Component analysis with visualization of fitting – PopShare, a Windows program for data analysis

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It is always a question whether the results what we have measured represent one population or they form a mixture of more components. In the first case the average, standard deviation and other, commonly used statistical indicators are reliable figures and describing the distribution, but in the second case these are only meaningless numbers. To judge this question numerical tests are used. We present here a computer program, which performs some tests and visualizes the distribution, the goodness of fit, and searches the components using the SIMPLEX algorithm.

Figure 1: The "rhomb-plot" where the user can input quickly by mouse clicks the supposed mean, standard deviation for component 1 and 2 and also their ratio as "User Defined Parameters".

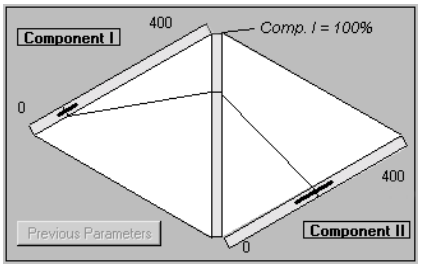


Figure 2: Results of SIMPLEX fitting (RMS: root mean square, W: weighted, K-S: Kolmogorov-Smirnov test).

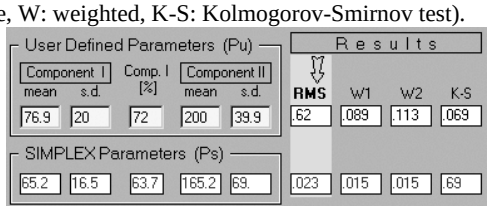
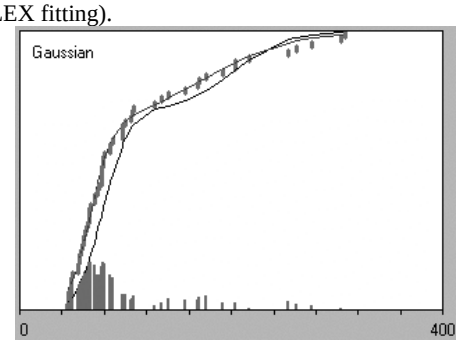


Figure 3: Graphic presentation of fitting (dots: cumulative distribution of measured data, vertical bars: residuals, thick line: fitting with User Defined Parameters, thin line: SIMPLEX fitting).



Detrital zircons from the Jack Hills metasediments, Western Australia: provenance record of the Earth's oldest material

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Detrital zircons up to 4.4 billion years old (Ga) occur in metaconglomerate from the Jack Hills metasedimentary belt (Compston & Pidgeon 1983; Mojzsis *et al*. 2001, Wilde *et al.* 2001) and are the only source of direct information about the Earth's early history. All work has so far concentrated on zircon grains extracted from a single sample of metaconglomerate with no attempt to establish either the distribution of old grains within the belt or variations in the detrital zircon age signature of the belt. The depositional environment of the sedimentary units and the character of potential source rocks is still unknown, although the time of deposition is considered to be about ~3.0 Ga, based on the youngest detrital grains found in the conglomerate.

We have extracted zircon grains from five samples representing three apparently conformable units (quartz-pebble conglomerate, quartzite and shale) and collected from both near the original sampling site and from the other end of the belt, some 70 km to the north-east.

All rock types contain various proportions of grains older than 4.0 Ga. Conglomerate and quartzite samples show age distributions similar to those reported in previous studies with the youngest detrital zircons at ca. 3.0 Ga. However, two shale samples contain a significant number of zircons with Late Archaean (2.7-2.5 Ga) as well as some grains as young as 1.9 Ga, which contradicts the existing view that the sediments have been deposited at ~3.0 Ga.

Detrital zircon age distributions suggest that the Jack Hills sedimentary belt consists of at least two distinct sequences deposited more than 1000 m.y. apart. The presence of ca. 4.2 Ga zircons in the younger sediments argues against the tectonic juxtaposition of the two parts of the sequence. Either the two temporally distinct parts of the belt were deposited in close proximity to >4.0 Ga source rocks or alternatively, the younger part of the sequence contains significant proportion of material derived from erosion of the older depositional sequence of the Jack Hills meatsedimentary belt.

References

Compston W. and Pidgeon R.T. (1983) *Nature* **399**, 252-255.

Mojzsis S.J., Harrison T.M. and Pidgeon R.T. (2001) *Nature* **409**, 178-181.

Wilde S.A., Valley J.W., Peck W.H. and Graham C.M. (2001) *Nature* **409**, 175-178.