

The National Centre for  
Environmental Data  
and Surveillance

Synthetic Aperture  
Radar: SAR



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# Synthetic Aperture Radar:

The Environment Agency spends £13.3m annually on research and development. A significant proportion of this is allocated to the environmental monitoring techniques topic. This research is managed by the National Centre for Environmental Data and Surveillance.

The National Centre is currently undertaking a feasibility study into the use of airborne Synthetic Aperture Radar (SAR) for digital elevation measurements. SAR is a technique for generating map-like imagery of the ground, regardless of time of day or weather conditions.

A SAR image is made up of pixels, the brightness of which depend upon the amount of radar energy reflected by the relevant area on the ground. In SAR imagery, surfaces which are rough or perpendicular to the radar beam will be represented by bright pixels, while areas which are smooth are represented by dark pixels.

In addition to two dimensional, map-like imagery, SAR can produce three dimensional topography maps known as digital elevation models (DEM).

The DEM is produced from a measurement of the phase difference of radar signals returned to two antennae. This phase difference is directly related to ground height. DEMs can be used as part of the process to predict and manage floods. Airborne SAR can produce high level DEMs to fulfil the Environment Agency's requirements for flood plain and flood event modelling.

Following further evaluation, operational techniques will be developed which, when implemented, will form part of a comprehensive flood management system to include flood event mapping and coastal defence monitoring.



DEM generated from airborne SAR, Upton-upon-Severn area

# SAR

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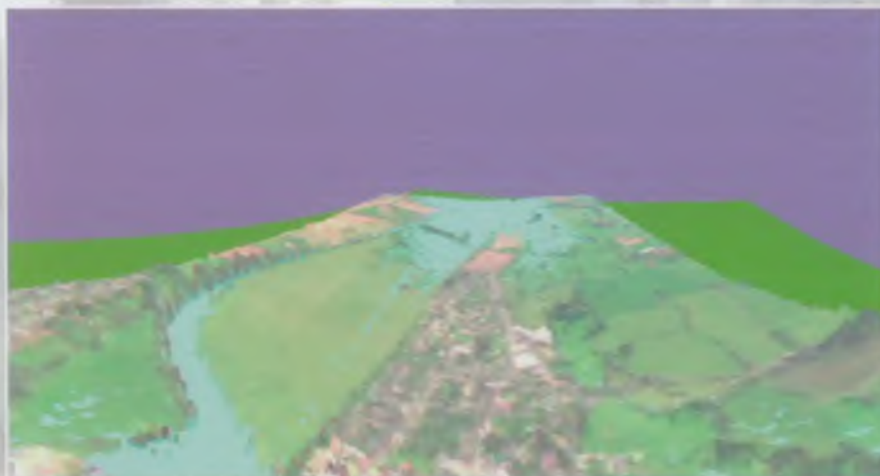
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CASI image corresponding to SAR DEM area



CASI image 'flooded' to 14 metres using height information from DEM



Perspective view of 'flooding' as seen from the North

One in a series of booklets describing techniques used by the Environment Agency's National Centre for Environmental Data and Surveillance. For further information please contact Nick Holden or Bob Davison at the National Centre address shown overleaf.

### MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

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