

## **Bitumen Re-Os geochronometer constraint on the timing of petroleum generation and migration in the northern Longmen Shan thrust belt, southwest China**

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Twelve Lower Cambrian bitumen samples and three oil samples from the veins along the fault distribution were selected for Re-Os analysis to determine the timing of tectonism and coupled oil generation in the northern Longmen Shan thrust belt. The Re and Os abundances of the bitumen samples range between 283.3–563.3 ppb and 4058.2–15347.3 ppt, respectively. The Re and Os abundances of the oil samples vary between 7.7–9.6 ppb and 90.3–127.2 ppt, respectively. These values are significantly elevated from those of the average continental crust and previously reported bitumen samples from both hydrocarbon and metalliferous systems, and also the majority of marine and lacustrine organic-rich sedimentary rocks (REFS), which has also been shown by previous studies [1]. The  $^{187}\text{Re}/^{188}\text{Os}$  values are high and range from  $\sim 230.7$  to 718.4 and the Os isotopic composition is radiogenic, with the  $^{187}\text{Os}/^{188}\text{Os}$  ratios between  $\sim 2.79$  and 3.48. Repeat analysis yield similar Re and Os concentrations, and  $^{187}\text{Re}/^{188}\text{Os}$  and  $^{187}\text{Os}/^{188}\text{Os}$  values. The bitumen Re-Os isotope data define two positive correlations. One yield a Re-Os date  $158 \pm 77$  Ma with an initial  $^{187}\text{Os}/^{188}\text{Os}$  value of  $1.85 \pm 0.61$  ( $2\sigma$ ; MSWD = 76). The remaining samples yield a broad trend of  $\sim 220$  Ma with an initial  $^{187}\text{Os}/^{188}\text{Os}$  value of  $2.09 \pm 0.89$ . Oil generation is a dynamic process and it is most likely that the bitumen dyke represent multi event of oil influx related to oil generation. The data suggest that generation is protracted and also suggested by the oil currently migrating today. The Re-Os bitumen geochronology was coeval with intense thrust fault movement of the northern Longmen Shan thrust belt, which also provides a new direct absolute age evidence for the Late Mesozoic deformation of the northern Longmen Shan thrust belt.

[1] Selby, D., Creaser, R.A., Dewing, K., et al., 2005, *EPSL*, **235**: 1–15.