remote sensing

Editorial

Editorial for the Special Issue "Disaster Monitoring Using Remote Sensing"

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Human civilization is rapidly developing thanks to the spread of geospatial technology and artificial intelligence. People all around the world are leading richer lives with the help of these technologies. However, the size of natural disasters is growing and causing many casualties and damage to property. Since it is difficult to accurately predict when, where, and how large a disaster will occur, such events have huge ripple effects on the social and economic spheres. Natural disasters can be very large in scale, so it is important to quickly detect their scale and progress through continuous monitoring. For such disaster monitoring, various kinds of high-resolution, satellite-based sensors, high-altitude images from aircraft and drones, MMS (multiple mobile sensors), CCTV (closed-circuit television), etc., can be utilized.

This Special Issue includes articles on new technologies and solutions to image-based disaster information extraction that help with disaster monitoring and situational awareness. This Special Issue consists of seven research papers [1–7]. All the papers used remotely sensed imagery for disaster monitoring with state-of-the-art methods and demonstrate theoretical and practical contributions. The first paper assessed flood vulnerability (FV) using four indicators, including elevation, slope, index of relative socio-economic disadvantage (IRSD), and hydrologic soil groups (HSGs) [1]. It was found that a combination of low elevation, low slope, low IRSD score, and very-low-infiltration soils resulted in very high levels of flood vulnerability.

Sometimes, high-resolution spatial data are very effective in detecting the occurrence of a potential disaster. For landslide events, the questions of how to rapidly detect landslides and obtain landslide data re significant topics. The second paper in this Special Issue employed object-oriented classification to extract landslide data from high-resolution GF-1 and Sentinel-2 data [2]. The destructiveness of the landslide Is determined by comparing the results of object-oriented classification before and after the landslide. The authors combined the geological structure, rock lithology, spatial location, landslide occurrence process, elevation of the study area, precipitation, and the impact of human activities to analyze the causes of the landslide. High-resolution image data are also effective to detect active faults. The third paper detected active faults by performing a detailed topographic analysis of aerial LiDAR images, which produced high-resolution images and DEMs at greater than 20 cm [3]. Using LiDAR images and DEMs, a 2–4 m high fault scarp and 50–150 m deflected streams with dextral offset were identified.

New technologies, such as artificial intelligence, can also be used for monitoring a disaster event. The fourth paper constructed a comprehensive grassland drought monitoring model using the random forest (RF) technique, which is currently being widely used in the field of artificial intelligence, and tested it in Inner Mongolia [4]. There was a significantly positive correlation between the drought indicators output by the model and the standardized precipitation evapotranspiration index (SPEI) measured in the field.

In recent decades, European countries have faced repeated heat waves. The fifth paper evaluated the spatial crosscorrelation of Greenhouse gases Observing SATellite (GOSAT)

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CO_2 concentrations with repeated heat-wave-induced photosynthetic inhibition in Europe by applying geographically weighted regression (GWR) [5]. The local standardized coefficient of a fraction of photosynthetically active radiation (FPAR) and the normalized difference vegetation index (NDVI) indicate that photosynthetic inhibition increases atmospheric CO_2 in Europe.

Wildfires are predicted to occur more frequently and intensely as a result of global warming. The sixth paper investigated the correlation between fire count (FC) and soil properties, such as soil bulk density, taxonomy, and texture, using machine learning in Pakistan [6]. In the results, the temporal variations in the FC are negatively correlated with soil properties, and multivariate linear regression models based on soil properties offer superior estimates of FC than linear regression models based solely on elevation. Spatiotemporal distribution of wildfire occurrences can be detected by the burstiness of the events. The seventh paper discussed the characteristics of the spatial distribution of forest fire occurrences with the local indicators of temporal burstiness [7]. It was found that the frequency of forest fires was increasing at intervals of about 10 years. With the local indicators of temporal burstiness, the areas with remarkable temporal irregularities in forest fire occurrences can be identified.

Finally, various methods were proposed in this Special Issue to monitor natural disasters including flood, landslide, active fault, drought, heat wave, and wildfires. Comprehensive situation awareness and decision support for disaster response can be provided by conducting various spatial analysis using the proposed techniques and high-resolution, remotely sensed data.

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