

OCEAN OPTICS XXIV

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Friday, October 12

Oral Session 12

14:00–15:20

14:40–15:00

LIGHT SCATTERING BY WATER: THE DEPOLARIZATION RATIO AND ITS VARIATIONS WITH SALINITY

It is well recognized that one key challenge in further improving our understanding of seawater scattering is the better knowledge of depolarization ratio of water and its variation with salinity. The current uncertainties in this parameter are +/-50%, more than 100 times the uncertainty of any other fundamental physical parameter used in computing the scattering by water. The current value of 0.039 was determined in 1976 by Farinato and Rowell for pure water. However, there has been no verification of their findings, nor any additional studies on the effect of sea salts. Theoretically, disassociated salts ions are expected to produce a change in the anisotropy of the solution, and thus also in the depolarization ratio. We made multiple experiments using a multi-angle light scattering instrument DAWN EOS (Wyatt Technologies) to quantify the depolarization ratio of pure water and its variation with salinity at 532 nm. The experiments differed in how the pure seawater was prepared. In each experiment, 10 – 12 samples were prepared to cover a range of salinity from 0 to 40 PSU. For each sample, the polarized volume scattering functions were measured at 18 angles from 22.45 to 147 degrees. Preliminary analysis indicates that the results are more or less consistent between the experiments. For pure water, our values agree with Farinato and Rowell's value of 0.039 within 10%. The depolarization ratio exhibits a tendency to increase with salinity nonlinearly, increasing by approximately 40% at 40 PSU compared with pure water.

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