Ekman Pumping/Suction and Wind-Driven Ocean Circulation From ERS-1 Scatterometer Measurements Over the Arabian Sea During October 1994- October 1995

D. Halpern (Jet Propulsion laboratory, California Institute of Technology, Pasadena, CA 91109; 818-354-5327; halpern@pacific.jpl.nasa.gov), M.H. Freilich (Oregon State University, Corvallis, OR 97331), and R. A. Weller (Woods Hole Oceanographic institution, Woods Hole, MA 02543)

Spatial variations of the east-west and north-south components of surface wind stress are critical in studies of ocean circulation and biological-physical interactions because surface wind stress curl produces a vertical velocity (w_E) in the upper ocean at the bottom of the Ekman layer. The wind-forced w_E acts as a "pump", causing water to upwell and sink. The NSCAT scatterometer provides reasonable coverage and unique direct measurements of vector of winds. However, empirical schemes must be used to generate wind velocity from ERS-1 radar measurements. Three schemes (ESA, IFREMER, and JPL) are evaluated relative to high-quality moored-buoy wind observations recorded in the central Arabian Sea, where high surface waves and high atmospheric water content during the southeast monsoon adversely affect the estimation of satellite-derived winds. The sensitivities of w_E and other wind-driven characteristics of ocean circulation (such as Ekman transport, Sverdrup transport, and Somali Current transport) to different ERS-1 surface wind velocity data products are discussed. NSCAT wind-forced w_E along cruise tracklines during October 1994 to October 1995 are described.