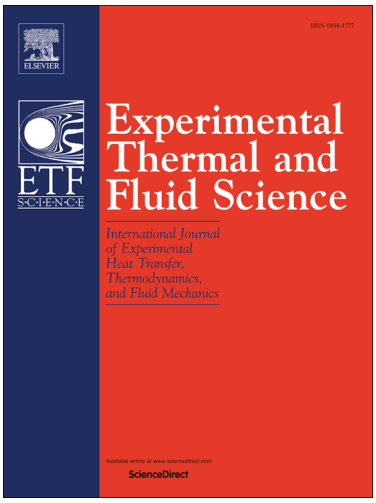

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Detection of landmines in peat soils by controlled smouldering combustion: Experimental proof of concept of O-Revealer

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Abstract: We study a novel landmine detection technology, called *O-Revealer,* which uses controlled smouldering combustion and is valid for minefields in peat soils. We have conducted laboratory experiments with two types of dummy landmines buried in peat, the plastic SB-33 and the metal PROM-1. The ignition and spread of a smouldering front was monitored under different soil moisture and wind conditions. Special attention was paid to the thermal conditions that could trigger thermal runaway of the explosive charge. In all experiments, the smouldering fire burned across the peat, leaving the dummy completely exposed to the open for easy identification and quick demining. The spread rate and peak temperature both decrease with soil moisture, and both increase with wind speed. The results show that for the SB-33 landmine, the heat damage to the shell can be significant, and the chance of thermal runaway ranges between low (moist peat and no wind) to high (dry peat and wind). For PROM-1 landmine, the damage and chance of runaway are always very low. In addition, using rock samples, we show that *O-Revealer* helps identify objects buried in the soil, thereby avoiding false detections. These experiments show the benefits of the technology and its feasibility for field application in peat minefields worldwide like Falkland Islands, Vietnam, Burma, Laos, Uganda, Zimbabwe or former Yugoslavia.

Keywords: demining; fire; heat transfer; soil; explosive.

1. Introduction to Humanitarian Demining

The landmine problem worldwide is rising. It is estimated that 2 to 5 million landmines are laid every year, while the rate of clearance is 10 times slower [1]. It matters because according to the International Committee

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