

CAIRT mission and possible synergies with IASI-NG

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The Changing-Atmosphere Infra-Red Tomography Explorer(CAIRT) is currently one of the two candidates admitted to Phase A of the ESA’s Earth Explorer 11. By exploiting its limb imaging capabilities, CAIRT could sound the atmosphere simultaneously from the middle troposphere to the lower thermosphere at 0.2 cm⁻¹ spectral resolution and with horizontal sampling of 50 km along track, 25 km across track and vertical sampling of 1 km.

Exploiting a tomographic retrieval approach, CAIRT would produce a unique three-dimensional dataset of numerous trace gases, temperature and aerosols across the entire middle atmosphere to the

edge of space. With this, CAIRT would provide critical information on (a) atmospheric gravity waves, circulation and mixing, (b) coupling with the upper atmosphere, solar variability and space weather and, (c) aerosols and pollutants in the upper troposphere and lower stratosphere. CAIRT aims to reveal, resolve, and unravel the complex coupling between composition, circulation, and climate in the middle atmosphere, by improving the knowledge of the radiative-dynamic-chemical interactions that govern the climate system.

Furthermore, CAIRT would fly in loose formation with MetOp-SG mission, opening new possibilities of exploiting the synergy between its 3D limb observations with horizontally resolved nadir measurements from MetOp-SG satellite. In particular, CAIRT and IASI-NG, covering approximately the same spectral range and making possible the synergistic retrieval of many trace species, could allow not only the extension of the middle atmosphere measurements of CAIRT down to ground level, but also the provision of products with higher quality than the single instruments.

CAIRT is currently undergoing Phase A feasibility studies. An overview of the mission and its science objectives will be provided, as well as the initial results of the effects of exploitation of the synergy between CAIRT and IASI-NG in sounding both the troposphere and the lower stratosphere region.