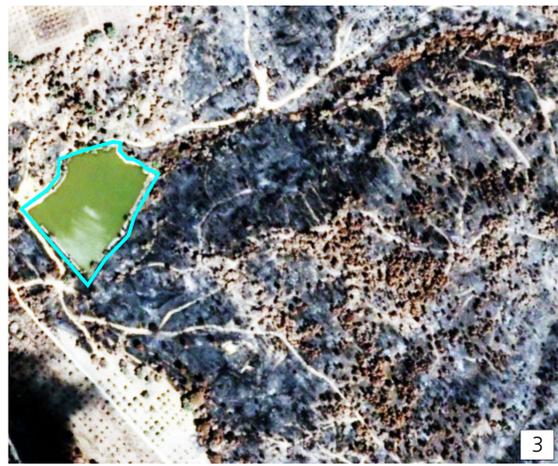


The image shows the area characterised by orchards and an agricultural road network, including four houses (red outline). Within the image, areas affected and unaffected (yellow outline) by fire are clearly distinguishable. It can be seen that IKONOS images can be used for the very detailed demarcation of the former fire front and therefore can help to locate the impact on settlements and other infrastructure. The polygons were created manually due to the high resolution of IKONOS data. This high spatial resolution (1 meter) creates a lot of image detail, which in turn makes an automated classification of different surface features based on their colour characteristics very difficult.



The different intensities of fire impact can be observed according to the intensity of the brown and grey colours. Besides the unaffected areas (yellow outline), less affected areas were mapped with an orange outline and two buildings are marked with red squares. The rest of the image shows different grades of severely damaged forest and scrubland, where the darker colours show the ash content on the forest ground, the lighter colours identify areas, where possibly less biomass has been burned. In general, it is difficult to judge the burning intensity from satellite data only, since the vegetation structure and -vigour just before the fire are strongly influencing the form and texture of the fire scars.

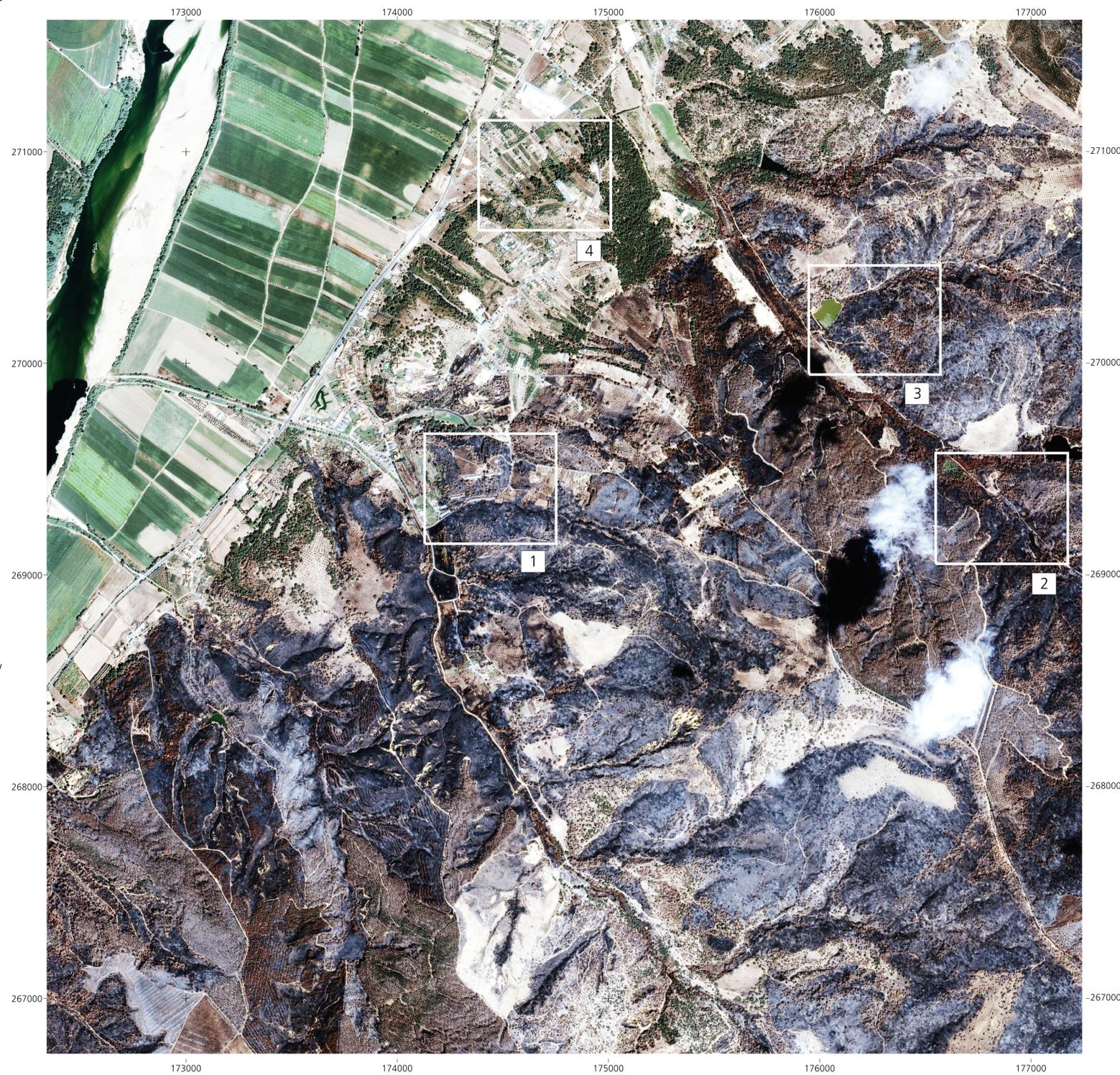


Next to the detection of burned areas, satellite data may also be used during the fire fighting operations for mapping the state of relevant topographic features such as water bodies and rivers as possible sources of water for fire extinction. The blue framed feature shows a small filled up artificial pond directly located next to the burning front. The very dark feature at the lower left corner is not an extremely burned area but the shadow of a cloud, which can not be seen in the subset (see central image map for cloud location).



As reference, undamaged agriculture and forest stands can also be mapped within this high resolution satellite data. Different cultivation patterns of orchards of varying age and density (green outlines) and dense natural forests (white outline) can clearly be separated. These structural references are crucial in order to judge the fire impact in the respective vegetation and agriculture types. Only by comparing unaffected vegetated areas with the affected sites can the damage and its severity be estimated. Putting data from before and after the fire into relation allows to quantitatively assess the vegetation loss. However, this requires a-priori satellite imagery acquired before the fire event, which is cost intensive and sometimes impossible to obtain.

## Rapid Assessment of Forest Fire Impact in Pinheiro Grande, Portugal using IKONOS Imagery from August 17, 2003



Geographic Orientation Map:

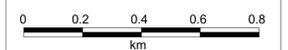


Legend:

The following features characterise the image components visible in the satellite map displayed to the left.

- River water
- Lake water
- Agriculture dense
- Agriculture medium
- Bare soil light
- Bare soil dark
- Forest dense
- Tree plantation
- Burned medium
- Burned fully
- Burned trees
- Settlement
- Clouds
- Cloud shadow

Scale of central satellite map:



Scale: 1:12,000



Projection: Transverse Mercator  
Spheroid: International 1924  
Datum: European 1950 (Portugal & Spain)

Ikonos Image provided by:



Satellite data processing and analysis by:



The International Charter on Space and Major Disasters was activated on August 4, 2003 at 16:10 UTC by the "Serviço Nacional de Bombeiros e Protecção Civil" who is the authorised user for Portugal. The German Remote Sensing Data Center (DFD), which is part of the German Aerospace Center (DLR) was assigned with the project management.

Supporting this 43. activation of the International Charter on Space and Major Disaster on the forest fires in Portugal in August 2003, EUROPEAN SPACE IMAGING provided some IKONOS imagery for rapid damage assessment. These images can be used for mapping affected infrastructure such as settlements, roads or other man made features. Furthermore, it can be used for rapid high resolution mapping of the burned landscape or other relevant topographic elements. The above example shows parts of the Pinheiro Grande Municipality in Central Portugal (center coordinates: 39° 23' N; 8° 25' W) on August 17, 2003.