Geophysical Research Abstracts
Vol. 17, EGU2015-14186, 2015
EGU General Assembly 2015

Evaluation of ADCP backscatter inversion to suspended sediment concentration in estuarine environments

Guan-hong Lee and Hyo-Bong Park
Department of Oceanography, Inha University, Incheon, Korea, Republic Of (ghlee@inha.ac.kr)

Acoustic Doppler Current Profiler (ADCP), designed for measuring velocity profile, is now widely used for the estimation of suspended sediment concentration from acoustic backscatter strength, but its application to estuarine environments has still room for improvement. In this study, we examinedthe inversion capability of two ADCPs with 600 and 1200 kHz at three Korean estuaries: macrotidalHan river estuary (HRE), microtidalNakdong river estuary (NRE), and anthropogenically altered macrotidalYeongsan river estuary (YRE). In particular, we examined the relative importance of the sound attenuations due to water (α_w) and sediment (α_s) in response to sediment characteristics (size and concentration) as well as changing salinity and temperature. The inverted concentration was compared with reference concentrations obtained either water samples or Optical Backscatter Sensors. In NRE and YRE, where suspended sediment concentrations were smaller than 0.2 g/l, the acoustic inversion performed poorly only with α_s (r = 0.20and 0.38for NRE and YRE, respectively), but well with α_w (r = 0.66and 0.42 for NREand YRE, respectively). Thus, it is important to accurately constrain α_w in low-concentration estuarine environments. However, we did not find that the varying α_w performed considerably better than the constant α_w. On the other hand, the acoustic inversion was poorest at HRE regardless of α_w and α_s (r = 0.71 and mean relative error =45%). The large discrepancy appears to result from the poorly constrained, spatially and temporally varying sediment characteristics (grain size, density and concentration) due to non-local sediment transport at macrotidal HRE.