world for ice jam, snowmelt, and snow/ice-related flooding events.
- Understand dynamic events that can result in significant infrastructure damage.
- Track and assess ice jam potential and risk.
- Conduct site visits during significant events.



Real-time view of river conditions provides warning of ice jam potential



Theater operational climate variability

