

In Search of Pre-Andean Depocentres – Integrated Geophysical Study in Peru and Bolivia

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ABSTRACT

The Andean foreland basin formed between the Cretaceous and the Paleocene in a retro-arc setting in front of the advancing orogen. A 2,500-km-long segment of this basin system passes through eastern Peru and Bolivia and is comprised of, from north to south, the Marañon, Ucayali, Madre de Dios, Beni and Chaco Basins. The Andean foreland basin contains substantially thick units of Cenozoic and Cretaceous sediments, which overlie Mesozoic and Paleozoic successions and Precambrian crystalline basement. In the deeper parts of the foreland basin, no wells have penetrated the full, pre-Andean sedimentary section and the sheer thickness of the sediments makes it difficult to seismically image crystalline basement in some areas. Thus, the thickness of the pre-Andean sediments and the existence of basins that pre-date the Andean Orogeny are partly obscured. Areally extensive gravity and magnetic data sets have been used to build a structural and tectonic framework for the area. Gravity and magnetic 2D forward modelling and 3D inverse gravity modelling, constrained by seismic interpretation and well data, enabled base Cretaceous and top crystalline basement horizons to be derived. This approach allowed lateral extrapolation of the detailed but localised seismic interpretation into areas without seismic coverage and it also extended this interpretation by including the depth to top crystalline basement. The results of this analysis indicate the presence of large pre-Cretaceous depocentres underlying the Andean foreland basin. These include a major depocentre extending from the central Marañon Basin north-northeastwards across the Iquitos Arch, two depocentres underlying the Madre de Dios Basin and four depocentres beneath the Beni/Chaco Basins.