

## **Siccar Point and Hutton Unconformity**

**4<sup>th</sup> Deep Water Circulation Research Conference (4DWC)**

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A day field trip Siccar Point outcrop, a famous example of an angular unconformity (Hutton unconformity).

The Siccar Point outcrop is a famous example of an angular unconformity. James Hutton was an 18th Century geologist (1726-1797) who challenged the then current idea that the Earth was created in 4004 BC, based on biblical interpretations. His observations led him to believe that the history of the Earth was much longer than this, and he was engaged with several colleagues in attempting to find evidence to support his theory.

Major angular unconformities, where the processes to create the unconformities must have encompassed millions of years, were obvious sources of his proof, and the base-Devonian unconformity exposed in several places across southern Scotland became associated with his theory, becoming known as "Hutton's Unconformity". In 1788, after reconnaissance work by locals, Hutton visited Siccar Point by boat, and observed the relationship between the older Silurian rocks and the younger Devonian strata.

On the wavecut platform at Siccar Point the unconformity is exposed both above and below the high-tide mark. The Silurian rocks were deposited in deep marine conditions near a convergent plate boundary, and were then imbricated into the current steep, folded, faulted and overturned orientations during the subsequent continental collision during the Caledonian Orogeny.

The steeply inclined 'greywackes' of Llandovery, Silurian age outcrop to both E and W sides of the outcrop, and at higher levels in the cliff face, showing that the outcrop is a small valley shape eroded into the Silurian rocks below. Given the arid climate during the Devonian time, this has been described as a wadi. The Silurian sandstones young to the WNW. The overlying strata are Upper Devonian (Lower Dinantian) breccia, conglomerate and sandstone which dip gently to the NW.

There are occasional sandstone layers with cross-bedding, and the breccias contain imbrication indicating a dominant current direction from the NNE,

not down from the sides of the wadi to SE and NW. The breccia layers, imbrication, planar lamination all indicate very high energy, and it has been suggested that these features indicate a depositional model for the Devonian of flash floods and ephemeral river flows (Swierczek 2011). The formation immediately overlying the unconformity is called the Redheugh Mudstone Formation, the basal breccia units being succeeded by a mud dominated succession that passes upwards along the coast to more sand dominated units at Pease Bay (Greenheugh Sandstone Formation).

