Underground Coal-Fires in Xinjiang, China: A Continued Effort in Applying Geophysics to Solve a Local Problem and to Mitigate a Global Hazard

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Spontaneous uncontrolled coal seam fires are a well known phenomenon that causes severe environmental problems and severe impact on natural coal reserves. Coal fires are a worldwide phenomenon, but in particular in Xinjiang, that covers 17.3 % of Chinas area and hosts approx 42 % of its coal resources. In Xinjiang since more than 50 years a rigorous strategy for fire fighting on local and regional scale is persued. The Xinjiang Coalfield Fire Fighting Bureau (FFB) has developed technologies and methods to deal with any known fire. Many fires have been extinguished already, but the problem is still there if not even growing. This problem is not only a problem for China due to the loss of valuable energy resources, but it is also a worldwide threat because of the generation of substantial amounts of greenhouse gases. Through the FFB, China is struggling to overcome this, but the activities could be much enhanced by the continuation of the already successful conjoint operations.

The last ten years have seen two successful cooperative projects between China and Germany on the field of coal-fire fighting, namely the German Technical Cooperation Project on Coal Fire in Xinjiang and the Sino-German Coal Fire Research Initiative funded by the corresponding ministries of both countries.

A persistent task in the fire fighting is the identification and supervision of areas with higher risks for the ignition of coal fires, the exploration of already ignited fire zones to extinguish the fires and the monitoring of extinguished fires to detect as early as possible process that may foster re-ignition.

This can be achieved by modeling both the structures and the processes that are involved. This has also been a promising part of the past cooperation projects, yet to be transformed into a standard application of fire fighting procedures.

In this contribution we describe the plans for a new conjoint project between China and Germany where on the basis of field investigations and laboratory measurements realistic dynamical models of fire-zones are constructed to increase the understanding of particular coal-fires, to interpret the surface signatures of the coal-fire in terms of location and propagation and to estimate the output of hazardous exhaust products to evaluate the economic benefit of fire extinction.