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Volume 25, Validation of an In-Water, Tower-Shading Correction Scheme

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Chapter 4

Preliminary Results

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ABSTRACT

The measurements from three field experiments, collected under very different environmental conditions, compare well with simulated model data. Under extreme conditions, however, high uncertainties in the estimated results are produced by excessive instrument tilt and by wave-focusing effects. Shadowing perturbations for very clear waters are restricted to within 15–20 m from the tower legs for upwelling radiance and downward irradiance. The far-field unperturbed distance is reached at 20–25 m in relatively turbid waters. Under overcast conditions, the magnitude of the shadowing effect is larger than under clear sky conditions and the far-field distance is reached at approximately 30 m from the tower legs.

4.1 INTRODUCTION

A selection of data taken from the experiments conducted during the second AAOT tower-shading campaign in July 1998 (Table 2) are used for preliminary intercomparisons between field measurements and model results. The *in situ* conditions were chosen to represent, as comprehensively as possible, the environmental variability found at the AAOT site and to investigate the extent of the influence these diverse conditions have on the AAOT shadowing of radiometric data.

The data chosen for the case studies were taken from three distinct experiments, each one performed on a different day, and selected as follows:

1. Experiment 6 (SDY 191), stratified and highly attenuating waters, clear sky, and data parsed at 9 m depth for all casts;
2. Experiment 16 (SDY 194), homogeneous and very clear waters, clear sky (with haze), and data parsed at 8 m depth for all casts; and

3. Experiment 18 (SDY 195), homogeneous and attenuating waters, diffuse (overcast) sky, and data parsed at 2 m depth for all casts.

The data collected during these experiments and then parsed at the specified fixed depths are of a quality suitable for intercomparison with simulations, and cover a broad range of environmental parameters, i.e., in-water IOPs, solar zenith and azimuth angles, atmospheric optical depths, and illumination conditions. Quality control on selected distance-profiles were carried out to discard data affected by excessive tilts or wave-focusing effects.

Profiles of the *in situ* hydrographic (temperature and salinity) and IOP (spectral absorption and attenuation coefficients derived from AC-9 data) variables are provided in Figs. 7, 8, and 9 for experiments 6, 16, and 18, respectively. Associated with these plots, full profiles of *in situ* optical quantities perturbed by the tower shading are provided in Figs. 10, 11, and 12 for the same three experiments, respectively.

The culmination of the analysis for experiments 6, 16, and 18 are the fixed-depth plots of distance-profile radiometric data, which are provided in Figs. 13, 14, and 15, respectively.

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