Trans-Pacific Asian dust transport has been well documented, but little is known about dust invasion to the South China Sea (SCS). This study presents the first detailed characterization of dust aerosols transported to the northern SCS during the Intensive Observation Period (IOP) of the Seven South East Asian Studies (7SEAS)/Dongsha Experiment in the spring of 2010. On 21 March, a strong Asian dust storm affected large areas from the Gobi deserts to the West Pacific, including Taiwan and Hong Kong, and was also observed by a comprehensive set of instruments at Dongsha Island, a small island (about 2 km², 20°42'52" N, 116°43'51" E) in the northern SCS. Our results show a dramatic increase of particle mass and number concentrations, shift of particle size distributions, and a change of aerosol optical properties due to airborne dust intrusion. Temporal variations of lidar depolarization ratio, dust mass fraction, aerosol hygroscopicity, and scattering Ångström exponent suggest particles have different mixtures (mixing of dust minerals, anthropogenic, and marine aerosols) in the dust-laden air mass. The vertical structure of the dust event indicates transport of aerosols in a shallow layer over the northern SCS. An important implication of these results is that the Asian dust transported to northern SCS may have influence on marine ecosystems. We will further address this implication based on historical records of Asian dust transport to SCS.