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Regional scale hydrodynamic modelling of offshore wind farm development areas off the east coast of Scotland

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There is considerable interest in Scotland, supported by the Scottish Government, in the expansion of renewable energy production. In particular, significant offshore wind energy developments are already planned in coastal waters to the east of the Forth and Tay estuaries. It is important to understand the local and cumulative environmental impact of such developments within this region, to aid licensing decisions but also to inform marine spatial planning in general. Substantial wind farm developments may affect physical processes within the region, such as tidal-, wind-, and wave-driven circulation, as well as coastal sediment transport and more complex estuarine dynamics. Such physical impacts could have ecological and, ultimately, socio-economic consequences. The Firth of Forth and Tay areas both exhibit complex estuarine characteristics due to fresh water input, complex bathymetry and coastline, and tidal mixing. Our goal is to construct an unstructured grid hydrodynamic model of the wider Firth of Forth and Tay region using the Finite-Volume Coastal Ocean Model (FVCOM), resolving the complex estuarine hydrography of the area and representing offshore wind developments. Hydrodynamic modelling will provide an accurate baseline of the hydrography in this region but also allow the assessment of the effect on the physical environment of multiple wind farm development scenarios.