

“Sustainable Weather, Climate, Oceans and Water Services for a Resilient Pacific”

Fourth Meeting of the Pacific Meteorological Council (PMC-4) Working Papers

14-18 August 2017
Honiara
Solomon Islands

**Agenda Item 16.2 Ministry of the Environment, Government of Japan (MOEJ) Project:
Develop the cost-effective methodology to assess the impact of natural hazards (Storm Surge and Storm Wave) considering the climate change scenarios for Small Island Developing States, with applying the satellite-based remote sensing technology.**

Purpose:

1. To introduce the Ministry of the Environment, Government of Japan (MOEJ) Project: Develop the cost-effective methodology to assess the impact of natural hazards (Storm Surge and Storm Wave) considering the climate change scenarios for Small Island Developing States, with applying the satellite-based remote sensing technology
2. To report on activities and achievements conducted under the auspices of the project through RESTEC

Background:

3. Preparation against natural disasters caused by extreme weather, which may be exacerbated by global warming, should be one of important issues of adaptation strategies to climate change. Small Island Developing States (SIDs) have difficulties to apply global climate models since the grid size is too large to represent the complex morphological variations of SIDs. The IPCC AR5 report listed the countries vulnerable to cyclones and many SIDs are listed as one of those vulnerable countries.
4. The Ministry of the Environment, the government of Japan (MOEJ) started the project to develop a methodology for the evaluation of climate change impacts on storm surge and storm wave hazards. The project targets Fiji, Samoa and Vanuatu. The project is one of the activities as the contribution to the Japan's national adaptation plan and it is connected with the activities in Asia-Pacific Adaptation Network and Paris Agreement.

Project Objectives:

5. To evaluate the natural hazards - Storm surge and waves, evaluated as key hazards in the Small Island Developing States (SIDS)-, the Study team funded by Ministry of the Environment, Government of Japan (MOEJ) develops the prototype to evaluate, identify and disseminate those hazards to the stake holders.

6. The models of storm surge and waves are based on the historical cyclone data and estimate the statistical hazards on coastal area. The cases occurred in similar climatologic condition is used for validation. In addition, the applying of climate scenario is now on-going. The prototype of 3D-based hazard map system will be developed on the WEB to disseminate the output of storm surge simulation. The system is expected to be designed for data sharing with stakeholders.
7. The innovative feature of the project is integrating the Japanese R&D resources. The researchers from University of Tokyo and Kanazawa University are creating the offshore wave height dataset for each Climate scenario/return period as the baseline data. Also they are evaluating the storm surge/wave hazards along with the coastal areas in three target countries (Fiji, Samoa and Vanuatu). The engineers of Remote Sensing Technology Center of Japan (RESTEC) apply the satellite-based remote sensing technology to assess the water depth around the coastal area by SDB (Satellite Derived Bathymetry) technique and the 3D-based hazard map is made by satellite-based Digital Elevation Model (DEM) and high-resolution optical satellite images.

Update:

8. The important goal in the developing methodology is to design the sustainability in each target country. SIDs already have a certain amount of research/survey output regarding the natural hazards as the outputs of the project by the international donors. However most of the research/survey does not cover the whole country nor renew in a certain period because of the budgetary reasons. The study team has been exchanging the information with stake holders in the South Pacific Island countries for this issue such as SPREP, SPC, USP, JICA, NIWA, ADB, World Bank and UN-ESCAP and the governmental agencies in Fiji, Vanuatu and Samoa.
9. In the workshop, the speaker will share some ideas for the regional collaboration with applying the developing methodology.

Recommendations:

10. The Meeting is invited to:
 - Note through RESTEC and its partners considerable progress has been made on the implementation of the project.
 - Recommend that additional resources will be needed to upscale the project and replicate the project in other countries.

Attachments

- Annex 1 Work Plan for 2017-2018
- Annex 2 Current Status of R&D

[Annex 1: Work Plan for 2017-2018]

1) Develop prototyped hazard information for each target area in 3 counties.

The team will finalize R&D and develop the information.

The information has 9 contents as maximum - each 3 probabilities x 3 RCP scenarios

	RCP 2.6 (Low Risk)	RCP4.5 (Likely)	RCP8.5 (High Risk)
30 years	30-L	30-M	30-H
50 Years	50-L	50-M	50-H
100 Years	100-L	100-M	100-H

<Target Area>

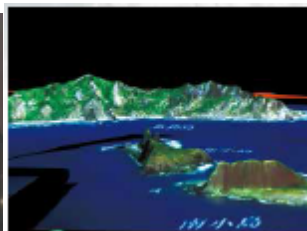
Country	Area	Field Survey
Fiji	Suva	Done
Vanuatu	Takara	17-18 Aug, 2017
Samoa	TBD	N/A (using existing LiDAR)

2) Develop the projection mapping system to the public (for Suva case)

The team will set up the projection mapping system with applying the scenario developed for the dissemination purpose.

The base system is called as P+MM.
(PROJECTOR + MAPPING MODEL)

The applying scenario will be selected because of its purpose (dissemination)



3) Workshops

The following workshops will be held in the region to;

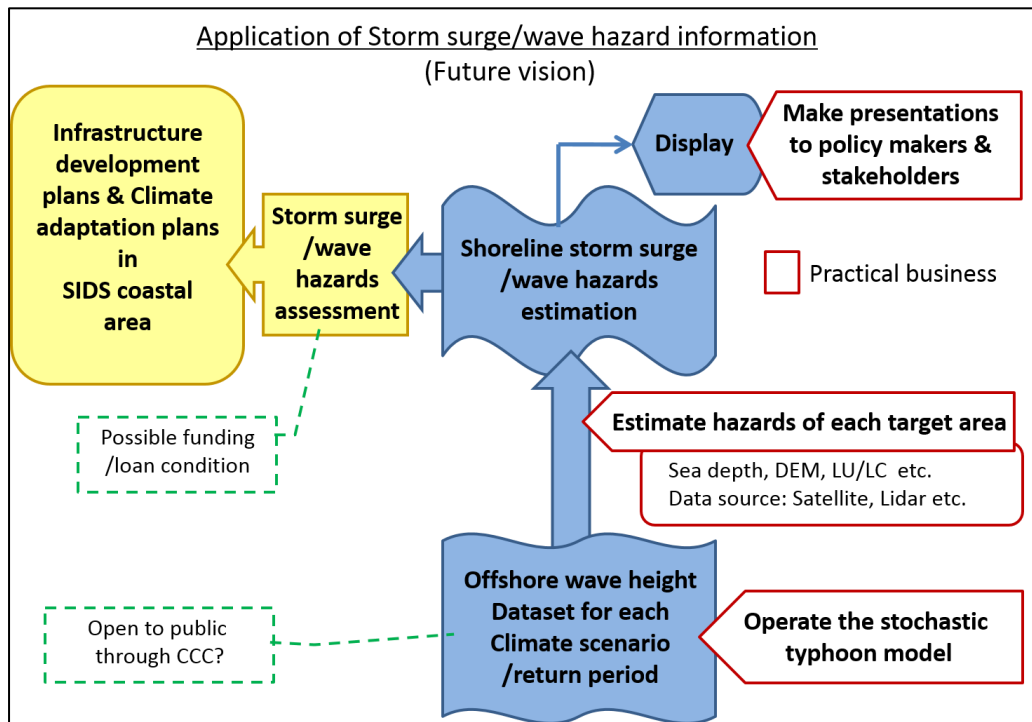
- share the on-going activities and results by the project.
- discuss toward the sustainable operation with the cooperation among international donors, regional related projects
- seek the possibility to apply the results to NAP (National Adaptation Plan) in SIDS.

2017-2018 1st Workshop will be held at Suva, Fiji on 25 Sep, 2017

2017-2018 2nd workshop will be held at Apia, Samoa on the latter part of Jan, 2018.

[Annex 2: Current R&D status]

1) The methodology

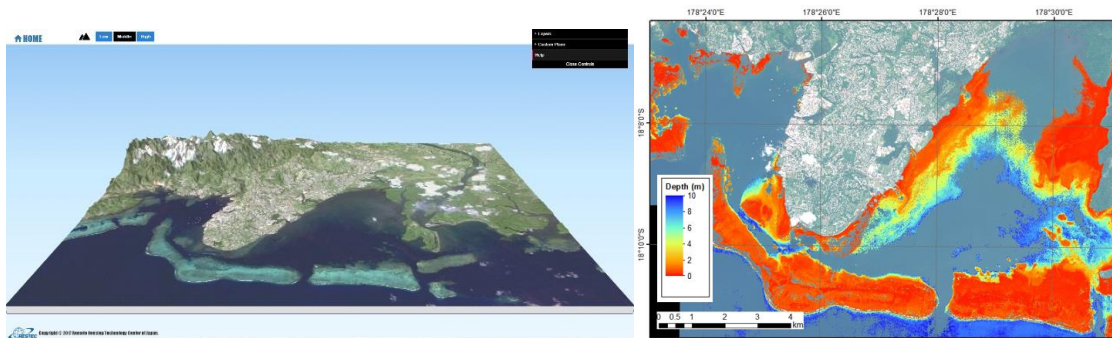


The methodology developing on the project aims to establish cost-effective way to estimate potential hazard led by storm surge / wave led by TC in the South Pacific region and possibly it can be applied to other region.

From 2016, the research team has been developing the system. The current status as bellow;

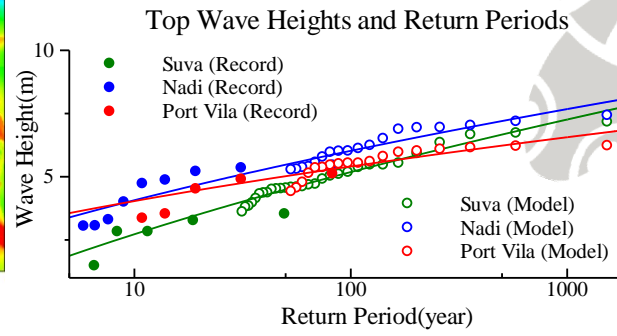
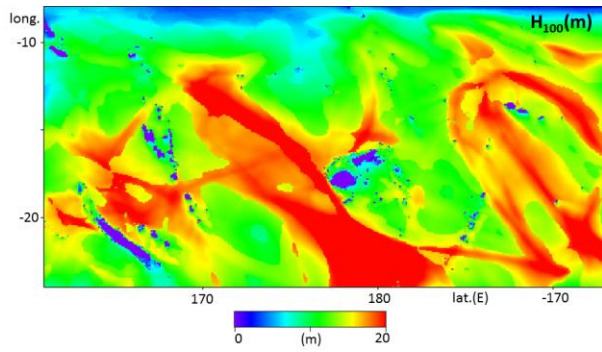
2) Status: Prepared the mapping system using satellite based sources.

The team developed the web-based mapping system with applying satellite based DSM (Digital Surface Model) and SDB (Satellite Derived Bathymetry). Regarding SDB, the team checked its accuracy by conducting the field survey -its highest accuracy is 0.32m (RMSE)



3) Status: Storm Wave Estimations applying numeric model

The team (Prof. Tajima, U-Tokyo) is analysing maximum wave height by developing the numeric model. For the analysis, historical records of TC tracking routes from 1966-2015 are inputted.



4) Status: Future Hazard Estimation applying climate change scenarios. The team (Assc Prof. Taniguchi, Kanazawa University) has started the worst case simulation applying RCP scenarios.

