Paper Number: 4493

The Bongwana Natural CO_2 Release

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The natural CO_2 release near the village of Bongwana in KwaZulu-Natal province in South Africa was first described in the early 20th century as dry gas exhalations (98% CO_2) along a line cutting through farmland over approximately 150 metres [1]. Since then little work has been reported, however other gas seeps and the formation of travertines have been noted and it is thought the CO_2 release is caused by an ~80km long fault cutting through the tillite caprock above a potential carbonate hosted CO_2 reservoir [2,3]. A team of UK and South African researchers performed initial fieldwork and reconnaissance in September 2015 and results to date are presented.

Figure 1: Umtamvuna 'Cone Spring' Travertine, KwaZulu-Natal, South Africa.

Preliminary studies were carried out to better document the surface emissions using near surface gas monitoring, understand the origin of the gas through major gas composition and stable and noble gas isotopes and improve understanding of the structural controls on gas leakage through mapping. In addition the impact of the leaking CO_2 on local water sources (surface and ground) is being investigated, along with the seismic activity of the fault. The investigation will help to build technical capacity in South Africa and to develop monitoring techniques and plans for a future CO_2 storage pilot there.

Early results suggest that CO_2 leakage is confined to a relatively small number of spatially-restricted locations along fault. Fracture permeability appears to be the main method by which the CO_2 migrates to the surface. The bulk of the CO_2 is of deep origin with a minor contribution from near surface biogenic processes as determined by major gas composition. Water chemistry, including pH, DO and TDS, and stable isotope composition is notably different between CO_2-rich and CO_2-poor sites. Soil gas content and flux effectively delineates the fault trace in active leakage sites.

References:

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