

Interactive comment on “Non-cylindrical parasitic folding and strain partitioning during the Pan-African Lufilian orogeny in the Chambishi-Nkana Basin, Central African Copperbelt” by Koen Torremans et al.

Anonymous Referee #1

Received and published: 15 February 2018

Dear editor of Journal of Solid Earth Find enclosed the review of the ms with Manuscript Number: se-2018-6

Non-cylindrical parasitic folding and strain partitioning during the Pan-African Lufilian orogeny in the Chambishi-Nkana Basin, Central African Copperbelt by Koen Torremans, Philippe Muchez, Manuel Sintubin

The submitted manuscript is a scientifically sound field study on parasitic folding in the Lufilian belt and nicely linked with mineralization in the Copper Belt. The paper

C1

reads well, and referencing adequate. I have no objections for publication after minor corrections. There are some minor open questions that could be addressed before publication. These concern regional aspects, mechanics and style of folding and mineralization:

Regional aspect concerning timing of tectonometamorphic event: Orogenic phases are determined by geochronology (monazite and argon ages). These ages are obviously derived from “basement” and granitoids but give the impression that the sedimentary cover (Roan, ...) is metamorphic. I would mention the fact that no such data (except for mineralization) are available from the sedimentary sequence but from inliers. Thrust slices with eclogite are found, that may provide information upon the geodynamic setting (I suggest to comment on this). Somewhat related to this: There are no comments on the metamorphic grade of the sediments, except that fibres with tremolite are mentioned. The reader wants to be informed upon the metamorphic grade of sediments, at least there was some mass transfer to hinge zones which requires mobility to derive the Ramsay type 1C folds.

Folding aspect: I wonder if there are co-genetic faults associated with folds. There must be huge decollement zones to accommodate different structural styles in basement and sedimentary cover. As far as I remember there is Neoproterozoic salt present that could have easily accommodated shear and solve space problems. Please comment on this.

Mineralization aspect: For a potential reader interested in the Lufilian Belt primary precipitation on remobilization of ore is of prime interest. In the abstract you write: “This work provides an essential backdrop to understand the influence of the Lufilian orogeny on metal mineralization and (re-) mobilization in the Copperbelt”. I do not fully agree with this statement. You elaborated very well the remobilization and enrichment of ore bodied due to the folding period. However, this is re-mobilization. There is no information of the potential source (except few comments in the intro) and primary mineralization. I am aware that this is not prime topic of your paper but I would appreciate

C2

comments on this.

Comments with reference to chapters: 1 Introduction. Informative and reflects aim of the paper 2 Geological and Geodynamic Setting 2.1 Regional geodynamic context Informative and good summary of events. In addition I suggest mentioning and interpreting the eclogites (hidden in the text “talk kyanite” and in Fig3). Many people are not aware of them and if they are related to a subduction like process they represent one of the most remarkable features in the belt.

2.2 The Chambishi-Nkana Basin and Nkana Cu-Co deposit Fine 3 Methodology 4 Lithofacies Variation in the Copperbelt Orebody Member at Nkana (COM). Fine but fig 5 is hard to read and, frankly speaking, I do not see the prime value of the figure in the frame of your MS. At least insert a color code to make it better readable. 5. Structural analysis 5.1 Foliations and structural polarity 5.2 Folds 5.2.1 Multiple order folds along the eastern limb of the Chambishi-Nkana syncline For unfamiliar reader specify shortly the range of C and K and the meaning of those numbers. 5.2.2 Non-cylindrical periclinal fold geometries 5.3 Faults and shear zones 5.4. Mineralization in relation to structural elements Fine 6. Interpretation 6.1 Lithofacies variation 6.2 Development of foliation fabrics 6.3 Apparent strain gradients and strain partitioning along the eastern limb of the Chambishi-Nkana syncline 6.4 Non-cylindricity, interference patterns and strain accommodating mechanisms in folds 6.5 Timing of faulting All fine 7 Discussion 7.1 Synthesis and timing of structural events in the SE Chambishi-Nkana Basin 7.2 Factors influencing fold geometries I agree with the simpler version of monophase folding 7.3 Influence of basement and extensional basin structures on inversion tectonics. Just statements in that chapter – may or may not be. Too little work is done on pre-convergent configuration 8 Conclusions Fine Figures: I could not relate the Kafue Evaporate Member (KEM) on Fig 2, instead I found REM

For further (minor) comments see attached file.

Please also note the supplement to this comment:

C3

<https://www.solid-earth-discuss.net/se-2018-6/se-2018-6-RC1-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-6>, 2018.