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| **Type the title of your abstract**Improving Land Use Classification Using Sentinel 2 and GEDI Data in the Andean Region |
| **Introduction/Aim:** The region from the Andes to the Amazon holds diverse ecosystems due to the different environments created by the great differences in elevation. These mountain ecosystems provide a variety of ecosystem services for human livelihoods. On the other hand, their functions have been severely degraded in recent years due to anthropogenic deforestation and forest degradation and large-scale fires caused by the El Niño phenomenon. Proper landscape management is necessary to conserve forests and maintain ecosystem services. For this purpose, highly accurate land use classification maps are necessary, and wide-area mapping using satellite data is expected. However, conventional optical sensors have limitations in understanding the state of forest degradation and classifying similar classes of reflectance spectra. Therefore, this study aims to improve the accuracy of land use classification by using 3D information from GEDI in addition to conventional optical sensors.**Methods:** The study area is located in southern Peru. A ground-truth survey was conducted in the field to obtain teacher data for classification. In non-forest land use, land use classes, geographic coordinates, and local conditions were recorded, and in forests, a survey was conducted to estimate forest biomass to provide one indicator of forest degradation.　Sentinel-2 and GEDI data were used as satellite data. Since the target area is susceptible to cloud cover throughout the year, we extracted cloud-free areas from all satellite data for one year within the target area in GEE. For the Sentinel data, the percentile data was used to plot height against percentile, and the pattern of this curve and the height at the 95th percentile were used to determine whether the area was forest or bush and to classify the degraded state of the forest.　Classification was performed on the cloud-removed Sentinel-2 satellite data using the ground-truth data and class data obtained from the GEDI data using the random forest method and compared to the results of classification without the class data obtained from the GEDI data.**Results:** **I**n the study area, the "forest" and "shrub" classes are difficult to classify due to similar reflectance spectral characteristics. This may be due to the fact that "shrub" is not a forest, but has similar reflectance spectral characteristics to forest due to the large number of woody plants growing in it, and that many forests are also similar in texture with a height of 3 to 5 m, but only about 10 m. Using GEDI data, the differences between these classes The GEDI data could be used to clarify the differences between these classes. Isolated forests that are considered relatively degraded and surrounded by agricultural lands show a linear relationship of observed height to percentile of observed data, whereas inaccessible native forests show curves that suggest a large difference in height between the tops of trees and their surrounding canopy areas.Classification accuracy using the random forest method with class data obtained from the ground-truth and GEDI data improved accuracy by about 5% compared to the results of classification without class data obtained from the GEDI data. |

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