

The deep basalts encountered in the base of Yolla 1, probably sit on the Late Cretaceous - Tertiary unconformity, and are related to a widespread volcanic episode at that time. Similar extrusives are found in the nearby Tilana 1 well, and on the opposite side of the Cormorant Trough at Aroo 1. By the Top EVCM, a quiet period structurally commenced, and continued throughout the deposition of the marine shale Demon's Bluff Formation, and the early part of the Torquay Group limestones, shales and marls, until the Oligocene/Miocene unconformity boundary. At this time, the adjacent Cormorant Trough was structurally inverted, and was accompanied in the Yolla area by the development of a massive volcanic complex. Volcanoes were formed, and show signs of a long history of multiple and overlapping cones and eruptions. While some of the earlier faults show signs of reactivation and may have formed feeder conduits for the volcanic material, the majority of material was sourced up through a north-south trending fault system that dominates the structural picture from the Late Oligocene onwards (see Figure 10). Another phase of this episode included the intrusion of igneous material into the EVCM, forming thick sills like the dolerites encountered in the Yolla 1 and Tilana 1 wells.

The probable mechanism for this period is the intrusion of a sub-volcanic magma chamber, that in its pre-eruption stage causes doming and uplift of the adjacent Cormorant Trough. This is followed by the eruptions of tuffs and lavas which then trigger collapse and subsidence, and form the many crestal collapse features seen in the faulted Oligocene/Miocene aged band of sediment (Figure 11).

After this flurry of activity, there remained a quiet period structurally throughout deposition of the remaining part of the Torquay Group limestones, that has continued to the present day.

4.2 Seismic Signature

The presence of volcanic extrusives and igneous intrusives has added a degree of complexity to the seismic interpretation and depth conversion. The extrusive pile show time pull-up distortion of the seismic data beneath them, consistent with the presence of faster-than-normal velocity material, as shown in Figure 12. However, as shown on crossline 1220 of Figure 13, time push-down, due to a slower velocity material, also occurs. The latter is probably related to the presence of scorias and ash flows or possibly the presence of gas, as opposed to the more dense lava flows of the higher velocity material.

These zones of high and low extrusive material cause considerable disruption of the underlying seismic data. Fortunately the bulk of the Yolla Field is not affected, with most implications confined to the smaller Yolla Northeast closure on the down thrown side of the main fault at the deeper levels, and the top EVCM oil/gas/condensate reservoirs.

The igneous intrusives could occur anywhere within the EVCM. In the shallower part of the EVCM, the intrusives are obvious, as shown in Figure 14. However, deeper within the EVCM, and particularly below the thick coaly sequence of the middle M.diversus, the intrusives are not seismically definitive. They are possibly represented by zones of distortion around faults, and in some areas by very low frequency, high amplitude events that aren't correlatable over any appreciable distance (Figure 15).