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Structural analysis of the southern Ashanti Belt, Ghana, using airborne geophysical data

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The southern Ashanti Greenstone Belt, in Ghana, is an area of major economic importance for West Africa, where many companies are actively exploring for gold. As a consequence, a significant geological data set has been collected over the years, but it has not always been subjected to an integrated interpretation, especially away from the main Ashanti fault system and the Tarkwaian portion of the belt, such as around the Wassa Mine. The gridded resolutions of the regional and mine-scale airborne geophysical surveys are 100 m and 25 m respectively. Using this geophysical data and field observations, we have revised the geological and structural map of the south of Ashanti Belt, and have produced a new map around the Wassa mine. Along cross-section of these maps, the inversion of the data with GM-Sys allows us to extend the map in the third dimension.

These new data, combined with previous studies in the area, suggest the presence of 4 or 5 deformation events, associated with plutonism between 2200 and 2000 Ma: a first phase of NW-SE shortening (D1), previous to Tarkwaian sediments ; after them, a second phase of this shortening (same orientation) (D2 or D1b), mainly characterized by large folds oriented NE-SW in the Birimian and the Tarkwaian. The next phase of shortening (D3 or D2b) is oriented WNW-ESE and presents 100-1000m wavelength folds on each side of the Ashanti Belt. At local scale, we can see other deformation events (D4, D5 ?), with subhorizontal cleavage and folds or with reactivation of previously structures.

The next step will be the 3D modeling to finally understand the structural and temporal relationship between the observed structures.