Progress Report on the GROWTH (GNSS Reflectometry for Ocean Waves, Tides, and Height) Research Project

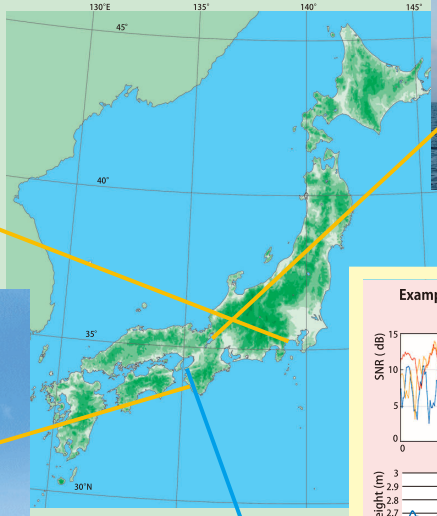
- **Scope:** To evaluate the capabilities of GNSS-R observations for oceanographic phenomena with different time scales, such as ocean waves (1/10 to tens of seconds), tides (one or half days), and sea surface dynamic height (a few days to years).
- **Research Duration:** January, 2015 – March, 2017
- **Sponsor:** MEXT (Ministry of Education Culture, Sports, Science and Technology, JAPAN)

Cross-platform GNSS-R measurement data, together with in situ simultaneous oceanographic observations, will be compared after adequate temporal averaging that accounts differences of the footprint sizes and temporal and spatial scales of oceanographic phenomena.

1 Marine observation towers


(Photo: The Univ. Tokyo)

● Hiratsuka: Face to Pacific Ocean (20m height)



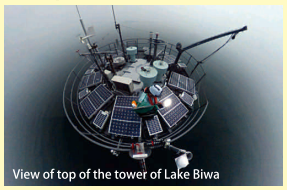

(Photo: Incorporated Administrative Agency Japan Water Agency Lake Biwa Development Integrated Operation & Maintenance Office.)

● Lake-Biwa: In a large lake without swells (7m height)

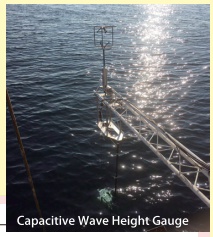

(Photo: Kyoto Univ.)

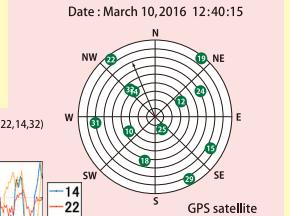
● Nanki-Shirahama: At an entrance of large bay (20m height)

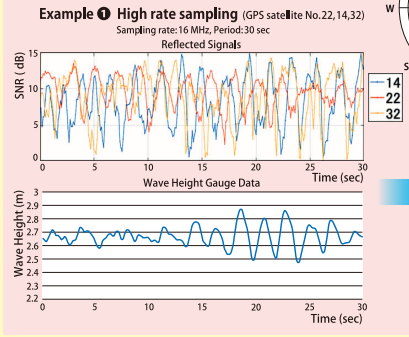
Examples of measurement data

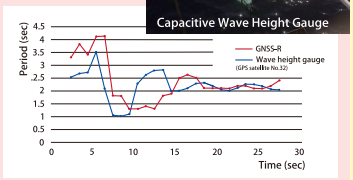

View of top of the tower of Lake Biwa

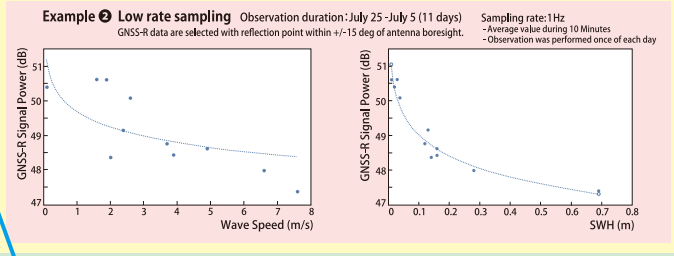

GNSS-R receiver with birdrepelling tool


Capacitive Wave Height Gauge









SWH and Wind Speed Dara are provided by Lake Biwa Development Integrated Operation & Maintenance Office.

2 Multi-copters (about 100 to 200 m height)

Confirming footprint size dependency on ocean GNSS-R data (Taking off of multi-copter on board)

3 CYGNSS data (about 500 km height)

A ground station (12m dia. antenna) of Wakayama University were moderated as a CYGNSS data downlink station. Compatibility tests were performed at July, 2016.

Preparation for receiving CYGNSSscience data was completed.

The authors wish to acknowledge Prof. Dr. Chris Ruf, Mr. Randy Rose, Dr. Scott Gleason, and the CYGNSS team for their sophisticated suggestions.

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