

EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

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AN OVERVIEW OF HIGH RESOLUTION THERMAL INFRARED EXPLORATORY STUDIES AT
THE EUROPEAN SPACE AGENCY: PAST, PRESENT AND FUTURE

Abstract

Satellite series such as Meteosat and Landsat have been providing thermal infrared images for many years. At the European Space Agency (ESA) there have been a number of high resolution thermal infrared studies aimed at a number of applications ranging from thermal anomaly monitoring to land surface temperature mapping.

Nearly a decade ago, during the Copernicus Sentinel definition phase, exploratory activities focused on the feasibility of accommodating a thermal infrared capability on the Copernicus Sentinel spacecraft. Since then, other exploratory studies relating to thermal infrared have been performed or are on-going at ESA. These activities include the ESA Fuegosat set of activities, the ESA Earth Observation Convoy studies and the ESA Thermal InfraRed Instrument (TIRI) set of activities. This paper shall provide an overview of all these exploratory studies and present the latest results of the presently on-going activities.

The aim of the ESA Earth Observation Convoy studies was to explore the possibilities of flying additional cost effective missions with the Copernicus Sentinels to meet new Earth science and application objectives e.g. fulfilling observational gaps and synergistic measurements. These studies identified a high-resolution thermal infrared concept to fly with Sentinel-2/Sentinel-3 and a multi-angle thermal infrared capability flying with Metop-SG. This work also included exploring the possibility of flying a thermal infrared instrument in constellation with Landsat-8.

The ESA Fuegosat set of activities comprises the derivation of high resolution thermal infrared needs, the definition and development of a high resolution thermal infrared sensor system measuring at 20 m (including on-going bread boarding activities) and associated toolbox developments which demonstrate the added value of high resolution thermal infrared when used together with optical and SAR data.

A study is presently on going at ESA focused on the definition and development of a Thermal Infrared Instrument (TIRI) together with a supporting science activity (TIRI-SIM) focused on defining the latest user needs. The aim is to explore the possibility of flying TIRI with Sentinel-2. The latest results of these activities shall be presented.

Exploratory work is also on going between ESA and the European Commission regarding ways to extend the capability of the present day Copernicus Sentinels. One such candidate being discussed is a high-resolution thermal infrared capability.

This paper shall detail these exploratory activities (past, present and future). A discussion regarding ESA's possible role in the provision of high-resolution thermal infrared within a Copernicus context shall also be included.