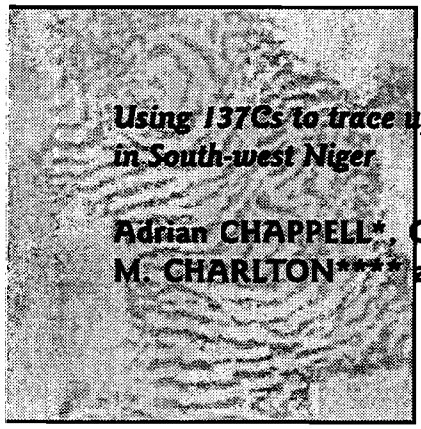

Using 137Cs to trace upslope migration of banded vegetation in South-west Niger

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Recent studies of banded vegetation have suggested a successional model, in which bare bands are colonised by a pioneer front on the upslope side of a vegetation band. Vegetation patterns in south-west Niger have been interpreted to suggest that spatial transitions reflect this form of temporal succession, and in these patterns there is corroborating evidence for slow up-slope migration. However, given the inherent difficulties of long-term field experiments there are few data to judge the validity of this model.

The use of the artificial radionuclide caesium-137 (137Cs) to provide information on net soil flux over the past 30 years offers potential in this regard. Furthermore, the identification of various types of soil crust, which can induce different types of hydrological behaviour, provides valuable information for predicting soil evolution. To test the hypothesis that banded vegetation migrates upslope, a 70 m transect encompassing two vegetation bands and a single bare lane was sampled in south-west Niger. The transect was aligned orthogonal to the bands and approximately parallel to the direction of water, soil and nutrient flow. Soil samples for gamma-ray spectrometry and particle-size analysis were collected along the transect at twenty one locations with 1 m intervals in the lower part and three samples were obtained on the upper part. Prior to collection, the soil surface characteristics were examined to distinguish between crust types and to identify the presence of termite activity.

The results emphasise the utility of these techniques for examining the net redistribution of soil over periods of three decades and its relations

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to vegetation succession. The amount of soil eroded was found generally to decrease downslope, whilst the proportion of fine silt in the soil generally increased downslope. These patterns correspond with the location of the erosion and sedimentation crusts identified using a standardised classification. The relations between microtopography and net soil flux may also explain some of the spatial variation in soil redistribution processes. The intensity of crust and 137Cs measurements on the upslope edge of the lower vegetation band enabled the calculation of the upslope migration rate (c. 0.3 m yr-1) which coincided with other independent studies in the same region. Moreover, because considerable spatial variations in topography and soil flux were found to occur over very small distances, further detailed studies over larger areas will be needed.