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## A new method to determine the deformation of conglomerate rocks and their material properties



An international group from University Tübingen (Germany) in collaboration with the UAB Geology department have published a study about the conglomerates deposited by rivers in central China over a billion years ago. They have discovered a new method to determine the amount of deformation during mountain building periods and its material properties. In this manner, geologists can now measure the shape and orientation of pebbles in a conglomerate and plot and understand the creation of the modern continents.

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An international team of geologists lead by Prof. Paul Bons and Dr. Hao Ran, from the University of Tübingen (Germany), in collaboration with two researchers from the Geology Department of the UAB (Dr. María-Gema Llorens and Dr. Albert Grier) investigated ancient conglomerates, deposited by rivers in central China over a billion years ago. Conglomerates are sediments that consist of river pebbles in a muddy matrix. Deep burial of the sediments and shearing of the rock during mountain building periods have squeezed and stretched the pebbles to ellipsoids. With computer models the research team replayed this deformation to find out what the amount of deformation was, but also to determine the material properties of the pebbles and the

surrounding mudstone. This resulted in a new method to determine these parameters for any deformed conglomerate. Geologists can now measure the shape and orientation of pebbles in a conglomerate and plot the results in a specially developed graph to obtain the amount of deformation and the material properties of the rock. Using this method, we could determine that the conglomerate from China was stretched about 300%, but the pebbles much less, because they were about five to eight times stronger than the surrounding mudstone. These results in turn help to find out how small continents came together to create the modern continents that we know, such as the present-day Chinese part of Eurasia.



Figure 1. Deformed conglomerates in the North China Craton compared with one of the simulations. (a) Tectonic subdivision of the North China Craton (modified after Zhao et al., 2005). TNCO is the Trans-North China Orogen. (b) Simplified geological map of the Yangjiaogou area and location of the outcrop with deformed Hutuo Group conglomerates. (c) and (d) Interactions between pebbles in outcrop compared with a numerical simulation at a finite strain of eight. From Ran et al., 2018.

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### References

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