Special Edition on Geohazards - Editorial

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The papers in this special issue of the SAJG were produced from a project undertaken by the South African Council for Geoscience (CGS) funded by DST from 2010 to 2014. The aim of the project was to develop a South African Geological Hazards Observation System (SAGHOS). Geological hazards are naturally occurring or human-induced phenomena that present risks to life and infrastructure. The geohazards investigated include landslides, coastal geohazards, terrestrial erosion, earthquakes, mining-related deformation, sinkholes and subsidence, geochemical hazards, problem soils, tsunami and groundwater vulnerability. The study not only entailed the assessments of the mechanisms of formation of geohazards and their impact areas, but also provided a framework and proposals for their long-term monitoring. It was particularly evident that the development of remote sensing and spatial analysis techniques would be instrumental in the cost-effective regional assessment and monitoring of geohazards.

Coastal geohazards are discussed by Musekiwa *et al.* (2015), Callaghan *et al*. (2015), Fourie *et al*. (2015), Cawthra and van Zyl (2015) and Machutchon (2015). Musekiwa *et al.* (2015) discuss the creation of a coastal vulnerability map for South Africa. The criteria used included elevation to chart datum, beach width, tidal range, wave height, geology, geomorphology, anthropogenic activities, distance to 20m isobaths and relative sea level change. The values of these parameters were divided into classes and the various classes ranked on a scale of 1 (very low vulnerability) to 5 (very high vulnerability) and the layers were combined using map algebra to create the final vulnerability map.

Callaghan *et al.* (2015) discuss the use of remote sensing for the detection and monitoring of coastal erosion in False Bay, South Africa, using Landsat satellite imagery and aerial photographs. Image differencing, tasseled cap transformations, vegetation index differencing and post-classification change detection techniques were performed on the Landsat imagery. The aerial photographs were assessed using the Digital Shoreline Analysis System (DSAS), which determines statistical differences in shoreline position over time.

Fourie *et al.* (2015) investigate the coastline retreat to the east of Monwabisi Beach in False Bay, South Africa. The analysis was done using aerial photographs and wave data to establish whether there is a relationship between the dynamic wave action and the observed erosion within the study area.

Machutchon (2015) discusses the use of digital elevation models (DEMs) created from mobile laser scanning, conventional beach profile data (acquired using a differential global positioning system (DGPS)) and LiDAR data (obtained using an aircraft). The DEMs were used to assess sediment dynamics and erosional trends at Monwabisi Beach in False Bay.

Cawthra and van Zyl (2015) discuss projected inundations for tsunami waves in low-lying areas on the South African coast. The methodology presented provides a simple means of determining coastal areas susceptible to a significant inundation by far-field tsunami waves.

Terrestrial erosion is the focus of the paper by Singh *et al.* (2015), who present the temporal study of erosion along the Xolobeni coastal strip in KwaZulu-Natal. This study uses remote sensing to provide information on the inter-relationship between vegetated classes and bare areas using the Normalised Difference Vegetation Index (NDVI) data derived from multi-temporal Landsat data.

The subject of problem soils is the highlight of the paper by Cole *et al.* (2015), which focuses on a study using ASTER satellite imagery data and standard remote sensing techniques, for example band ratios, in identifying expansive soils around the town of Odendaalsrus in the Free State Province, South Africa.

Maya *et al.* (2015) present two papers on geochemical hazards. The first is a study on the assessment of coal mining pollution using geochemical data and ASTER remote sensing data in the town of Emalahleni, in South Africa. Trace metal contamination was assessed using the Nemerow index, the Geoaccumulation index (I_{geo}) and the Pollution loading index. The second paper focused on the investigation of geochemical hazards associated with the mineralogical and heavy metal contents of mineral salts found in the East Rand area of the Witwatersrand Basin, which is affected by acid mine water drainage. Powdered X-ray diffraction techniques were used to identify and quantify mineralogical phases and a scanning electron microscope was utilised to determine the morphology of the identified minerals. The concentrations of major cations and anions were determined using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Ion Chromatography (IC). Geochemical modelling was used to predict the saturation levels of the minerals.

The papers provided in this special edition clearly demonstrate how remote sensing and spatial analysis techniques could be used for assessing and monitoring geohazards in South Africa. I would like to thank the Editor and Board of the South African Journal of Geomatics for the opportunity of publishing in this journal.