



## **On Joint Effects of Wave and Storm Surge to the Coastal Areas in Taiwan**

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### **ABSTRACT**

Copula function and Compound Extreme Value Distribution (CEVD) were used in this study to calculate the joint probability of significant wave height and water level. Comparing with the traditional method, the copula function can quantify the correlation between different variables. On the other hand, the Compound Extreme Value Distribution solves the problem of shortage in samples by the use of the typhoon occurrence frequency. This study purposed a new definition for the destructive time period by typhoons for a coast with considerations of background wave height and swell simultaneously.

This study employed Typhoon Extreme Value Culling Method (TEVC) and Wave Height Threshold Culling Method (WHTC) to select data for our analysis. The data selected by TEVC needed to be multiplied by simulations due to the lack of samples. The joint probabilities of wave height and water level obtained by the TEVC as well as WHTC are very close. It was found that the result of WHTC is more sensitive to the threshold of wave height. The return period calculated by CEVD was smaller than copula, while the return period calculated by CEVD is similar to that of the traditional method. This study showed that CEVD is more suitable than WHTC.

**KEY WORDS:** Wave, Storm Surge, Joint probability, Copula, Compound Extreme Value Distribution.