Water Quality Under Ice

Under Ice Deployment

Although water quality monitoring in the winter months can sound formidable it can be one of the easiest times of the year to deploy instruments. The most difficult aspect is usually just getting to and from the site. The field crew will be able to use the ice cover as a work platform and will need to take precautions related to sampling on rivers in the winter. As with all fieldwork, safety is always a concern and field crews must be trained to safely work on ice (ice should be 30 cm thick).

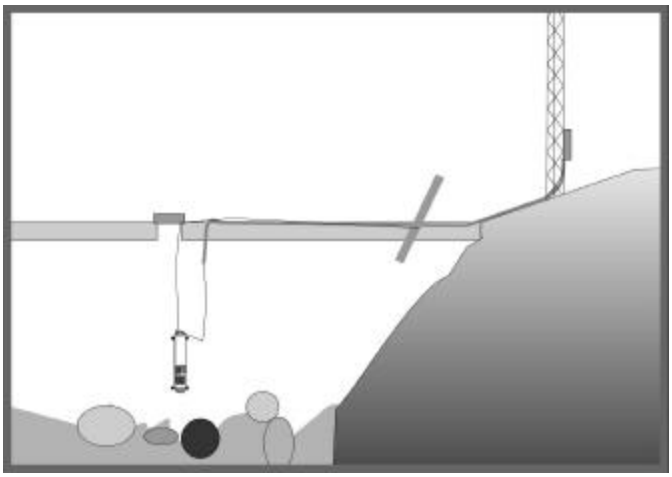

Figure 1

During ice cover (usually December to April in Alberta) one method of deployment is used for both real time and remote instruments (Figures 1 & 2). The river or lake ice is used as a platform from which the instrument, protected by the PVC cage is suspended. A heavy aircraft cable (5/16” or thicker) is attached to the cage, which is then lowered into a hole (30x30cm), cut through the ice with a chainsaw. The aircraft cable is attached to shore or to an anchor frozen into the ice some distance from the main hole. The cage should be lowered so that it is near or just slightly above the river bottom, avoiding the frazil ice that is usually present in early winter, downstream of large open water leads. Frazil ice contains charged particles and will stick to and clog the instrument and the electronic sensors (Dr. F. Hicks, personal communication). The conductivity probes are most vulnerable to this type of fouling.

At real time monitoring installations, PVC electrical conduit protects the underwater cable as it passes through a hole in the ice and is connected to the instrument in the cage. There must be enough extra cable available so that the cage can be easily withdrawn from below the ice regardless of the ice thickness. The underwater cable and conduit are allowed to freeze into the ice and are not removed until the end of the season. This cable and conduit run from the hole in the ice to the antenna tower, logger and transmitter on shore. A door, constructed of plywood, 2x4 lumber and R20 fibreglass insulation is placed over the hole to reduce the amount of ice formed and to help field crews to relocate the instrument on the next change over. During the winter, instruments can be installed just about anywhere there is sufficient ice cover to support the field crew, but usually must be removed before break up.

Figure 2

Methods of deployment can be complex but the theme is the same for all. The instrument must be protected, the information must represent the true conditions in the river and the field crews must be able to recover the instrument at any time with a minimum of effort. It is vital that field crews are skilled, trained and safety oriented. This is potentially dangerous work, with many hazards.

For more information on this or any Hydrolab application please contact Campbell Scientific (Canada) Corp. at (780) 454-2505.

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