



# 2007 MATE Center/MTS ROV Committee ROV Competition For High School & College Students

[www.marinetech.org/rov\\_competition/index.php](http://www.marinetech.org/rov_competition/index.php)

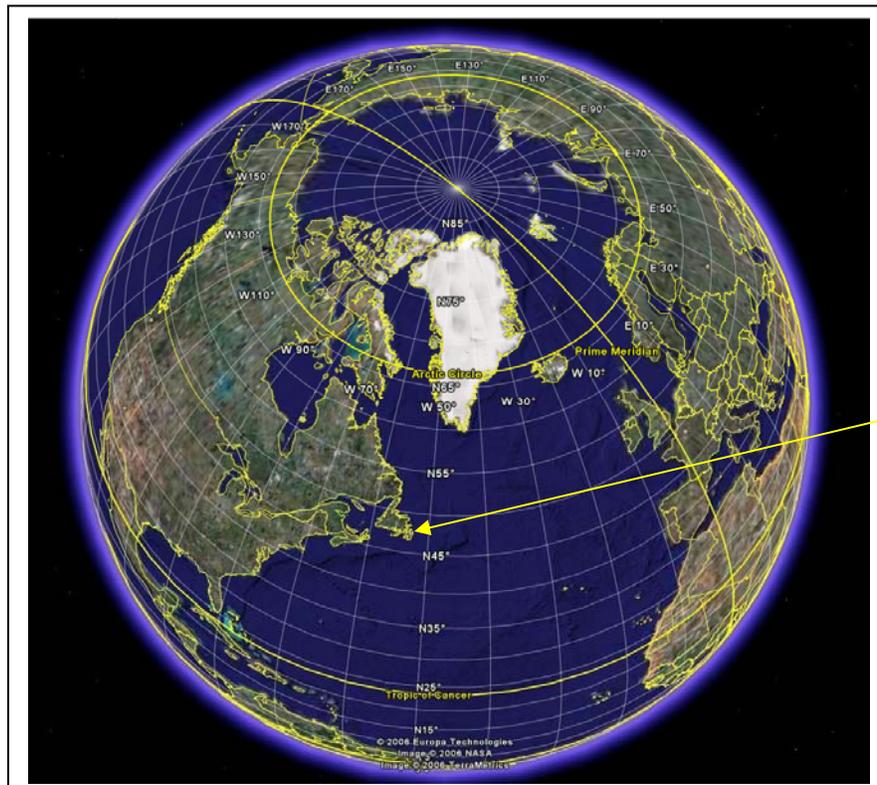
*Celebrating the International Polar Year:  
Challenging Students to Design & Build ROVs for Operation in Polar Environments*



## Overview of Competition Scenarios & Mission Tasks EXPLORER & RANGER

In recognition of the **International Polar Year (IPY)**, the 2007 international ROV competition challenges students to design and build ROVs for operation in polar environments. The competition also challenges students to increase their understanding of the Polar Regions and how these regions impact – and are being impacted by – our global climate.

Located ~2,100 km south of the Arctic Circle, St. John's, Newfoundland and Labrador, Canada is the ideal host city. The facilities at the **Marine Institute of Memorial University** and the **National Research Council's Institute for Ocean Technology** where the underwater missions will be staged allow the competition to simulate real-world environmental conditions like it has never before.



St. John's

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The ROV competition is divided into two competition classes: **RANGER** and **EXPLORER**. The **RANGER** ROVs operate at a maximum of 13 volts, 25 amps. **EXPLORER** vehicles have a higher power limit (51 volts and 40 amps surface power). Eligibility requirements for both classes are listed within the 2007 **General Information** document. Please review these requirements carefully.

The 2007 underwater missions will take place in 3 different environments: a flume tank, an ice tank, and an offshore engineering basin. Each environment will have a different scenario and tasks.

In addition to the underwater mission tasks, both classes will be challenged with engineering evaluation interviews, technical reports, and poster displays. The scoring breakdown is as follows:

- Mission
  - **EXPLORER** – 200 points (max), plus a time bonus
  - **RANGER** – 200 points (max), plus a time bonus
- Engineering & communication – 200 points (max)
  - Engineering evaluation – 120 points (max)
  - Technical reports – 60 points (max)
  - Poster displays – 20 points (max)

Information about both **EXPLORER and RANGER** class competition scenarios and mission tasks is organized by mission venue and included in the following, separate documents:

- **Mission #1 – FLUME TANK**  
Ocean observing in polar seas: The SmartBay Project in Placentia Bay
- **Mission #2 – ICE TANK**  
Science & technology under the ice: NOAA’s “Hidden Ocean” arctic expedition
- **Mission #3 – OFFSHORE ENGINEERING BASIN**  
Oil & gas exploration and production in the North Atlantic: Hibernia platform

The **Engineering & Communication** document contains information about the evaluation, report, and display requirements. The **Design & Building Specifications and Competition Rules** document contains information about ROV specifications and competition rules.

The remainder of *this* document contains information about IPY and a brief history of the competition host province of Newfoundland and Labrador.

## **CELEBRATING THE INTERNATIONAL POLAR YEAR**

Icebergs glistening in the sun. Polar bears ambling across seemingly endless ice sheets in the glow of the northern lights. Seal pups inching their way towards open water for their first dip. The earth-shattering rumble of ice calving off of ancient glaciers. Leopard seals and gentoo penguins in a life and death chase in near freezing waters. These are the sights and sounds that make our planet's poles so enticing to scientists, explorers, and schoolchildren around the world.

These are also the impetus behind the designation of 2007-2008 as the International Polar Year (IPY). Over the years, scientists and explorers have witnessed and recorded environmental changes in the Polar Regions. IPY will highlight these findings and encourage new research and expeditions that use today's technologies to better understand the roles that Polar Regions play in global processes. IPY will also ensure that "schoolchildren" of all ages understand how changes in the poles affect them and how they themselves can affect change in the delicate balance of our global climate.

Environmental changes currently taking place in Polar Regions are vivid. Arctic ice cover is decreasing at an alarming rate; satellite data and surface-based observations indicate that Arctic sea ice coverage has declined about 7% since 1978. It is estimated that within the next 34 years the Arctic ice cap will be completely absent during the summer months. A decreasing ice cap has major implications for organisms that depend on the ice. Polar bears, for example, rely on the ice to hunt for seals. Less ice means less time to hunt. Less ice also means that polar bears are forced to swim more often, and for longer distances, in search of ice sheets. A new study shows that, for the first time, polar bears have been drowning in significant numbers.

Meanwhile, in the southern hemisphere, local temperatures on the Antarctic Peninsula have risen by about two degrees Celsius over the past 50 years, an increase that is more pronounced than in other regions of the world. This temperature change has had dramatic effects. For example, in January of 2002, 3,250 square kilometers of the Larsen-B ice shelf, a large floating ice mass on the eastern side of the Antarctic Peninsula, began to shatter and completely broke up within 35 days. Since then, the Larsen-B ice shelf has lost another 2,450 square kilometers, and is now less than half of its original, stable size. The high rate of warming on the Antarctic Peninsula has also led to increased precipitation. When this precipitation falls as snow, it can reduce the amount of bare ground that is available for penguin rookeries, leading to a decline in penguin populations.

Our own species is being impacted as well. Alaskan villages are being relocated to higher ground in response to coastal erosion and sea level rise. The thawing of permafrost is causing the collapse of roads and buildings and having major economic, as well as societal, impacts on local communities. For example, the Alaskan pipeline's support structures are designed for specific ranges of ground temperatures, and are subject to heaving or collapse if the permafrost thaws. Replacing them, if required, would cost about \$2 million per mile.

The impacts of polar climate change are not limited to the Polar Regions. The earth's Polar Regions are immensely influential on the entire planet's climate, environment, ecosystems, and human societies. To have any hope of understanding the current global climate and what might happen in future, we need a better picture of conditions at the poles and how they interact with and influence the oceans, atmosphere, and land masses. In "celebrating" IPY, scientists, explorers, engineers, and technicians in more than 25 nations around the world are embarking on an intense campaign to bring this picture into focus.

IPY is centered on the following six themes:

- 1) *Status*: to determine the present environmental status of the polar regions
- 2) *Change*: to quantify, and understand, past and present natural environmental and social change in the polar regions and to improve projections of future change
- 3) *Global linkages*: to advance our understanding on all scales of the links and interactions between polar regions and the rest of the globe, and of the processes controlling these links
- 4) *New frontiers*: to investigate the frontiers of science in the polar regions
- 5) *Vantage point*: to use the unique vantage point of the polar regions to develop and enhance observatories from the interior of the Earth to the Sun and the cosmos beyond
- 6) *Human dimension*: to investigate the cultural, historical, and social processes that shape the sustainability of circumpolar human societies and to identify their unique contributions to global cultural diversity and citizenship

The research, engineering, and exploration that will take place as part of IPY will complement these six themes. For example, IPY can make a major contribution to science and society by designing and setting in place observing systems that will enable ongoing observations of Polar Regions for decades to come. It can also make a major and lasting contribution by serving as a mechanism to attract and develop a new generation of scientists, explorers, engineers, and technicians with the versatility to tackle complex global issues.

This is where you come in.

**References:**

International Polar Year, [www.ipy.org](http://www.ipy.org)

*A Vision for the International Polar Year 2007-2008*, The report from the U.S. National Committee for the International Polar Year 2007-2008, National Research Council ([www.nap.edu/catalog/11013.html](http://www.nap.edu/catalog/11013.html)).

*National Geographic Magazine*, November 2006.

*Climate Change: The Role of Science and the Media in Policy Making*, presented by the Honorable Al Gore, American Geophysical Union 2006 Fall Meeting, San Francisco, California.

*An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*, Al Gore, 2006.

*Polar Bears on Thin Ice*, Natural Resources Defense Council,  
[www.savebiogems.org/polar](http://www.savebiogems.org/polar)

*Historical Evidence Shows Larsen Ice Shelf Collapse Is “Unprecedented,”* Scientific American, [www.sciam.com/article.cfm?articleID=00098D55-228C-12F1-A28C83414B7F0000](http://www.sciam.com/article.cfm?articleID=00098D55-228C-12F1-A28C83414B7F0000)

*Larsen B Ice Shelf Collapses in Antarctica*, National Snow and Ice Data Center,  
<http://nsidc.org/iceshelves/larsenb2002/index.html>

*U.S. National Assessment of the Potential Consequences of Climate Variability and Change Educational Resources Regional Paper: Alaska*, U.S. Global Change Research Program, [www.usgcrp.gov/usgcrp/nacc/education/alaska/ak-edu-3.htm](http://www.usgcrp.gov/usgcrp/nacc/education/alaska/ak-edu-3.htm)

## **THE “PROMISED LAND OF THE SAINTS” A brief seafaring history of Newfoundland and Labrador**

The North Atlantic Ocean has always been the shortest route for Europeans voyaging to the riches of the New World. It may have been an Irish monk named Brendan, born in 484 AD, and his cohorts who first followed the northern route on a seven-year voyage, skipping from Ireland to Iceland to Greenland and, some even speculate, to what has been referred to the “Promised Land of the Saints,” now known as Newfoundland. The boat they sailed was nothing more than a large Irish curragh made from tanned ox hides stretched across a wooden frame and sewn together with leather thread. The hull was smeared with animal fat to make it waterproof. For years historians discounted the voyage as myth since they could not imagine such a craft crossing the stormy North Atlantic. However, in 1976, a marine historian named Tim Severin set out to prove Brendan could have made the voyage. He constructed and sailed a similar craft from England across the Atlantic, landing on Peckford Island 150 miles north of St. John’s.

In addition to Severin’s successful recreation, Brendan’s voyage across the North Atlantic is given credibility by the tenth century Norseman Leif Erickson. When Erickson made his famous explorations to Iceland, Greenland, and eventually to the New World, his crew recorded meeting with “Papers” (priests or monks) during their stops in harbors along their route. The Norsemen explorers, traveling across the North Atlantic and southward down the North American coast, also recorded a number of lands on their journeys, including Helluland (land of rocks), thought to be Baffin Island; Markland (land of trees), thought to be the coast of Labrador; and Vinland (land of grapes?).

Newfoundland does not grow grapes, but they do grow blueberries. Unless blueberries can be considered grapes, Vinland may not be the island of Newfoundland, but nonetheless, the Norse definitely stopped there; L'Anse aux Meadows, located on the northern tip of Newfoundland, is home to the only authenticated Norse settlement in the New World.

But it was in 1497 that the Italian Giovanni Caboto (pronounced John Cabot by the English) made the North Atlantic route famous or infamous, depending on whom one spoke to at the time. Cabot set out at the request of the English King Henry VII and Bristol merchants to find a northern trade route to Asia. Cabot did not find an easy and profitable route to Asia, but he did find something of great value. He recorded finding fish so plentiful that he was able to catch them in baskets lowered into the water. He also found large trees in Newfoundland and Labrador. Large straight bore trees such as these were suitable for shipbuilding and the construction of ships' masts. To the Bristol merchants however, the fish and trees were not the great, rich cities of the orient. Fish and trees could not provide them with wealth and power, and hence this "New Found Land" was a considerable disappointment to the Bristol merchants who had backed Cabot's voyages. But Cabot's voyage did open up Newfoundland and Labrador as a colony that, in the next five centuries, provided Europe with cod, whales, seals, trees, and, during World War II, a safe haven for merchant convoys, the primary targets of German U-boats. June 24<sup>th</sup>, "Discovery Day," celebrates John Cabot's "discovery" of Newfoundland and Labrador. June 24<sup>th</sup>, 2007 will mark the 510<sup>th</sup> anniversary of Cabot's discovery.

For five centuries after Cabot, stalwart fisherman worked the waters off of Newfoundland, gathering their bounty from the sea. But little did they know that they sailed over one of the most valuable treasures that the North Atlantic possessed – black gold. Oil. Below the waters that the Norsemen once traveled, oil wells now penetrate the seafloor. Above the icy waves, where it is likely that the monk Brendan once piloted his small vessel, stands the Hibernia oil platform. Rising 224 meters above the cold ocean, the Hibernia oil field and drilling platform take their name from the Latin term for Ireland, in reference to the home of perhaps the first brave Europeans to see these waters and this shoreline.

Whether the European settlement of Newfoundland and Labrador is traced to the Irish monks, Leif Erickson, or John Cabot, native peoples had been living on the island of Newfoundland for 7,500 years and in Labrador for at least 9,000 years. Both the Norse and Cabot reported native peoples, the Beothuk, in this newly discovered land. Cabot and his men would not venture a bow's length into the forests for fear of natives, and the Norse skirmished constantly with the natives, which they termed Skraelings. One theory states that the Norse gave up their settlements in "Vinland" due to the large and hostile native populations. It is also believed that the native people of Newfoundland and Labrador, which used red ochre paint on their bodies and clothes, gave rise to the term Redskin. These native peoples, like the Europeans who followed, surely recognized and made use of the sea, forest, and other bounties of the "Promised Land of the Saints."

**For more information, visit:**

*Newfoundland and Labrador: The Far East of the Western World,*  
[www.wordplay.com/tourism/intro.html](http://www.wordplay.com/tourism/intro.html)

*In Saint Brendan's Wake,* [http://ics.villanova.edu/in\\_saint\\_brendan.htm](http://ics.villanova.edu/in_saint_brendan.htm)

Saint Brendan the Navigator, [www.boatmail.net/brendan.htm](http://www.boatmail.net/brendan.htm)

*Tim Severin,* [www.timseverin.net](http://www.timseverin.net)

*The Norsemen in America,* [www.sacred-texts.com/neu/nda/nda26.htm](http://www.sacred-texts.com/neu/nda/nda26.htm)

*John Cabot,* [www.heritage.nf.ca/exploration/cabot.html](http://www.heritage.nf.ca/exploration/cabot.html)

*German U-boats,* <http://en.wikipedia.org/wiki/U-boat>

*Hibernia,* [www.hibernia.ca/index2.html](http://www.hibernia.ca/index2.html)

*Aboriginal Peoples,* [www.heritage.nf.ca/aboriginal](http://www.heritage.nf.ca/aboriginal)