

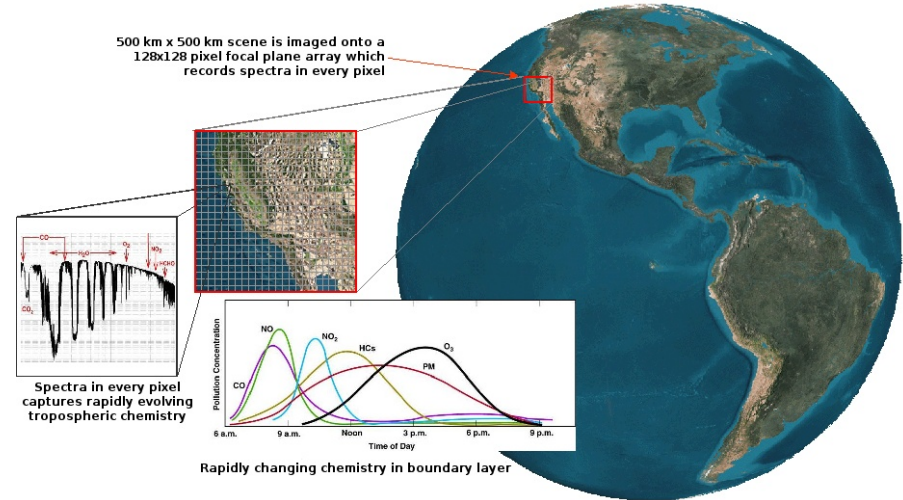


On-board Processing to Advance the PanFTS Imaging System for GEO-CAPE

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Objective

- Leverage the capabilities of the Xilinx Virtex-5 FPGA to meet demanding processing requirements of future space instruments.
- Develop an on-board processing (OBP) platform based on the Virtex-5 to optimize the data processing and instrument design of a Panchromatic Fourier Transform Spectrometer (PanFTS) for the GEO-CAPE mission concept.
- Achieve at least 20x reduction in data rate by converting time-domain interferograms to spectra with a highly parallel instrument digital signal processing design.



PanFTS measurement of atmospheric chemistry

Accomplishments

- Marina-3 processing board was designed and built, and tested in PanFTS EM thermal-vac test. Utilized at California Laboratory for Atmospheric Remote Sensing (CLARS), Mt Wilson, with NIR and SWIR detector arrays.
- Laser phase extraction works in real-time on the Virtex-5 at CLARS and is used to correct interferometer tip/tilt error while the scan is in progress.
- Full processing pipeline ran on a workstation at CLARS to compute spectra in a timely fashion, with data reduction factors of 28.9x in the SWIR and 40.2x in the NIR, exceeding 20x goal, to enable the real-time scanning requirements of PanFTS.
- These spectra have been analyzed to retrieve amounts of CH4, CO2 and O2 from the PanFTS imaging data at Mt Wilson, hence validating the processing in the relevant environment of a field deployment.
- Produced Virtex-7 design to reduce number of processing boards from six, under Virtex-5 design, to one for future Pan FTS spaceborne implementation.

Co-Is/Partners:

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TRL_{in} = 3 TRL_{out} = 5