

EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Sensors and Technology (3)

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DEVA: A THERMAL INFRARED OPTICAL INSTRUMENT FOR EARTH OBSERVATION FROM
SPACE WITH UNPRECEDENTED PERFORMANCE**Abstract**

This paper describes the DEVA instrument design which was the result of the continuation of a sequence of studies devoted to the development of IR sensor concepts. The design activity is clustered within the GMES IR Sensor System Definition and Development framework, funded by the European Space Agency. The conceptual design addressed the instrument, the mission analysis, as well as the data products selection and implementation which is driving the targeted instrument performance. The consortium in charge of the development is led by Selex ES, and composed by coseno S.r.l, Thales France, INSA and Kell S.r.l.. DEVA is a multispectral Infrared optical imager for Earth observation from Low Earth Orbit. The sensor system has been designed to work in five different spectral channels covering the visible (VIS), mid-wave infrared (MIR) and thermal infrared (TIR) and is capable of providing a Ground Spatial Resolution (GSD) of 20 m from an orbit altitude of 700 Km. These five channels have been at the

base of the whole design phase, since they ensure the full functionality to the instrument. Given the same spectral range, three different MIR detectors, differing in the detector saturation temperature, have been considered as part of the instrument. The instrument is comprised of a main optical bench supporting the optical components, a cryostat, focal plane electronics and cryocoolers and a calibration assembly containing blackbodies and mirrors. An entrance shutter protects the instrument against potential sun intrusion. The entrance shutter would be in the closed position during calibration. The front-end telescope is a three mirror anistigmat (TMA) with a 400 mm entrance aperture. Two dioptric relays are present: one to focus the image on the MIR and TIR detectors, the other to focus the image on the VIS detector. The calibration assembly, is used to calibrate the MIR and the TIR channels. The cryostat is cooled with cryocoolers controlled by the cryocoolers electronics which provides stable operations at cryogenic temperatures for the MIR and the TIR detectors. DEVA will be used to observe and monitor the Earth in this broad spectral range with unprecedented optical and geometrical performance, enabling a range of applications such as fire monitoring, volcano monitoring, irrigation water management, urban climate monitoring as well as security and surveillance.