



The onshore Cenozoic basin development of the UK and its relation to present-day vertical surface motions

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Historical long wavelength uplift and subsidence patterns in the UK have been assumed to reflect glacial isostatic adjustment. Shorter wavelength variations are generally neglected, and do not fit with glacial rebound models, hence they may give important clues to other processes driving vertical motions. Present day vertical surface motions are based on one generation of observed data and do not necessarily represent the long-term stress and tectonic configuration of the UK. Cenozoic strata can provide a record of long-term changes and potentially can indicate the drivers of present day short wavelength variations. Understanding the dominant controls on UK tectonics may have implications for petroleum systems, geotechnical assessments and anthropogenic impact factors.

Here we apply stratigraphic backstripping techniques to determine Cenozoic vertical surface motions. To complete the dataset, we also backstripped the Pleistocene Crag formations of East Anglia which post-dated the substantial Miocene hiatus most likely caused by the main phase of Alpine orogenic development. These deposits, the youngest being 2.1 Ma pre-date the glacial maximum of the UK helping to bridge the gap between the early Cenozoic and recent events. Subsidence analysis of the sequence indicates larger subsidence rates and sediment accumulation in the Hampshire basin than in the rest of southeast England. Reactivation of Variscan faults during the deposition of Cenozoic sediments appears to have taken place concomitantly with tectonic shortening and suggests phases of compression affected the UK throughout the Paleogene and Neogene not dissimilar to the current stress state and earthquake record.

From our data we may be able to understand the major tectonic controls influencing southern England during the Cenozoic and assess the nature of the transition to the vertical surface motion observed from CGPS (Continuous Global Positioning Stations) at the present day. The Cenozoic could be a good analogue for the present day and for projecting into the future.