The landscape change of salt and alkaline land in semi-arid district before and after flooding

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This paper adopted relief map and TM, SAR image, impaling the image disposal technology of Remote Sensing and the space analysis technology of Geography Information System, and combining landscape ecology theory to analyze the effect of flooding before and after 1998 on soil salinization. The analysis includes several aspects such as quantiy, spatial distribution and landscape distribution of salt and alkaline land in Zhenlai county. The results show that the sun-acreage of saline-alkali land in Zhenlai Counly in creased by 13929.5hm2 after the flood. The connectivity and integrity of saline-alkali land increased as well. Furthermore, the center of Gravity of saline-alkali offset from west to east 1.57km. The offset of the flooded area is 1.53km, and that of the non-flooded area is 3.68km. The offset distance, flooding has the effect to slow up the offset of the saline-alkali land. By contrasting the change ratio of unit area of saline-alkali land between flooding zone and no-flooding zone , it is found that the change ratio of all kind of saline-alkali land in flooding zone is higher than that in no-flooding zone at large. For example, the ratio of heavy grade of saline-alkali land in flooding zone is 5 times of that in no-flooding zone. The ratio of moderate grade saline-alkali land in flooding zone is 4.5 times of that in no-flooding zone. The ratio of gentleness grade saline-alkali land in flooding zone is 1.1 times of that in no-flooding zone. It is conculuded that the flooding has the effect to promote the extension of saline-alkali land in half arid district after the flooding. Though studying the integrity and average area of the saline-alkali patch of the landscape distribution, the landscape distribution of the saline-alkali land in the flooded area is obviously different from the non-flooded area. At the same time, the degree of salinization is higher in the flooded area than that in the non-flooded area after the flooding. The flooding push forward the speed and speed of the saliniztion in the half arid district where the terrain is low-lying and level of groundwater is higher.

Paleoproterozoic crustal growth in West Africa: Archean or modern tectonics?

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The Paleoproterozoic granite-greenstone terrains of the West African Craton represent the key area to study the transition from the Archean so-called “vertical” tectonics towards the modern “plate” tectonics. Our study was focused on structural evolution, geochemistry and metamorphism of the eastern and western Burkina Faso and eastern Senegal.

Geochemical data suggest that the greenstone (GS) belts, composed of tholeiitic basalts/gabbros and voluminous calc-alkaline intermediate sequences, originated in the volcanic arc setting at ~2.2 Ga. Presence of subduction zones is furthemore supported by the cold metamorphic gradient in some of the metasediments found in the eastern Burkina Faso. Compared to the Archean terrains, the proportion of komatiites and ultramafic rocks is extremely low, which suggests only limited mantle plume activity.

The calc-alkaline tonalite-trondjemite-granodiorite magmas, associated with the subduction zones, as well as younger granitoids were syntectonically emplaced into the greenstone belts during a long period from 2.18 to 2.10 Ga. No structures indicative of “sagduction” of greenstones into granitoids were found in the study area. Structural analysis of three GS belts in western Burkina Faso shows that the regional scale geometry is controlled by the rheologically strong mafic and intermediate volcanic rocks, which form up to 400 km long synforms. The granitoids are syntectonically emplaced into the presumptive antiforms between the belts.

Some of the granitoid intrusions induced a thermal overprint of the pre-existing cold metamorphic gradient in the tectonically burried greenstone belts. This is recorded as isobaric heating of Barrovian-like assemblages of garnet, straurolite and kyanite bearing micaschists. Decompressional cooling documented by the growth of sillimanite and cordierite is consistent with tectonic exhumation from the depth of at least 18 km to the depths of 4-6 km.

To conclude, our data point to the existence of subduction and collisional zone settings, which operated in a modified way compared to the present-day analogues.