SEDIMENTATION RATE AT SETIU LAGOON USING NATURAL RADIOTRACER ^{210}Pb TECHNIQUE

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ABSTRACT

This study was conducted to determine the sedimentation rate of soil at Setiu Lagoon by using natural radiotracer ^{210}Pb. The area covers a 10 km length lagoon involving 5 sampling stations of approximately 2 km apart. The sediment samples were collected using a corer box comprising of a meter long transparent PVC plastic pipe inserted manually into the sediment bed 2 m below the water surface. The sediment core extracted were then cut into several 5 cm interval, labeled and stored in a close beaker. A total of 24 samples were collected from the 5 sampling stations. The measurement of ^{210}Pb activity was made using Hyper Purity Germanium (HPGe). The total activity of ^{210}Pb was measured from gamma ray peak of energy 46.5 keV and supported ^{210}Pb by the weighted average decay of ^{226}Ra daughters at 295, 351 and 609 keV. Unsupported ^{210}Pb was calculated as the difference between the total and the supported ^{210}Pb activity. Two models were used in this study to calculate the sedimentation rate; the Constant Initial Concentration (CIC) and Advection-Diffusion Equation (ADE) model. The results show that, there are differences in sedimentation rate values of each model for each station. The sedimentation rates obtained using CIC model varies from 0.08 to 0.37 cm/yr whereas ADE model varies from 0.43 to 0.93 cm/yr.

ABSTRAK

Kajian ini dijalankan untuk menentukan kadar pemendapan tanah di Setiu Lagun menggunakan radionuklid ^{210}Pb semulajadi. Kawasan ini meliputi 10 km panjang lagun yang melibatkan 5 stesen persampelan yang jarak antara satu sama lain adalah dianggarkan 2 km. Sampel sedimen telah diambil dengan menggunakan *corer box* yang terdiri daripada paip PVC plastik lutsinar sepanjang satu meter yang telah yang dimasukkan ke dalam sedimen yang jaraknya 2 m di bawah permukaan air. Teras sedimen yang diekstrak kemudian dipotong 5 cm, dilabel dan disimpan dalam sebuah bikar ditutp rapat. Sebanyak 24 sampel diperolehi dari 5 stesen persampelan. Ukuran aktiviti ^{210}Pb telah dibuat dengan menggunakan alat pengesan Germanium Hiper Tulen (HPGe). Jumlah keaktifan ^{210}Pb ditentukan dengan mengukur aras tenaga gamma 46.5 keV dan keaktifan ^{210}Pb lebihan yang turun dari udara boleh diukur pada aras tenaga 295, 351 dan 609 keV. Perbezaan jumlah keaktifan antara ^{210}Pb keseluruhan dan ^{210}Pb lebihan yang turun dari udara akan memberikan nilai sebenar keaktifan ^{210}Pb yang terhasil dalam tanah. Terdapat dua model yang telah digunakan dalam kajian ini, iaitu *Constant Initial Concentration* (CIC), dan *Advection-Diffusion Equation (ADE)*. Hasil kajian menunjukkan bahawa terdapat perbezaan dalam kadar pemendapan di setiap stesen bagi setiap jenis model. Nilai yang diperolehi bagi CIC berubah dari 0.08 ke 0.37 cm / thn dan ADE berbeza dari 0.43 kepada 0.93 cm / thn.