

**Report on the short-term overseas study program
for KU Engineering students
Graduate School of Engineering, Kyoto University**

Name:	Shoko Sato	Date:	2022-10-14
Department/ Undergraduate School:	Civil and Earth Resources Engineering	Grade:	Second year
Main body:	<p>I went to University of Notre Dame through this program in September, 2022. University of Notre Dame is located in South Bend, Indiana state. This university is a prestigious private Catholic university and its campus has several religious buildings. Almost all buildings are authentic and so beautiful (Figure1).</p> <p>While I'm staying in University of Notre Dame, I was sitting in Computational Hydraulics Laboratory (Figure2) and I worked with Professor Westerink and Professor Kennedy. Professor Westerink is one of members who created ADCIRC that is used worldwide (Figure3). Professor Kennedy is one of Professor Mori's collaborators and his research focuses on waves, storm surge, boulders in coastal areas. Thanks to him I was able to go to University of Notre Dame.</p> <p>The purpose of my work at University of Notre Dame was to improve the accuracy of ADCIRC's calculation results around Japan by using more detailed bathymetry and shoreline datasets. During the first couple of days, I spent most of time learning about ADCIRC and running examples of 'OceanMesh2D' which is a program to create triangular meshes for ADCIRC (Figure4). After that, GEBCO and Japan detailed bathymetric datasets, and Japan</p>		



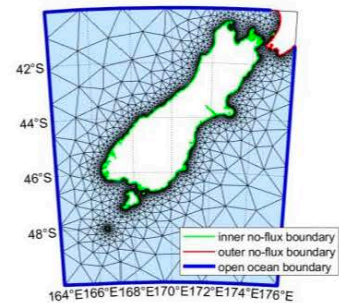
Buildings in the campus



Computational Hydraulics Lab



Prof. Westerink (center)



Triangular meshes around New Zealand

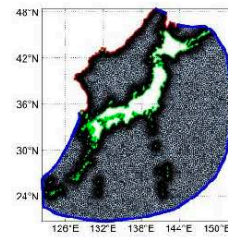
detailed shoreline vector datasets were collected. In the second week, I could obtain meshes around Japan by using these data (Figure5). It was very difficult to convert the data into a form that could be used in OceanMesh2D.

In the third and last week, I was working on running ADCIRC. Because it was first time to use ADCIRC, I was so excited but had many problems. It was especially difficult to get stable results. If the boundary conditions and calculation range are not properly chosen, the calculation will not be stable and strange points will appear in the results. It took quite a bit of time, but thanks to kind lab members, finally ADCIRC calculation became stable.

During the last two days, ADCIRC with obtained meshes was tested in the example case of typhoon NANMADOL (Figure6). The ADCIRC results were compared with the observations at 8 stations. The result showed good agreements at some stations (Figure7). In addition, I could capture the typhoon NANMADOL moving by making GIF of water level (Figure8).

From here, I will share the various events that took place at the University of Notre Dame. The first essential topic to start with is about football game. There is a stadium with a capacity of approximately 80,000 people in the campus (Figure9). At Notre Dame, football is not a university club activity, but a city business. In addition to paying for tickets to games, everyone in attendance buys Notre Dame team uniforms and merchandise, and parties are held around town before and after games. I have

Fig5



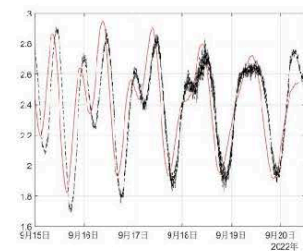
Meshes around Japan

Fig6



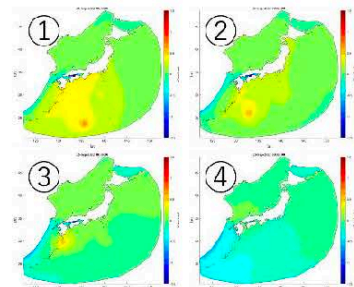
Typhoon NANMADOL track (weather news, 2022 Typhoon NANMADOL Track Map, <https://weathernews.jp/onebox/typhoon/2022/14/>)

Fig7



ADCIRC result and observation at Omaezaki station (red: ADCIRC, black: observation)

Fig8

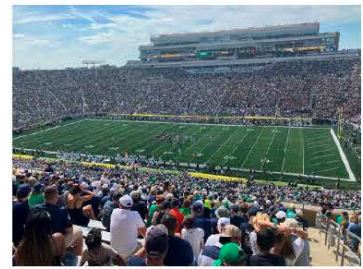


Capturing typhoon NANMADOL moving

been to BTS concert and ARMY (their fan name) is known for their enthusiasm, but South Bend on game day was even more enthusiastic than that. I spent the morning with my lab members going through several tailgates (Figure10), then after the game we went to a Mexican restaurant for dinner and enjoyed a whole day of game day (Figure11).

During my stay at Notre Dame, I ate delicious food every day. Burgers, mac & cheese, sandwiches, pepperoni pizza, donuts, cookies, cup cakes, and so on (Figure12,13). I attended many seminars and meetings, and there was always food available. I think this is a very good culture. Notre Dame always has free food somewhere every day (this is actually what I was told!). You have to take care of your health, but you can live on free food during the week.

In summary, through this project, I learned about ADCIRC and OceanMesh2D and was able to use them. I also attended various seminars and meetings and learned about the research being done at Notre Dame and in the US. This was very inspiring for my research and life as a young researcher at Kyoto University. I am aware that I only saw the best parts of the U.S. since my stay was only one month, but this motivates me to try to get more opportunities to go abroad in the future. I would like to continue working on my research and improving my communication and English skills.



Notre Dame Stadium



Tailgates



Mexican restaurant



Pepperoni pizza



Donut, cookie, cup cake