CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Xavier Brookes; Amanda Hunt

Project Number

35768

Project Title

Variation in Biogenic Sand along the Western Beaches of Okinawa, Japan

Abstract

Objectives/Goals

Does the leeway coastal sand of Okinawa, Japan, along the East China Sea, transport from north to south due to the Black Current and other surface water processes? This experiment should prove that sand moves from north to south along the leeway coast due to the local surface currents which would greatly affect the coastal and marine ecology of the tropical, fringing reef island.

Methods/Materials

Seven sands were collected from isolated beaches along the western coastline. Each collection of sand was passed through several sized sieves. The mass of the different granule sizes were calculated on a digital balance to understand distribution of grain size and sorting. An average of 120 grains and fragments of each sand were meticulously inspected and researched by microscope to include: texture (sphericity, clastic, variation, shape, roundness); biogenic content (general taxonomy). Hydrochloric acid was used to dissolve and measure / inspect composition (biogenic, lithic fragments, human particles) .

Results

The texture of sand grains were inconsistent; though lithic fragments and major biogenic particles tended to be more angular in the south, with no real pattern for sphericity. Of the biogenic structures observed, there was a lack of diatoms and planktonic foraminifera, all of which were benthic. Spicules were present in many beaches, with little to no correlation between them. There was no observable correlation between the compositions of lithic fragments either. According to the histogram of each beach, there is a high leptokurtic peak in all sands except Bottle G , which was different on many counts including a manganese coated surface concluding it must be a paleo sand.

Conclusions/Discussion

The presence of fragile biogenic structures; lack of planktonic organisms; bathymetry; soft coral striations; lack of similar texture, composition, grain size, and sorting account for the determination that the motility is controlled by tidal motions. This means there is an absence of surface currents affirming the lack of motility on Okinawa#s leeway shoreline, disproves the original hypothesis, showing that sand does not move north to south, but rather moved by tides with little net sand deposition.

Summary Statement

Sand motility related to the ecology of a tropical fringing reef island.

Help Received

Lab materials and initial mentoring from John-Henry Cottrell, a teacher at San Jacinto High School. Consulted Dr. W. B. Leatham, sedimentology professor at CSUSB, on gaps of knowledge and result clarifications.

Preliminary