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A MODIS-based analysis of the Val d'Agri Oil Center (South of Italy) thermal emission: an independent gas flaring estimation strategy

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Different kinds of atmospheric pollution affect human health and the environment at local and global scale. The petroleum industry represents one of the most important environmental pollution sources, accounting for about 18% of well-to-wheels greenhouse gas (GHG) emissions. The main pollution source is represented by the flaring of gas, one of the most challenging energy and environmental problems facing the world today. The World Bank has estimated that 150 billion cubic meters of natural gas are being flared annually, that is equivalent to 30% of the European Union's gas consumption.
Since 2002, satellite-based methodologies have shown their capability in providing independent and reliable estimation of gas flaring emissions, at both national and global scale. In this paper, for the first time, the potential of satellite data in estimating gas flaring volumes emitted from a single on-shore crude oil pre-treatment plant, i.e. the Ente Nazionale Idrocarburi (ENI) Val d'Agri Oil Center (COVA), located in the Basilicata Region (South of Italy), was assessed. Specifically, thirteen years of night-time Moderate Resolution Imaging Spectroradiometer (MODIS) data acquired in the medium and thermal infrared (MIR and TIR, respectively) bands were processed. The Robust Satellite Techniques (RST) approach was implemented for identifying anomalous values of the signals under investigation (i.e. the MIR-TIR difference one), associated to the COVA flares emergency discharges. Then, the Fire Radiative Power (FRP), computed for the thermal anomalies previously identified, was correlated to the emitted gas flaring volumes, available for the COVA in the period 2003 – 2009, defining a satellite based regression model for estimating COVA gas flaring emitted volumes. The used strategy and the preliminary results of this analysis will be described in detail in this work.