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Interactive comment on “A mesoproterozoic continental flood rhyolite province, the Gawler Ranges, Australia: the end member example of the Large Igneous Province clan” by M. J. Pankhurst et al.

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This is an interesting contribution that describes one of the largest continental rhyolitic provinces in the world represented by the Gawler Range Volcanics (GRV). The authors interpret a large part of this volcanic province as resulting from eruption from a central group of feeder vents along a short period of time (<2 Ma). The required low viscosity, comparable to basalts of continental flood eruptions, can be the result of a combination of high temperatures and dissolution of halogens like F. The interpretation of a single, or central, eruption for the whole rhyolite-dacite association needs a more careful ex-

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amination of field and mapping relations. The information shown by the authors is too concise on this respect. The aeromagnetic image is not clear to define precisely lobe geometries and the supposed radial distribution. Possibly an improved image and the superposition of geological and morphological maps may help to distinguish the lava lobes. These observations must be convincing particularly in this case in which lava flows are so old, 1600 Ma!. The second point of interest that needs improvement is about the chemistry of the lavas. This is critical to calculate viscosities. It is important that the selected composition corresponds to a liquid. This means that crystals were in equilibrium and formed by crystallization of that liquid and that post-consolidation modifications were not important. Alkalis are critical in calculating viscosities and these are the most mobile by alterations. Twelve samples were analyzed but no information is given on Table 2. Only two data. Are these averages? Or representative samples? Are rhyolites and dacites linked by fractionation form a common magma? Plotting of the 12 analyzed samples may help to understand any criteria for calculations. One of the two samples, the dacite, is too rich in Fe with molar Fe/Fe+Mg ratio >0.9. This sample is too poor in CaO (1.1 wt%) for a dacite and too rich in Fe for a rhyolite. It does not plot on a cotectic of alkali-calcic system. Likely, this sample was altered and is depleted in CaO. Examination of variation trends and trace-element patterns for immobile elements (e.g. REE) may help to discern about the nature of these samples in order to select those representing liquids. Other minor points are:

Abstract: the last sentence is not clear. “The erupted portion of the felsic end-member...” Also the meaning of end-member is not clear in the title.

Introduction (and other parts). In general Ma is preferred instead of M yr.

Section 2. Include in the heading “Age and morphology...” Pag. 254 line 27: We consider this... (this refer to what?) Pag. 255 line 2: ... et al. (2008) See comments above about the interpretation of Fig. 2. Section 3 “Physicochemistry” Change this title for another one more accurate in relation to the content of this section. For instance, “Temperature and viscosity” or “geochemical and rheological properties” The subhead-

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ing 3.1 is not necessary. Pag. 256 line 12. "...data range over 200 °C..." this range is 100 °C according to data on line 8 on this page.

Section 4 Pag. 258 line 18: close MPa, not M Pa (correct throughout the text) Pag. 258 line 20: The estimation of 1 wt% water is reasonable according to phase equilibria. However, the comparison of this figure with LOI is fortuity and nonsense in old lavas subject to weathering and possibly metasomatic transformations.

An additional discussion that authors must take into account is about the implications for a large magma chamber beneath the volcanic system. The homogeneity in composition and mineral assemblages, which produced homogeneous viscosity within large volumes of magmas, is compatible with a single magma chamber with the dimension of a large batholith. Are the plutonic rocks associated to the volcanics (they have the same age) representing this large magma chamber? Which is the driving force that triggered the eruption of a so large volume of low-viscosity magma?

Interactive comment on Solid Earth Discuss., 2, 251, 2010.

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