S A Hsu, J Marine Sci Res Dev 2014, 4:3
http://dx.doi.org/10.4172/2155-9910.S1.005

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference on
Oceanography
July 21-23, 2014 Hampton Inn Tropicana, Las Vegas, USA

S A Hsu
Coastal Studies Institute, Louisiana State University, USA

Applied Physics of Air-Sea-Land Interaction during a Tropical Cyclone

During a tropical cyclone, the air-sea-land interaction is very active. For example, in 2004 Hurricane Ivan and again in 2005 Hurricane Katrina devastated numerous oil and gas production facilities in the north central Gulf of Mexico as well as over 1,800 fatalities and countless destruction and damages to the near shore infrastructures including bridges and buildings (costing about $81 billion in damages). In order to rapidly estimate these destructions before and after the land-falling tropical cyclones, this presentation provides scientists and engineers with some applied physics of air-sea-land interaction so that rapid assessments may be made. While computer simulations of these destructive forces can be made, the purpose of this paper is for those meteorologists, oceanographers, and engineers who may not have the access of numerical modeling of computational fluid dynamics. On the basis of applied physics of air-sea-land interaction, following formulas are derived and validated using the minimum sea-level pressure (Po in mb) as the most important input. They are: (1) Maximum wind speed (in m/s)= 6.3 (1013 - Po)^0.5; (2) Max significant wave height (in m) = 0.20 (1013 – Po); (3) Max wave setup (in feet)= 0.11 (1013 – Po);(4) Max surface current (in m/s) = 0.22 (1013 – Po)^0.5; (5) Max shoaling depth (in m) = (1013 – Po); (6) Max storm surge (in feet) = 0.23*(1010 – Po)*Fs*Fm, where Fs is a shoaling factor (not the shoaling depth) and Fm is a correction factor for storm motion; And (7) Max bottom (seabed) stress (in N/m^2) = 0.016 (1013 – Po). Examples using these formulas during Hurricane Katrina in 2005 are also provided. Some contents of this presentation are just published in June 2014 in the Global Journal of Researches in Engineering: E, Civil and Structural Engineering, Volume 14, Issue 2, Version 1.0, pages 1 thru 16.

Biography

S A Hsu is the Professor of Oceanography and Coastal Sciences (Emeritus), Louisiana State University (LSU) since 1969 after he completed his Ph.D. in Atmospheric Sciences (specializing in the physics of air-sea-land interaction and engineering hydrometeorology), Department of Civil and Environmental Engineering, the University of Texas. He published world-first textbook entitled “Coastal Meteorology” by Academic Press in 1988 and over 120 articles in refereed journals, encyclopedias, and book chapters in the fields of coastal and marine meteorology, air-pollution meteorology, air-sea interaction, and hydro- and engineering meteorology. Dr. Hsu is a Certified Consulting Meteorologist (certified by American Meteorological Society in 1979) for numerous corporations and law firms. Prof. Hsu is also the Co-Editor-in-Chief for “The Open Ocean Engineering Journal".

sahsu@lsu.edu