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## Surface and subsurface fault mapping in the Yorkshire Wolds, UK

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The Flamborough Head Fault Zone (FHFZ) marks the southern extent of the Cleveland Basin and the northern margin of the Market Weighton Block, England. It is a regionally-significant structural zone which has undergone a complex history of Mesozoic-Cenozoic extension and compression. It is predominantly comprised of east-west trending faults which form a graben that is dissected by north-south trending faults, including the southern extension to the Peak Trough, the Hunmanby Fault. To the west, FHFZ links with the Howardian Fault System and offshore, in the east, it is truncated by the north-south trending Dowsing Fault. The FHFZ is well exposed and described from coastal cliff sections at Flamborough Head but the inland development of the faults have hitherto been poorly explored predominantly due to limited inland-exposure.

The region around the FHFZ is underlain by the Chalk Group, a 500 m thick limestone succession. The Chalk Group is a principal aquifer that is the main source of water supply in East Yorkshire. The geometry and physical characteristics of the Chalk succession, including the effects of faulting, influence groundwater flow across the region. A range of modern data and recent geological research highlight that considerable changes can be made to the region's current geological maps and subsurface understanding. Ensuring these features are better-documented is key for updating groundwater models to enable more confident decisions about land-use, water management and environmental regulation.

A multi-faceted approach to geological mapping has been undertaken in the region by the British Geological Survey (BGS), in collaboration with the Environment Agency. Remote sensing and field mapping of the superficial deposits has better characterised the extent and nature of these deposits and identified potential recharge 'windows' into the bedrock. Remote sensing, targeted field mapping, palaeontological analysis, passive seismic and 2D onshore seismic interpretation have been integrated to produce a new map of the Chalk succession, which reveals the inland extension of the FHFZ in unprecedented detail. Combining these techniques has enabled us to bridge the gap between the surface geology and deeper subsurface structure, increase our understanding of the geology of the region and produce an improved conceptual model at a range of depths which will be used to better manage water resources.

