

論文 / 著書情報
Article / Book Information

題目(和文)	ベトナム南部地域における台風がもたらす高潮や高波に関する研究
Title(English)	Analysis of Typhoon Risk associated with Storm Surge and Wind Waves in southern Vietnam
著者(和文)	LETuan Anh
Author(English)	Letuananh
出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第11346号, 授与年月日:2019年12月31日, 学位の種別:課程博士, 審査員:高木 泰士,神田 学,秋田 大輔,中村 隆志,VARQUEZ ALVIN CHRIST
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第11346号, Conferred date:2019/12/31, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	要約
Type(English)	Outline

Thesis Outline

This thesis is titled “Analysis of Typhoon Risk associated with Storm Surge and Wind Waves in southern Vietnam” and consists of 6 chapters in English.

Chapter 1 “Introduction” describes the background and necessity of this research. A comprehensive review of related past research papers and research reports is provided to explain the current state of typhoon disaster research in Vietnam. It is pointed out that the possibility of a large typhoon taking place in Southern Vietnam, including the Mekong Delta, is considerably smaller compared with the northern and central parts of the country. Furthermore, there are few studies on coastal disasters such as typhoons and storm surges in this area. Thus, a method such as numerical analysis techniques for the assessment of typhoons and storm surges disaster risks in southern Vietnam is necessary.

Chapter 2 “Typhoon Perception in Southern Vietnam” presents the results of statistical analysis of the number of typhoons that have landed in Vietnam over the past 60 years, as well as typhoons in southern Vietnam based on the results of interviews with residents in the coastal villages of the Mekong Delta and Con Dao island. We are trying to evaluate the relationship between the frequency of occurrence and residents' awareness of typhoon disasters. In the Mekong Delta area, the number of typhoons is significantly lower than in the northern and central areas, but on average, typhoons and tropical cyclones are approaching once every 10 years, indicating that typhoon risk cannot be ignored. Interviews show that residents rarely experience typhoons, but they have some understanding of storm surges and other phenomena caused by typhoons. This point is related to the fact that many residents still remember Typhoon Linda, that landed in the Mekong Delta in 1997 and killed more than 3,000 people. On the other hand, psychological concerns about typhoon disasters are scarce, revealing that knowledge about disasters and awareness are not necessarily correlated.

In Chapter 3, “Coupled Storm Surge – Wave Model using Meso-scale Data”, a numerical analysis model that couples storm surges and waves is proposed. Among several possible methods, in this study, we have implemented an integrated storm surge and wave analysis model using the mesoscale numerical forecast model provided by the Japan Meteorological Agency for weather field analysis. On that basis, we conducted a disaster survey of Typhoon No. 21 that occurred in September 2018 and caused tremendous storm surge and high wave damage in Osaka, Wakayama, Hyogo, and Tokushima. Based on the survey results and observation records of the Japan Meteorological Agency, it is shown that this integrated analysis model gives high-accuracy estimation over a wide range for both storm surges and high waves.

Chapter 4 “Coupled Storm Surge – Wave Model using Parametric Typhoon Model” describes a model that uses a simple parametric typhoon model to calculate meteorological fields against the background that precise mesoscale numerical forecast data is not available in Vietnam at present. The validity of the model is confirmed in the case of The 1997 typhoon Linda. The tide level data observed in the Mekong Delta was used to verify the accuracy of the storm surge when the wave data from the Gulf of Thailand was used to verify the accuracy of the waves. It shows a good

agreement between simulated and observed data. Moreover, the evaluation of typhoon risks in lowland areas such as the Mekong Delta shows that it is necessary to appropriately evaluate the surplus water level rise caused by the mutual interference between storm surges and waves. The coupled model implemented in this study is effective for this evaluation. In addition, in Typhoon Linda, fishing boats operating offshore have suffered high waves and many lives have been lost. The simulation using the coupled model reveals that the wave height is 8 m or more off Con Dao island, which is extremely high compared to the constant wave in the sea area. Since this parametric model has a high accuracy of high wave analysis around the typhoon path, it shows the possibility of being used for evacuation guidance of fishing boats operating on the typhoon path.

Chapter 5 “Discussion” points out that disaster prevention education at schools and disaster prevention education for children and fishermen are particularly important based on the results of interviews with residents. Based on this, the idea of a concrete plan that contributes to disaster reduction and disaster prevention in southern Vietnam is shown, such as applying the integrated storm surge and wave analysis model constructed in this study to hazard mapping.

Chapter 6 “Conclusion” summarizes the conclusions of this study.