

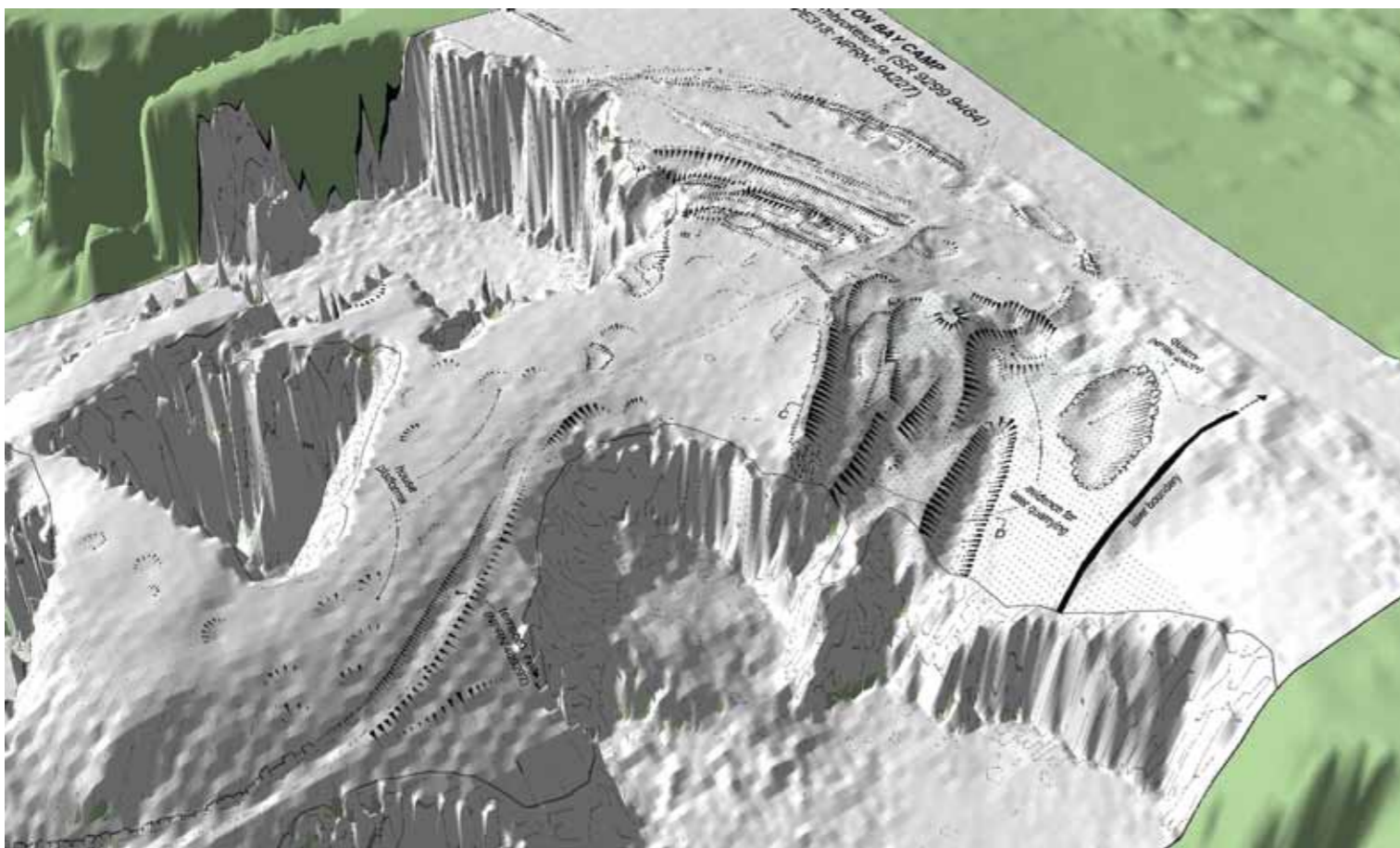
Airborne Remote Sensing, LiDAR and the Coastal Promontory Forts of Pembrokeshire

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Over half of the 106 coastal promontory forts known in Wales are located upon the dramatic sea cliffs of the Pembrokeshire Coast National Park. These are some of the most impressive monuments in Wales, yet also the most threatened. Their location leaves them continuously exposed to erosion by the sea and weather systems, and current and historical aerial photography clearly shows sporadic collapses. Recording the speed and impact of this erosion has become a priority for archaeologists, but as so few have been accurately surveyed it has been difficult to assess the rates of erosion. In light of this the Royal Commission on the Ancient and Historical Monuments of Wales and the Dyfed Archaeological Trust have recently undertaken a project, sponsored by Cadw, to test the use of remote sensing data for accurately mapping cliff-edge loss, and for producing archaeological plans that accurately show the character and condition of these threatened sites. Linney and Flimston were among a sample of Pembrokeshire forts chosen for analysis.

For this coastal project LiDAR data was used in conjunction with historic and recent aerial photography and 19th century Ordnance Survey mapping. The essential control was a measured ground survey, using a survey-grade Global Positioning System (GPS). While the LiDAR data for the landward earthwork defences matched the ground survey closely, errors in the calculation of the cliff-edge shown by the 2m resolution LiDAR (flown in 2004 and still the best available in 2010) for Linney Head Camp meant that it was neither accurate nor reliable enough to measure sub-metre cliff loss, when compared with the ground GPS survey. However, the ability to directly compare very accurate ground survey data and LiDAR data for the same piece of ground has proved to be a useful field test.

The project has been a valuable way to develop expertise in the use of LiDAR and comparative aerial, map and GIS datasets, to begin to chart cliff-loss and coastal erosion at archaeological sites. It has shown a clear way forward for the future integration of LiDAR data, at a higher resolution, in archaeological projects in Wales. During 2010 a new project combining fieldwork, aerial mapping and LiDAR analysis of the well-preserved prehistoric field systems on Skomer Island, Pembrokeshire, has commenced.



Above: Flimston Bay promontory fort, Pembrokeshire. (upper image) Vertical aerial photography flown for Welsh Assembly Government draped over 2m Environment Agency LiDAR data illustrating topography of the promontory fort. (lower image) Royal Commission GPS survey draped over LiDAR data for comparison of datasets to show landward earthworks and eroding cliff-edge.

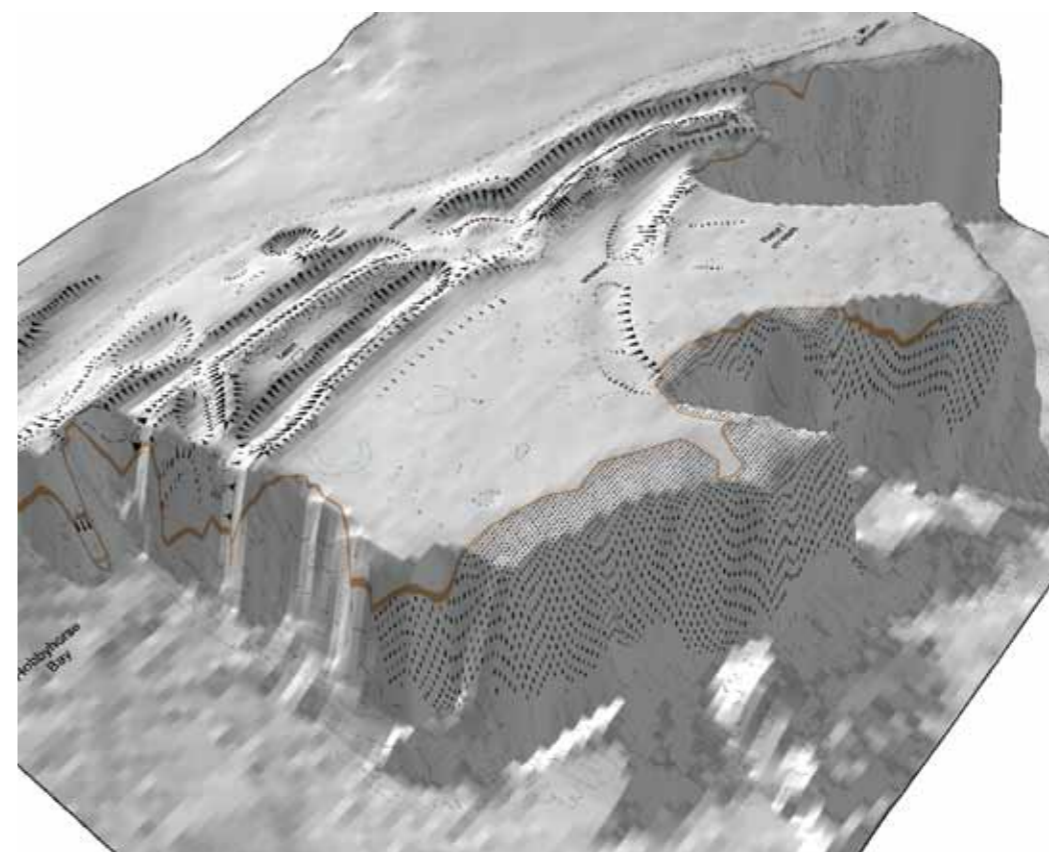


Left: Flimston Bay promontory fort. Aerial view showing eroding Carboniferous Limestone cliffs and coastal stacks (upper right).

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Further reading:

Barker, L & Driver, T. Forthcoming. Close to the edge: new perspectives on the architecture, function and regional geographies of the coastal promontory forts of the Castlemartin Peninsula, South Pembrokeshire, Wales. Proceedings of the Prehistoric Society 77 (2011).



Left: Linney Head promontory fort, Pembrokeshire. Detailed ground survey draped over 2m LiDAR data showing disparity between survey (brown line showing cliff edge) and remote sensing datasets. (Crown Copyright RCAHMW)