# Frazil Ice Detection is Possible

A January 2006 Update on SWIP

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A paper entitled *"Instrument for Detecting Freeze-up, Mid-Winter and Break-up Ice Processes in Rivers*" was presented at the CGU HS Committee on River Ice Processes and the Environment in Hanover, NH, September 15-16, 2005. It reported data from a Peace River Shallow Water Ice Profiler (**SWIP)** study carried out in the winter of 2004/2005, which showed weak but quantifiable with 235 KHz acoustics returns from suspended frazil ice. Sources of the backscattered returns received by the river-bottom-mounted upward-looking sonar instrument were initially concentrated at depth but later (prior to ice cover formation) extended upward throughout the water column. Calculations suggested that the use of higher acoustic frequencies would show increased sensitivity to weak returns enabling reliable frazil detection and, when used in conjunction with lower frequency monitoring, could, possibly, support extraction of frazil densities and size distributions from SWIP data.

Consequently in the 2005/2006 field program, a 546 kHz unit was deployed adjacent to the 235 kHz unit (and in slightly deeper water) to examine returns from frazil ice.

Initial low frequency results showed, as in 2004/2005, weak returns from the water column appearing after 18:00 1/12 (Figure 1) at times coincident with the presence of frazil ice. These returns appear in discontinuous vertical lines below the more intensely coloured horizontal lines associated with the water/air and water/ice interfaces. The numbers listed along the vertical axis of the Figure denote distance above the SWIP transducer on the river floor. The corresponding high frequency results (Figure 2) showed, as anticipated, much stronger returns for the same time intervals.

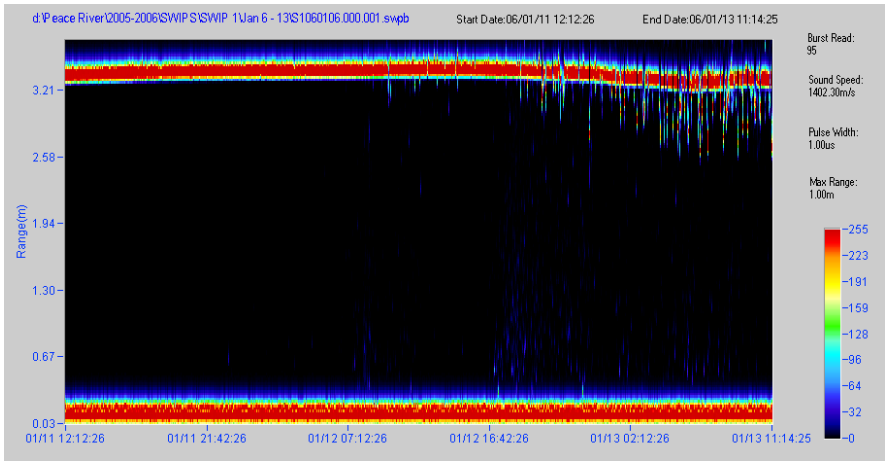


**Figure 1**: 235 KHz unit data- Initial low frequency results show weak returns from the water column (depths less than 2.94 m) appearing primarily after 18:00 1/12.

Both Figures also showed the persistent presence of floes with drafts of a few tens of cm for times beginning at approximately 18:00 1/12.

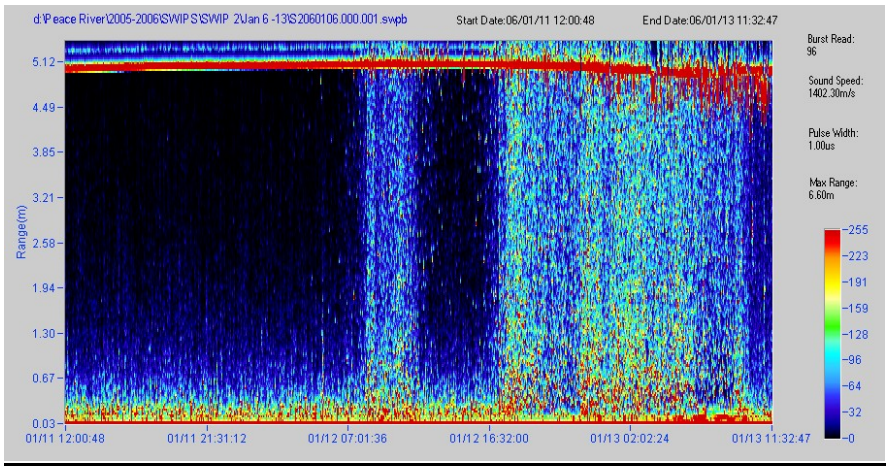


**Figure 2**: 546 kHz unit data- High frequency results show full range of return variability in same intervals associated with frazil ice presence (depths less than 4.8 m).

More detailed analyses will follow the planned April recovery of the instruments. It is anticipated that these analyses will further clarify interpretation of SWIP results and allow fuller exploitation of what appears to be a powerful technique for monitoring important aspects of winter freshwater environments including suspended frazil ice.

Thanks to Alberta Environment for their assistance with downloading the data. For more information, visit *www.aslenv.com/SWIP.htm* or contact **Jan Buermans** of *ASL Environmental Sciences Inc.*, Sidney, *BC*, *jbuermans@aslenv.com or tel: 250 656-0177 x125.*

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