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STUDY OF COAL MINE FIRE IN DAMODAR RIVER BASIN, INDIA USING THERMAL REMOTE SENSING TECHNIQUE

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Coal mine fires are a serious socio-economic problem because of hazards to health and the environment including toxic fumes, and subsidence of surface infrastructures. Globally, thousands of inextinguishable mine fires are burning today, especially in China and India. In India, Damodar River basin is the repository of the 46The entire Damodar River basin exhibits in an almost linear fashion in the central part of the Jharkhand and western part of West Bengal States of India. The coal fields are adjacent to the Damodar River or its tributaries. The general trends of coalfields are nearly east-west and showing gentle dip towards south. The area is bounded within Latitude 2330 - 2350N and Longitude 8456 - 8648E. Since all the coal deposits of Damodar River basin were formed in almost similar sedimentary environmental condition and are of equivalent geologic age; and the coal grades are more or less comparable, it is highly probable that the other coal fields in this region are also vulnerable to mine fires. Aerial and Space borne Thermal Infra-Red Remote Sensing method has been proved to be the most cost effective and time saving method to find out the thermal anomalies present in an area. Here, an attempt has been made to find out the presence of coalmine fire and their aerial extent in Damodar River basin including the well known Jharia and Raniganj coalfields using Space borne single band thermal IR data of Landsat 7 Enhanced Thematic Mapper (ETM+) sensor. Two daytime Landsat ETM+ images (path / row:140/44), acquired on 07.03.2001 and 24.01.2003, covering visible, one near Infrared (NIR), two short wave infrared (SWIR), one thermal infrared (TIR) and a panchromatic band, were used for the present study. Standard procedure of calculating surface temperature from band 6 of Landsat ETM+ data was followed. These include atmospheric corrections, data normalization for sun elevation angle, conversion of image DN values to spectral radiance and spectral radiance to radiant temperature, and calculation of surface temperature from radiant temperature. In the month of late January 2003, day-time temperature of the land surface features like agricultural crops, soil, road, etc. varies

in the range of 15–27C. Therefore, the threshold temperature is fixed as 27.5C to delineate fire from background. Moreover, fieldwork has been carried out to validate the present findings and to isolate coal-fire pixels from other non-coal-fire high temperature pixels. The study of thermal data processing reveals that almost all major coalfields of Damodar River basins are affected by severe coalmine fire. Other than Jharia and Raniganj, coalfields of East and West Bokaro, North and South Karanpura are also highly fire affected.