

Science
Environmental Geoscience
Unit 5: The Cryosphere

Essential Understandings	<ul style="list-style-type: none"> ▪ Causation: Nothing “just happens”. Everything is caused. ▪ Interrelatedness: Everything in the universe is connected to everything else in the universe. ▪ Dynamism: Everything is changing in some way all the time. ▪ Uniformitarianism: The way the universe works today is the way it worked yesterday and the way it will work tomorrow.
Essential Questions	<ul style="list-style-type: none"> ▪ How does the cryosphere influence Earth? ▪ What makes up the cryosphere, and where on Earth does it exist? ▪ How has Earth’s cryosphere changed through time, and how have scientists learned of this history? ▪ How do changes in the cryosphere effect the world’s population? ▪ What political and economic controversies exist related to the cryosphere?
Essential Knowledge	<ul style="list-style-type: none"> ▪ Glaciers form very slowly but can deteriorate very quickly. ▪ Glaciers have shaped the world’s topography, and there is evidence of many past glacial episodes on Earth. ▪ Glaciers exist in the poles and also in the tropics. ▪ Glacial melt water feeds many of the world’s largest rivers, which supply drinking water for much of the world’s population. ▪ Climate change is a natural phenomenon, but is likely being accelerated by anthropogenic influences and is changing Earth’s cryosphere.
Vocabulary	<ul style="list-style-type: none"> ▪ <u>Terms:</u> <ul style="list-style-type: none"> ○ climate, Milankovitch theory ○ glacier and different types ○ accumulation zone, ablation zone, crevasse ○ cirque, arête, hanging valley, roche moutonnees, horn ○ glacial till, Moraine and different types, esker, dunes ○ ice sheet, ice cap, sea ice, permafrost, firn ○ outwash plain ○ thermokarst topography ○ Ice Age, glacial and interglacial periods ○ dendrochonology
Essential Skills	<ul style="list-style-type: none"> ▪ Explain the interactions among the biosphere, atmosphere, hydrosphere, lithosphere and cryosphere. ▪ Describe scientists’ lines of evidence for past glaciations, and for climate change. ▪ Explain a political and/or economic controversy related to the hydrosphere and give ideas for resolving that controversy.

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<p>Related Maine Learning Results</p>	<p><u>Science and Technology</u></p> <p>A. Unifying Themes</p> <p>A1. Systems</p> <p>Students apply an understanding of systems to explain and analyze man-made and natural phenomena.</p> <ol style="list-style-type: none"> a. Analyze a system using the principles of boundaries, subsystems, inputs, outputs, feedback, or the system’s relation to other systems and design. b. Explain and provide examples that illustrate how it may not always be possible to predict the impact of changing some part of a man-made or natural system. <p>C. The Scientific and Technological Enterprise</p> <p>C3. Science, Technology, and Society</p> <p>Students describe the role of science and technology in creating and solving contemporary issues and challenges.</p> <ol style="list-style-type: none"> a. Explain how science and technology influence the carrying capacity and sustainability of the planet. b. Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment. c. Explain how ethical, societal, political, economic, religious, and cultural factors influence the development and use of science and technology. <p>D. The Physical Setting</p> <p>D2. Earth</p> <p>Students describe and analyze the biological, physical, energy, and human influences that shape and alter Earth Systems.</p> <ol style="list-style-type: none"> a. Describe and analyze the effect of solar radiation, ocean currents, and atmospheric conditions on the Earth’s surface and the habitability of Earth. b. Describe Earth’s internal energy sources and their role in plate tectonics. c. Describe and analyze the effects of biological and geophysical influences on the origin and changing nature of Earth Systems. d. Describe and analyze the effects of human influences on Earth Systems.
<p>Sample Lessons And Activities</p>	<ul style="list-style-type: none"> ▪ Identify local glacially-shaped topography ▪ Use a surficial geological map to understand the effects of glacial ages on Maine’s landscape and surface materials ▪ Library Research Project (Topic: Glaciers, climate change, and impacts on human populations through time)

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Sample Classroom Assessment Methods	<ul style="list-style-type: none">▪ Quizzes on class lectures▪ Laboratory and project grades▪ Examination at the end of unit
Sample Resources	<ul style="list-style-type: none">▪ <u>Publications:</u><ul style="list-style-type: none">○ <u>Modern Earth Science</u>, William L. Ramsey et al., Holt, Rinehart and Winston, Inc., Austin: 1989.▪ <u>Other Resources:</u><ul style="list-style-type: none">○ Science Resource Center (Library online database)