Long-term Change Detection of the Coastal Zone in Bangladesh Using Multiple Satellite Data

*HALIPU AYIHUMAIER[1], Youngjoo Kwak[2], Akihiko Kondoh[3]

1. Graduate School of Science and Engineering, Chiba University, 2. International Centre for Water Hazard and Risk Management, 3. Center for Environmental Remote Sensing,Chiba University

The Bangladesh floodplain covers approximately 80% of the country which is formed by the deposition of alluvium by the network of the Ganges-Brahmaputra-Meghna Rivers.
Bangladesh has a subtropical monsoon climate characterized by rainy and dry seasons. In particular, floods occur frequently in the rainy season causing erosion and deposition due to intense rainfall and unexpected river discharge. The people living in the riverine and lowland areas are substantially affected by flood and storm surge. Satellite remote sensing is crucial to the understanding of natural disasters in coastal areas of Bangladesh because earth observation data can detect long-term coastal changes at the large scale. The objective of this study is to detect and clarify the relationship between the long-term coastline changes and hydrological events using time series data from multiple satellites between 1993 and 2016.
First, geometric corrections were performed for different types of satellite data including JERS-1SAR and ALOS PALSAR. Next, the coastline was traced into polylines on each image in order to convert to GIS data in ArcMap (ESRI). Erosion and sedimentation were extracted from the changes of the coastline. Correlations between erosion, sedimentation, precipitation and water level were analyzed to understand the mechanism of the coastal changes.
Preliminary results showed that erosion and sedimentation occurred simultaneously in the Ganges Estuary area between 1993 and 2016. We found that precipitation and water levels both contributed significantly to the changes of erosion and sedimentation in the study area. Strong erosion and sedimentation processes have been occurring continuously along the coastal area for over 14 years. At the same time, sandbar repeated appearing and disappearing by deposition and erosion in the middle of the channel in a short period of time.

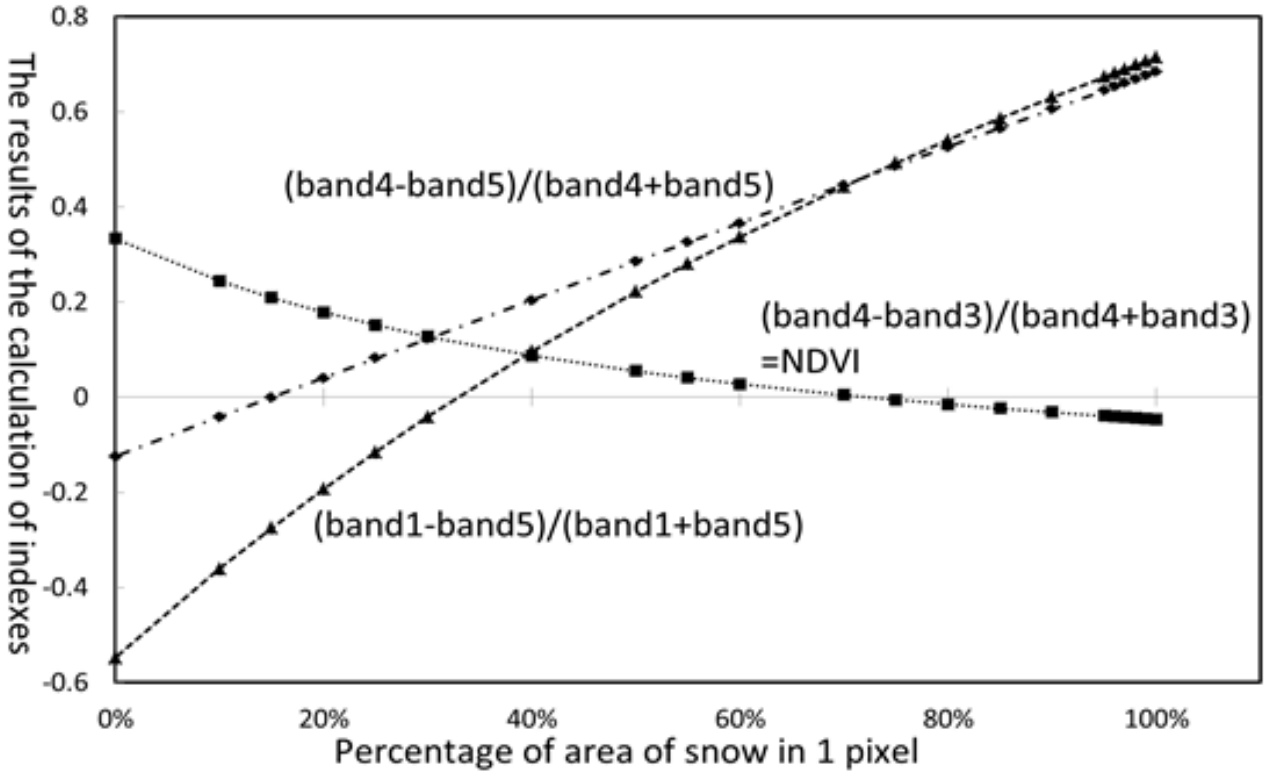
Evaluation of Covered Area with Tree in Forest using Satellite Remote Sensing

*Azuki Ito[1], Tomoki Fukita[1], Rinako Kiski[1], Koki Kamada[1], Kuriki Murahashi[2], Yohei Kawase[3], Lucy Lahrita[3], Hiroshi Kawamata[1,4], Nobuyasu Naruse[5], Yukihiro Takahashi[1,2]

1. Global Science Campus, Hokkaido University, 2. Graduate School of Science, Hokkaido University, 3. Graduate School of Agriculture, Hokkaido University, 4. Institute for the Advancement of Higher Education, Hokkaido University, 5. Shiga University of Medical Science

Forest occupies important position for global environment. Especially, trees in forest play major role for fixing carbon dioxide, leading to deceleration of global warming. In our knowledge, the covered area with tree in forest is evaluated by the cost- and time- consuming method such as aircrafts, high resolution satellite images, and field survey. Alternative inexpensive method covering the wide area is issue of interest. Here, we propose the method which combines the new index R described below with low-resolution Landsat 7 remote sensing, applying to branches of trees on mountainous areas covered with snow because it’ s easy there to distinguish between vegetation and non-vegetation. Figure displays two new index R= (band1(4)-band5)/(band1(4) +band5) and normalized difference vegetation index (NDVI) in varying the ratio of branches to snow in a pixel. As to the reflectance spectra of branch, Beech (that is a deciduous broad-leaved tree and widely distributes in Japan) is adopted as the model species. Both slopes of our new indexes Rs have more steep than conventional index, NDVI, which means the formers are more sensitive than the latter.
Following these results, we would examine other indexes using other wavebands. Our final goal of this study is to establish the most effective index to estimate quantity of trees by satellite remote sensing. The detail will be shown in the presentation.

Keywords: Remote sensing, Beech, Forest, Covered Area



Seeking the distribution of cryoconites using satellite images

*Daichi Yamaga[1], Ally YASUMOTO[1], Hiroshi Kawamata[1,2]

1. Global Science Campus, Hokkaido University, 2. Institute for the Advancement of Higher Education, Hokkaido University

Cryoconites, which are small dark objects on glacier are formed by cyanobacteria tangling with minerals, melts the glacier faster because of its high absorption of sun light. These cryoconites were researched only by field survey which was valuable, low frequency and could only be researched in small ranges. Also there were some remote sensing researches about darkening and regression on the glaciers. However cryoconites have had difficulties in distinguishing with clouds, sands, shadows and other dark things on the glacier. Here, according to the different luminance’s between the glacier and the cryoconite, we propose a new method with using multispectral bands of Landsat8 (resolution 30m), band2 (450-515nm, B2) and band5 (850-880nm, B5) to distinguish those two by making a new formula” (B5-B2)/(B5+B2)” (R). At the range of B2, the cryoconite’s reflectance is about 10 %; otherwise the glacier has high percentage. In the range of B5, the cryoconite’s one is about 20%; in contrast the glacier’s almost half. The satellite images we use in 2016 July 30th, are analyzed since the cryoconite appeared widely and well in the period of 2016 late July to the beginning of August. We were successful in removing the shadow on this image by comparing R and RGB image. If a pixel in R is brighter than the other images, the place of the pixel should contain cryoconite or sand. We used the satellite image from 2016 July 30th. This is because the cryoconites appeared well in the period of 2016 late July to the beginning of August.
The calculated index(R), in their spectra from previous studies, applied that both of the cryoconites and the sands take a positive value while the glacier take a negative value in the pixel.
The criterion will be shown in the presentation.

Keywords: cryoconite, remote sensing, glacier

