Hydrodynamic Behaviour of Nummulitids: Numerical Explanation and Discussed Results

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The calculation of hydrodynamic parameters for quantifying the behaviour of tests under water energy stress must take into account several steps; they give much information about environment, transport and accumulation processes. The formation of the so called '*Nummulites* banks' or the distribution of forms and species on a slope or a ramp is still partially unclear and hydrodynamics could give an advance for understanding the mechanical processes leading to the various deposition forms.

The parameters directly measured on the test are: largest diameter (length), intermediate diameter (width), smallest diameter (height or thickness), equatorial section area, axial section area and density. The following parameters are derived from these direct measurements: true nominal diameter, volume, dimensionless size of the equivalent sphere, dimensionless settling velocity of the sphere, critical shear stress, critical shear velocity, shape entropy, settling velocity of a non spherical grain, settling velocity of the equivalent sphere, drag coefficient, terminal settling velocity and Reynolds number.

These parameters and their inter-relations describe the hydrodynamic behaviour of a particle as an answer to the energetic input.

Different kinds of input must be considered in a shallow marine environment such as tides, waves, long shore currents, bottom currents, fluvial plains, hyperpycnal flows, and combinations of these at the same time or in an sequence through time.

Every energy source can be mathematically analysed resulting in numerical evaluation of the input. Combining the form and intensity of energy input with the hydrodynamic response of the test will give an upgrade on the paleoenvironmental reconstruction in terms of physical variables and the geographic setting in each area. Some examples for recognized shallowing upward tendencies, turbulence variation and sea level variations are given just by exercising the calculated hydrodynamic parameters.

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