

THREE-DIMENSIONAL CHARACTERIZATION OF SAND GRAIN SHAPE AND SURFACE TEXTURE USING A NITROGEN GAS ADSORPTION TECHNIQUE

SIMON J. BLOTT,¹ ALI M. AL-DOUSARI,² KENNETH PYE,^{1,2} AND SAMANTHA E. SAYE¹

¹*Kenneth Pye Associates Ltd., Crowthorne Enterprise Centre, Crowthorne Business Estate, Old Wokingham Road, Crowthorne, Berkshire, RG45 6AW, U.K.*

²*Department of Geology, Royal Holloway University of London, Egham, Surrey, TW20 0EX, U.K.*

ABSTRACT: Shape and surface texture are fundamental characteristics of sand grains, which have long been used by sedimentologists to provide information about grain provenance, transport pathways, and postdepositional weathering. Hitherto, most work on the gross aspects of grain shape (sphericity, roundness, or angularity) has been undertaken on two-dimensional digitized grain images analyzed by Fourier or fractal methods, or simple shape-factor measurements, and studies of grain surface textures have mainly involved qualitative or semiquantitative recording of the relative abundance of a number of discrete surface textural features. Here we describe a new nitrogen gas adsorption technique that can be used to provide information on three-dimensional shape and surface texture with very high precision, and to test hypotheses about sediment sources and postdepositional alteration. The method has been tested on a range of sandy sediments from around the world and found to provide a useful quantitative measure of the shape and surface texture of different sediments, provided that strict protocols are observed in sample preparation.