during each deployment is limited to *circa* monthly visits by divers to clean instruments, check sensor calibrations against portable underwater lamp sources, and perform minimal maintenance.

Because of these uniquely different measurement requirements, platform related geometry, instrument characteristics, and operational conditions, the protocols applying to the MOBY instruments and methods of measurement and data analysis are presented separately in the present chapter. Where appropriate, certain protocols will be defined and described by reference to other chapters. This chapter documents the protocols used by the MOBY Operations Team to measure and derive the MOBY data sets that consist of the $L_{WN}(\lambda)$ time series. The information is intended as background for those wishing to apply this data to validate water-leaving radiances from one or more satellite ocean color sensors.

2.2 THE MOBY PRIMARY VICARIOUS CALIBRATION SITE

The primary components of the MOBY vicarious calibration site are located as shown in Fig. 2.1. A MOBY is continuously moored approximately 20 km west of the island of Lanai in 1200 m of water. During prevailing trade wind conditions, this location is sheltered in the lee of the island, yet it is far enough offshore to minimize atmospheric perturbations associated with the island's wake. CIMEL[2] sun photometers on Lanai and Oahu, operated by the Aerosol Robotic Network (AERONET) Project (Vol. II, Chapter 4 and Vol. III, Chapter 5), provide time series measurements of aerosol optical thickness and sky radiance distributions that are required to reduce the uncertainty budgets of atmospheric correction models used during vicarious calibration analyses. The MOBY Operation Site, located at the University of Hawaii (UH) Marine Facility in Honolulu, is staffed full time by personnel from the Moss Landing Marine Laboratory (MLML) for buoy maintenance, instrument maintenance and calibration, and for staging buoy relief and bio-optical sampling cruises. The UH's research vessels are used for cruises to support buoy deployments (L-series cruises identified in Table 2.1), Marine Optical Characterization Experiments (MOCE-series), and interim maintenance and quality control operations. During the MOCE and some L-series cruises (Table 2.1), *in situ* bio-optical measurements are made to validate MOBY $L_{WN}(\lambda)$ determinations, to characterize spatial variability near the mooring, and to develop and validate bio-optical algorithms. A subset of the MOBY data is transmitted, in real time via cellular telephone, to the MLML in California. The MOBY data are processed at MLML to produce and extract appropriately weighted band-averaged $L_{WN}(\lambda)$'s for SIMBIOS and SeaWiFS Project Offices at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC), and/or to the MODIS Team at the University of Miami.

MOBY and the Marine Optical System (MOS)

MOBY is a 12 m spar buoy (including the lower instrument bay) uniquely designed as an optical bench for measurements of $E_d(z,\lambda)$ and $L_u(z,\lambda)$ at depths of 1 m, 5 m, 9 m, and 12 m (Fig. 2.2). The features of MOBY are summarized in Table 2.2. Fig. 2.3 is a schematic illustration of the MOBY system's sensors, operations and communications, while the mechanical layouts of the upper and lower instrument bays are illustrated in Fig. 2.4 and Fig. 2.5, respectively. The MOBY spar is tethered to a second surface buoy, which is slack moored, *i.e.* isolated by subsurface floats, to an anchor on the sea floor (Fig. 2.6). Sensors for wind speed, wind direction, air temperature, relative humidity, and barometric pressure are mounted on the main mooring buoy.

The Marine Optical System (MOS), the heart of MOBY, consists of two single-grating CCD spectrographs connected via an optical multiplexer and fiber optic cables to the $E_d(z,\lambda)$ and $L_u(z,\lambda)$ optical heads mounted at the ends of the buoy's 3 standoff arms (Fig. 2.2 and Fig. 2.3). To provide low-loss transmission at ultraviolet wavelengths, 1 mm diameter silica fiber-optic cables are used to connect the optical heads to MOS. $L_u(12,\lambda)$, at z = 12 m, is measured through a window in the bottom of the MOS housing itself. A seventh fiber optic cable connects a surface irradiance $E_s(\lambda)$ cosine collector, mounted at the top of the MOBY above-water mast, to the spectrographs. Each pair of in-water optical heads is mounted on a standoff arm to minimize radiometric artifacts due to shadows or

[2] Certain commercial equipment, instruments, or materials are identified in this document to foster understanding. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.