In view of the high cost and sparse spatial resolution of offshore meteorological observations, ocean winds retrieved from satellites are valuable in offshore wind resource assessment as a supplement to in situ measurements. This study examines satellite synthetic aperture radar (SAR) images from ENVISAT advanced SAR (ASAR) for mapping wind resources with high spatial resolution. Around 181 collected pairs of wind data from SAR wind maps and from 13 meteorological stations in Hangzhou Bay are compared. The statistical results comparing in situ wind speed and SAR-based wind speed show a standard deviation (SD) of 1.99 m/s and correlation coefficient of $R = 0.67$. The model wind directions, which are used as input for the SAR wind speed retrieval, show a high correlation coefficient ($R = 0.89$) but a large standard deviation ($SD = 42.3^\circ$) compared to in situ observations. The Weibull probability density functions are compared at one meteorological station. The SAR-based results appear not to estimate the mean wind speed, Weibull scale and shape parameters and wind power density from the full in situ data set so well due to the lower number of satellite samples. Distributions calculated from the concurrent 81 SAR and in situ samples agree well.