

Science for Environment Policy

Fire risk in Mediterranean Europe mapped using satellite images

Satellite observations are valuable aids to detect and monitor fire activity. A recent study has investigated how satellite images of fire activity, together with information on vegetation cover and fire risk associated with long and short-term atmospheric conditions could be used to help authorities better manage the risk of wildfires in Mediterranean Europe.

Wildfires, especially in southern Europe, can destroy hundreds of thousands of hectares of land, causing significant environmental and economic damage and sometimes loss of life. Although most fires are started by people, either deliberately or negligently, the type of landscape, dry vegetation in summer, land management practices, weather and climate found in southern Europe put this region especially at risk of fire. The **risk** of wildfires is expected to increase further under even hotter and drier conditions of future climate change.

Satellite images are very suitable for detecting and monitoring fire activity. Using information from the European EUMETSAT Meteosat-8 satellite¹, this study, partly conducted under the EU FUME project², investigated the relationship between wildfires, vegetation cover and climate in Mediterranean Europe in July and August for the years 2007, 2008 and 2009.

Images revealed that about half of the fires in this period occurred in croplands, a quarter in forests and a quarter in shrublands. About 90% of persistent fires (i.e. fires lasting more than 10 hours) were in forests and shrublands. This implies that fires occur more often in cultivated areas, but are more persistent in forests and shrublands. This is probably because fire detection and fire fighting is easier in cultivated areas compared with forests and shrublands.

The researchers focused on climate conditions during the periods 24-25 July and 22-27 August 2007 when the largest number and most serious fires were identified in Italy and Greece from the satellite images. The year 2007 was hotter and drier than average in southern Europe and the Middle East.

For the period 24-25 July 2007, a high pressure system extending from the Atlantic to Central and Eastern Europe and a low pressure system above southern Turkey and the eastern Mediterranean caused hot, dry air to move north, raising temperatures to over 30°C above the Mediterranean basin, with some areas in Greece, Romania, Bulgaria and Turkey experiencing temperatures 8°C above normal.

Relative humidity was 25% lower than normal across southern Italy, Greece and across to the Black Sea basin. Surface air temperatures were further heated by the compression of sinking air caused by air flows in the atmosphere and lack of cloud cover during this period. It was in these hot, dry areas where extreme fire activity was seen on the satellite images.

In addition, the researchers compared these weather conditions with three weather-dependent fire risk indices adapted from the Canadian Forest Fire Weather Index System³. High values of the general fire danger index were found over the Balkan Peninsula and Italy, which were the same areas where the prevailing weather had caused hot and dry conditions. This suggests that weather information and fire risk indices, together with information on fuel availability and flammability (from vegetative cover), can be used to develop daily maps of fire risk and help authorities better manage such risks.



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1. See: www.eumetsat.int

2. FUME (Forest fire under climate, social and economic changes) is supported by the European Commission under the Seventh Framework Programme. See: www.fumeproject.eu

3. http://cwfis.cfs.nrcan.gc.ca/en_CA/background/summary/fwi