Supplementary Data 1 & 2 for *'A record of continental collision and regional sediment flux for the Cretaceous and Paleogene core of SE Asia: Implications for early Cenozoic palaeogeography'*

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1. Methods

Samples were separated using standard crushing, magnetic and heavy liquid (SPT and DIM) separation techniques (e.g. Mange & Maurer 1992). For U-Pb dating of zircon, samples were handpicked and analysed by LA-ICPMS using a New Wave 213 aperture imaged frequency quintupled laser ablation system coupled to an Agilent 750 quadrupole-based ICP-MS. Real time data were processed using the GLITTER software package (Griffin *et al.* 2008). External zircon standard PLESOVIC (TIMS reference age 337.13±0.37 Ma; Sláma *et al.* 2008) was used to correct for instrumental mass bias. Data were filtered using standard discordance tests with a 10% cutoff; discordant data that cut Concordia within error are also included. The ^{206}Pb/^{238}U ratio was used to determine ages <1000 Ma and the ^{207}Pb/^{206}Pb ratio for older grains. Data were processed using Isoplot (Ludwig 2003).

For a classification of detrital modes of sandstones we followed the Folk (1968) scheme and assessed the proportions of rock constituents using the Gazzi-Dickinson method of point counting (Gazzi 1966; Dickinson 1970). Thin sections were stained for potassium feldspar and point counted (n = 300). Samples were chosen to be representative of the different formations and only fresh unaltered samples were used. Quartz was also used as an indicator of provenance following the criteria discussed by Basu *et al.* (1975) and Smyth *et al.* (2008) and references therein. An assessment of heavy mineral assemblages was undertaken only on siliciclastic formations in order to provide provenance data complementing other techniques. Heavy minerals mounted in Canada balsam were identified by means of optical microscopy and counted (n=200) using the line-counting method (Galehouse 1971; Mange & Maurer, 1992). All samples discussed are summarized in Table 1 of Supplementary Data.

References

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2. Petrographic descriptions of West Java Sandstones

Middle Eocene - Ciletuh Formation

Analysed samples are moderately to poorly-sorted lithic-arkose to feldspathic-litharenite sandstones that are dominated by grains of volcanic origin (volcanic lithic grains and plagioclase) and quartz. They are relatively immature and show a wide variety of modal compositions, but all plot in the magmatic arc field. Sample 31A plots in the undissected arc field and is the most immature. Other samples plot in the dissected arc field indicating a minor non-volcanic contribution.

Middle Eocene - Ciemas Formation

Analysed samples are moderately sorted sub-arkose and arkosic sandstones that are dominated by grains of metamorphic (quartz) origin. They also contain subordinate igneous quartz, potassium feldspar and metamorphic lithic fragments. Monocrystalline quartz grains are predominantly strained (undulosity >5°) indicating a metamorphic origin. Unstrained monocrystalline quartz grains commonly contain strings of fluid inclusions indicating a probable plutonic source. The presence of potassium feldspar and metamorphic lithic fragments indicate contributions from granitic and metamorphic sources. Samples are texturally and compositionally moderately mature and plot in the recycled orogenic and transitional continental fields.

Upper Eocene – Bayah Formation

Samples are moderately sorted quartz-arenite, sub-arkose and sub-litharenite sandstones that are dominated by grains of metamorphic (predominantly quartz) origin. Subordinate to these are magmatic quartz, chert and potassium feldspar. Monocrystalline quartz grains are predominantly strained (undulosity >5°) probably indicating a metamorphic origin (Basu *et al.* 1975). Unstrained monocrystalline quartz grains commonly contain strings of fluid inclusions and are often anhedral indicating a plutonic source. A significant proportion of the total quartz is polycrystalline, indicating a (low grade?) metamorphic source (Basu *et al.* 1975). The presence of potassium feldspar in all samples indicates a granitic source was probably important in contributing material. Samples are compositionally mature, being dominated by quartz, but texturally relatively immature, being typified by angular to sub-rounded grains. Modal compositions plot in the recycled orogenic and craton interior fields.

Lower Oligocene – Cikalong Formation

Samples are moderately to poorly sorted quartz arenite, sub-arkose and quartzwacke sandstones that are dominated by grains of metamorphic (predominantly quartz) origin. Subordinate to these are chert and potassium feldspar. Monocrystalline quartz grains are predominantly strained (undulosity >5°) probably indicating a metamorphic origin. Unstrained monocrystalline quartz grains appear to be plutonic. A small proportion of polycrystalline quartz is present in all samples, probably indicating a (low grade) metamorphic source (Basu *et al.* 1975). The presence of potassium feldspar in all samples indicates a granitic contribution. Samples are compositionally very mature, being dominated by quartz, but texturally relatively immature, being typified by angular to sub rounded grains. Modal compositions plot in the craton interior field.

Lower Oligocene – Cijengkol Formation

Aanlysed samples are moderately to poorly-sorted quartz-arenite, sub-arkose and sub-litharenite sandstones that are dominated by grains of metamorphic (predominantly quartz) origin. Subordinate to these are igneous quartz, potassium feldspar and metamorphic lithic fragments. Monocrystalline quartz grains are predominantly strained (undulosity >5°) probably indicating a metamorphic origin (Basu *et al.* 1975). Unstrained monocrystalline quartz grains commonly contain strings of fluid inclusions and are often anhedral indicating a plutonic source. Polycrystalline quartz grains are present in all samples and typically have less than 5 crystal units per grain, indicating a low metamorphic grade source. Potassium feldspar in some samples indicates a granitic source. Samples are compositionally very mature, being dominated by quartz but texturally relatively immature, being typified by angular to sub rounded grains. Modal compositions plot in the recycled orogenic and craton interior fields.

References

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