THE PROMISES AND PITFALLS OF ESTIMATING TOTAL SUSPENDED SOLIDS BASED ON BACKSCATTER INTENSITY FROM ACOUSTIC DOPPLER CURRENT PROFILER

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Abstract

Mass concentration of suspended solids is one of the properties needed to understand characteristics c sediment transport in bays and estuaries.

Meaningful estimates of total suspended solids concentrations are particularly difficult to obtain becau common methods require collection of numerous water samples that tend to under sample the hig characteristics of suspended solids.

If optical sensors are used they often become useless because of biological fouling after short periods of time in highly productive water bodies.

Acoustic sensors that are routinely used to measure water velocity hold promise as a means of quant estimating total suspended solids from acoustic backscatter intensity, a by-product used in measuremer velocity. A field experiment was designed and carried out in San Francisco Bay, California in October 1998 to investigate the possibility of estimating total suspended solids concentration from backscatter inter measured by acoustic Doppler current profilers.

Results of estimates from two acoustic Doppler current profilers (1200 kHz and 2400 kHz) deployed at tw sites in South San Francisco Bay are described in this paper. Estimated total suspended solids concentrations are found to agree within about 15 percent (of total range of concentration) of values estimated l backscatterance sensors.

Success of these estimates provides promise that this technique might be appropriate for determining suspended solids concentration from commercially available acoustic Doppler current profilers. Some potential pitfalls and limitations of this approach that stem from theoretical limitations of attenuation properties of acoustic waves are discussed.