Geophysical Research Abstracts, Vol. 9, 10987, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10987

Turbulent Diffusion in the Coastal Regions

M. Diez(1,3), M.O. Bezerra(2) and J.M. Redondo (3)

(1) Ports de la Generalitat, Vilanova i la Geltru, Spain. (2) CNPQ, Belem, Brasil, (3) Dept. Fisica Aplicada, UPC, Barcelona, Spain

The study of near-shore Dispersion, with the added complexity of the interaction between wave fields, longshore currents, turbulence and beach morphology, needs more detailed measurements of mixing processes in order to understand the complexity of coastal dynamics [1]. Measurements of dye diffusion were performed including simultaneous time series of waves, currents, wind velocities and buoy tracking. Quantitative information from the video images is accomplished using the DigIFlow video processing system. Images can be digitally enhanced to filter "noise" before analysis. The video may be controlled by the computer, allowing remote control of the processing. Spectral analysis on the images has been used in order to estimate dominant wave periods as well as the dispersion relations of dominant instabilities[2]. The measurements presented here consist on the diffusion coefficients measured by evaluating the spread of blobs of dye (milk + fluorescein) as well as by measuring the separation between different buoys released at the same time using Taylor's ensamble method to estimate the diffusivity as well as Einstein's formula. There is an increase of diffusivity with wave height but only if the Wave Reynolds Number is greater than 1000. The other important factors are wind speed and tidal currents. The fit of wind of profiles shows the effect of wave height on the friction parameter allowing to distinguish between swell and spilling or irregular breaking waves. A non dimensional number based on the surf zone width and the wave height accounts for most of the scatter [3]. The spectra of wind and waves are compared and used to estimate horizontal crosshore and longshore diffusivities.

[1] Bezerra M.O., M. Diez, C. Medeiros, A. Rodriguez, E. Bahia, A. Sanchez and J.M. Redondo(1998)Study on the Influence of Waves on Coastal Diffusion Using Image Analysis Journal of Flow,Turbulence and combustion 59, 191- [2] Redondo, J.M., Sanchez, A.; Martinez-Benjamin, J. J.; Jolly, G. S. (1998) J.M.Spectral study of the

ocean surface with SAR , Earth Surface Remote Sensing II; G. Cecchi, E. Zilioli; Eds. Proc. SPIE. Vol. 3496 217-222. [3] Redondo J.M., Sanchez M.A. and Cantalapiedra I.R. (1999) Confined and Unbounded Mixing in Stratified Flows. Mixing and Dispersion in Stably Stratified Flows. Ed. P.A. Davies, Oxford University Press. IMA series 68. 89-104.