

ABSTRACTS OF POSTER DISPLAYS



DOES "A LATEST CRETACEOUS HOTSPOT AND THE SOUTH EASTERLY TILT OF BRITAIN" HAVE IMPLICATIONS FOR SOUTH-WEST ENGLAND?

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Cope (Cope, 1994) has related the analysis of apatite fission tracks to uplift and erosion induced by a mantle hotspot below the Irish Sea and north-west England. Uplift is said to have occurred within the late Maastrichtian and erosion continued into the late Palaeogene. Cope remarks that the curved lines of equal erosion parallel the outcrop of Jurassic rocks from Yorkshire to Gloucestershire.

However, the outcrop bends to the SSW from Gloucestershire to Dorset as a result of the general easterly dip. The unconformable relationship of the Upper Greensand to the older rocks suggests that this easterly dip is, in large part, the result of pre-Albian earth movements. Nonetheless, the existence of the Lundy granite and dykes dated at 50-55Ma leads to the suggestion that there may well have been an additional doming and associated gentle tilt during the early Tertiary.

The east Devon-west Dorset plateau hilltops show masses of sands, pebbles and cobbles overlying Clay-with-flints (e.g. Beaminster Down). These are found to the east of a NNW-SSE line passing through Lyme Regis and Axminster (Waters, 1960). The former are thought to be derived from the west and may represent a pulse of sediment associated with the tilting of a land surface before the initiation of the present-day drainage system. Silicification of the sands and gravels produced the sheets of silcretes which now survive as scattered sarsen stones through south Somerset and west Dorset.

A plot of the height of the sub-Cretaceous unconformity surface based on Figure 27 in Wilson et al. (1958) and the BGS Wellington and Sidmouth sheets shows a remarkable correlation with the major lines of drainage in west Dorset and south Somerset. The surface reaches 250 m at Pilsdon Pen (Marshwood Dome), and 140-156 m on a WNW-ESE line through Chard and Beaminster Down. This is the approximate line of the watershed for streams draining to the Bristol and English Channels.

It is reasonable to assume that warping of the sub-Cretaceous surface would have also affected the Tertiary land surface, relics of which still survive on the plateau hilltops. The east Devon-west Dorset area is unique in Britain in that it provides evidence linking a Tertiary surface, tectonic activity and the drainage pattern

Whilst one must beware of circular arguments, it is permissible to speculate that similar circumstances may have influenced the development of drainage patterns in adjacent areas:

- parallel streams on the dip slope of the Dorset Heights, in South Wales and in the eastern Mendips;
- the course of the River Exe from north Exmoor to the south;
- 'superimposed' courses of the Rivers Wye, south Somerset Yeovil and Avon.

The break-up of the earlier drainage system must surely be associated with the general disruption consequent upon the opening-up of the Bovey Tracey pull-apart basin. A map of faults in the Chard area

(Jukes Browne, 1903) shows N-S faults bounding an irregular pattern of faulted blocks. Might this be a failed pull-apart basin?

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FAULTS AND JOINTS REVEALED AS CROP MARKS IN SOUTH SOMERSET

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The drought which existed by early July 1975 produced good conditions for observing crop marks from the air. The photographs displayed included some with linear features that did not appear to be of archaeological significance (Leech, 1978). In particular, Plate 2 (White OAP BL 1551/9/10; BL 1552/1) in Charlton Mackrell parish, shows two dark lines running NNW-SSE [ST 5317 2968] to [5377 2916]. The lines are bordered by a close pattern of anastomosing lines which are approximately parallel to the double line.

The area is at present being worked for Blue Lias building stone. One quarry face shows a 1.5 m wide fault zone where the two lines on the air photograph converge at [ST 5360 2930]; the beds of limestone are fractured and separated. Thinly bedded, partially cross-stratified limestones with clay partings, appear to be downthrown on the north-east side of the faultline. Horizontal lineations, on vertical calcite joint linings in the fault zone, are aligned 130-310°N.

Extensive exposures of the quarry floor show that the close pattern of dark lines, in the photograph adjacent to the fault, consists of major joints.

There are a number of other small faults aligned NNW-SSE. One, at [ST 5316 2955], appears to downthrow to the south-west with marked fault drag.

The features show the effects of the regional strike-slip faulting, with dextral displacement. The flexuring of the beds and the opening-up of joints point to both local compressive and extensional movements.

Former quarries, shown on the older editions of the OS 1:10, 560 series, are seen to have sides aligned NNW-SSE, presumably representing faults or major joints which may have affected the extraction of workable stone.

The crop marks are the result of the vegetation being less

stressed during drought conditions owing to the greater depth of soil, and higher moisture content, over the faults and joints. The soils belong to the Soil Survey's Sherborne Series: "shallow well drained brashy calcareous clayey soils over limestone with slowly permeable calcareous clayey soils" (Findlay *et al.*, 1984). This soil type is widespread throughout the outcrop of Jurassic rocks and may well prove to be a fruitful area for search among collections of air photographs.

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TIN MINERALIZATION IN SOUTH-WEST ENGLAND:

NATURE OF VEINS AND CONTROLS ON ORE

LOCALIZATION

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Vein deposits represent an important source of metals throughout the world and display complex controls on ore localization. South-west England is a classic tin province with steeply-dipping, endo- and exo-granitic veins which display diverse structure, paragenesis and ore distribution. Vein width, dip and strike are variable and compounded by the effects of branching, intersections, wallrock hosted stringer networks, and post-mineralization intra- and cross-vein faulting. Vein formation is seen as a consequence of the superimposition of separate hydrothermal events involving wallrock alteration, mineral deposition and fracture dilation. Initial vein formation produces a network of sinuous fractures, of varying width, which develop into a wider composite vein by structural overlap during a multi-stage history. The mineralizing fluids probably entered the veins as a series of chronologically and structurally discrete pulses, reflected by the lateral and vertical distribution of specific minerals. Studies of historical development and stoping data indicates that veins are generally only between 30-40% payable and that economically payable regions are generally hosted in oreshoots, which represent discrete high grade zones but may also contain areas of lower grade. Oreshoot volumes are characterized by height (up to 350 m), strike and dip (0 to 90°), plunge length (up to 1000 m) and width (an average of 1-3 m). Mineralization is characterized by cassiterite with accompanying chlorite, quartz, fluorite, tourmaline and sulphides. Tourmalinitic, chloritic and sericitic wallrock alteration are widespread and often contain substantial cassiterite. The tonnage of oreshoots varies from a few thousand tonnes up to 2.5 million tonnes, with grades up to 5% Sn. Three principal, interrelated controls on ore localization are recognised: host fracture geometry, lithology and physio-chemical conditions. Oreshoots are commonly associated with variations in vein strike and/or dip, width, intersections, splays/branches or structural reactivation of specific domains. The prediction of the geometry, location and persistence of veins and oreshoots is of great importance. Each mine, and mining district has its own unique structural and paragenetic characteristics, which require a thorough understanding to ensure successful exploration, evaluation and exploitation.