

Reconstruction of the evolution of the Tasmanides in eastern Australia

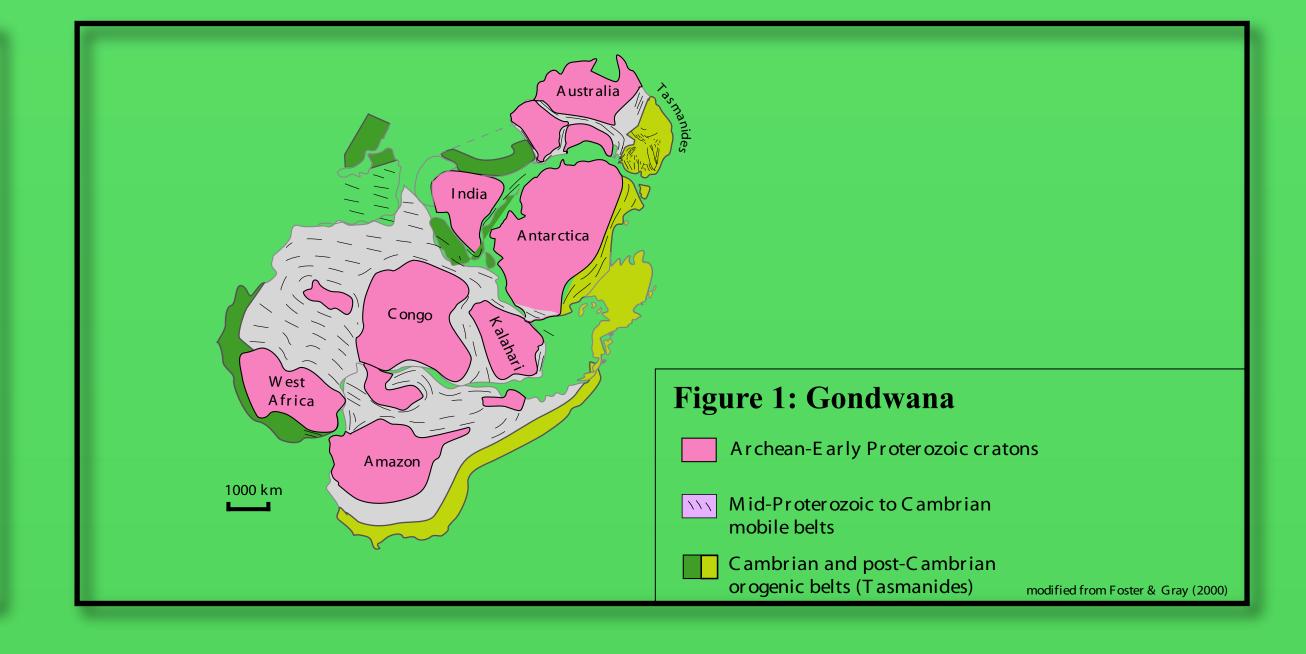
with special emphasis on the 440 Ma mineralizing event

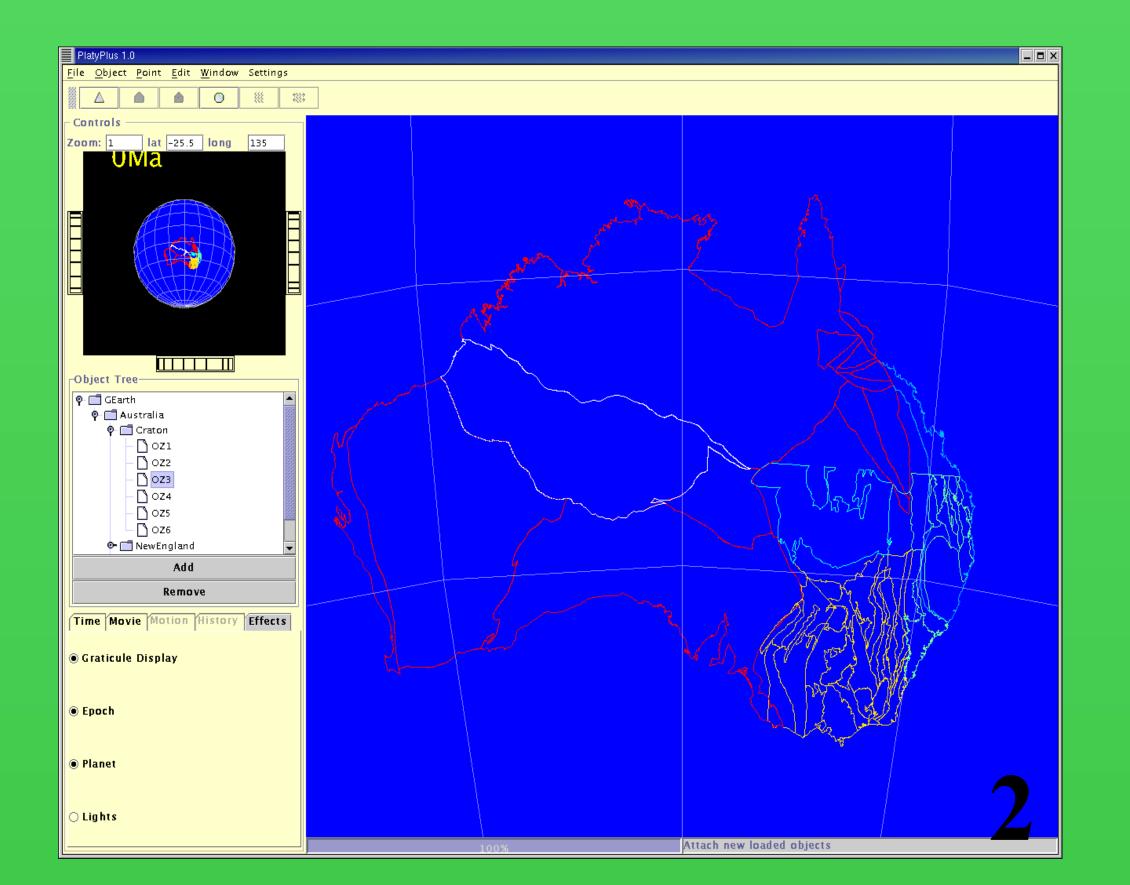




I. Introduction

The Tasmanides in Eastern Australia are part of an orogenic system along the margin of Gondwana that extended through Antarctica to the Andes in South America in Paleozoic times for almost 20,000 km (figure 1). In Australia it stretches from Tasmania in the south to Cape York in northern Queensland and is as wide as 1500 km (Coney et al., 1990). The evolution of the Tasmanides and the amalgamation of the various tectono-stratigraphic terranes is poorly constrained. This project aims at unravelling the tectono-stratigraphic history of the Tasmanides in Eastern Australia and ultimately along the entire margin of Gondwana, by means of various tools described in section II. As the Tasmanides are host to world-class mineral deposits, among which are Bendigo and Cadia, focus will be on the generation of ore deposits, particularly gold, along terrane-bounding faults and the mechanisms governing the formation of these deposits along the orogenic margin. One of the events of particular interest occurs at 440 Ma, resulting in the generation of large amounts of copper and gold. A reconstruction of the tectono-stratigraphic situation around this time may lead to increased knowledge on processes important in the generation of large ore deposits in accretionary orogens.



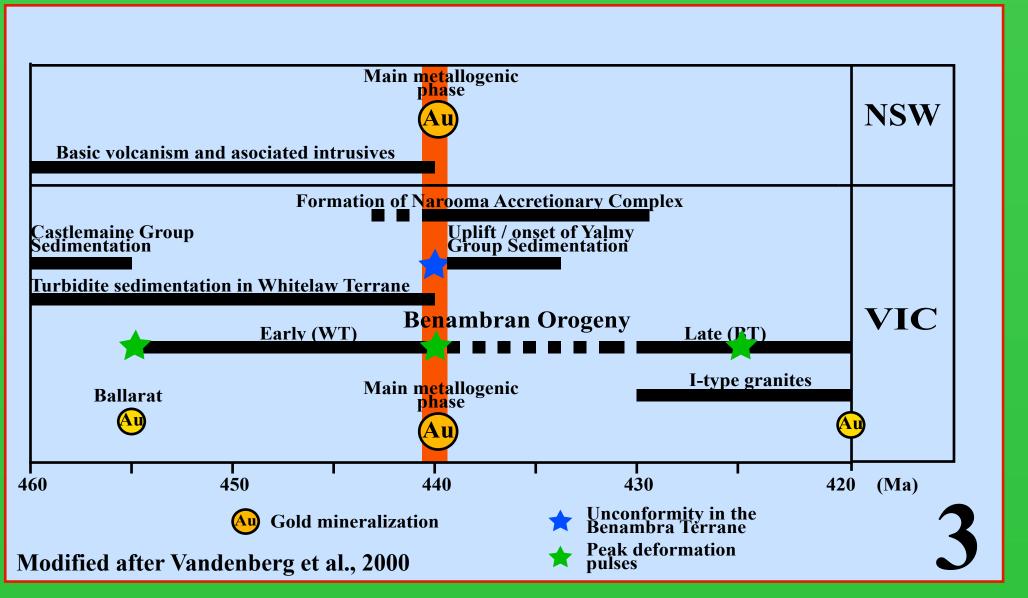


II. Tools and expected outcomes

PlatyPlus software (figure 2) provides a tool to create reconstructions from plate to terrane scale, based on spatio-temporal constraints (e.g. arc volcanics with a certain age range indicate the presence of a subduction zone near that region in that age range). Time-space plots (figure 3) and an extensive GIS database (figure 4) can be used to develop such spatio-temporal constraints. When intergrated into PlatyPlus, a well- constrained evolution of the Tasmanides can be generated. In conjunction, an attempt will be made to better constrain the relationship between the tectonic evolution of the Tasmanides and ore genesis within this framework. In particular the role of trans-lithospheric fault systems in generating major ore deposits and how they evolve through time will be addressed. This large-scale approach links with the A1 project (figure 5) in terms of: - the creation and evolution of trans-lithospheric fault systems through time,

- the timing of mineralization along these structures (during extension or shortening),

- increased insight in the plate tectonic setting governing the generation of ore in the evolution of accretionary orogens. Ultimately, this reconstruction will provide a framework to build a 3-dimensional model of the lithosphere (figure 6). This model may aid in identifying the important factors for endowment of crustal scale structures and may result in better prediction of the occurrence and position of large ore deposits in accretionary orogens (figure 7).



Images:

- 2. View of Australia in PlatyPlus. Image shows a division of Australia into tectono-stratigraphic terranes (in particular in E. Australia), which can be moved around in time and space depending on spatio-temporal constraints.
- 3. Preliminary time-space plot for NSW and Victoria around 440 Ma.
- 4. GIS map of Eastern Australia that can provide constraints to be used in the reconstruction and gives a broad overview of major structures and geology.
- 5. Part of the A1 global database used for identification and comparison of significant mineralized faults.
- 6. Example of 3-dimensional cross section through an arbitrary part of the lithosphere
- 7. These tools will aid in better targeting large ore deposits ...



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