Late Cenozoic contractional tectonics of the eastern Kinki region, southwest Japan

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We present structural models to define the structural evolution of the eastern Kinki region, southwest Japan, constrained by tectonic geomorphology, surface geologic mapping and high-resolution seismic reflection profiles. In this study the Nobi-Ise fault zone (NIFZ) is focused where prominent E-W contraction within this region situated north of the inactive Median Tectonic Line (MTL) appears to be accommodated upon east-vergent thrust sheets since late Miocene or early Pliocene time. The NIFZ is an N-trending, intraplate thrust system, and consists of a 110-km-long array of active, east-verging reverse faults juxtaposed with Pliocene-Pleistocene sedimentary basins of the Tokai Group (TG). The Nunobiki Mountains in the southern NIFZ comprising the stripped core of the late Cretaceous granitic basement and early Miocene sedimentary rocks are thrust eastward over a 1-km-thick sequence of Pliocene strata of the lower TG. Folding of beds and tapering of the lower TG towards the east indicate the forelimb of the basement-cored fold was steepening during deposition. East-dipping normal faults which bound the basement and early Miocene sedimentary rocks in the hangingwall of the thrust reactivated as west-verging, bedding-parallel thrusts to form by flexural-slip folding that acts to consume slip on the primary, east-verging blind thrusts across synclinal axial surfaces. These suggest that the deposition of the lower TG was synchronous with the structural growth of the basement-cored fold underlain by the east-verging thrusts which define the main boundary between the basement rocks and the Neogene basin to the east. East-vergent, active thrusting within the northern NIFZ is, however, likely to postdate the deposition of the lower TG, whereas the northern NIFZ is also a main boundary thrust that separates the Mesozoic basement rocks and the Neogene basin: units within the upper TG onlap with the west-dipping tabular beds of the pregrowth lower TG that are continuously traced on the seismic reflection profile across the Nobi basin, and their thickest accumulation occurs in a growth syncline in the footwall that are strongly folded on and tapered toward the forelimb of the basement-cored fold.. On the other hand, N-trending seismic reflection profile obtained in the Ise Bay (i.e., on the footwall of the NIFZ) indicate N-dipping, tabular beds of the upper TG on the backlimb of the E-trending, offshore active fold, and both north- and southward thinning of the lower TG, suggesting that area of subsidence has widened at the initiation of the deposition of the upper TG, rather than propagated to the north. Northward coeval widening of subsidence and active thrusting is likely to correlate with downward propagation of the subducting slab of the PHS plate since late Miocene to early Pliocene time. Oblique subduction of the strongly deflected slab may result in both subsidence and prominent E-W contraction within the forearc crust that may be accommodated by east-verging thrusts.