

EFFECTS OF ATMOSPHERIC COMPENSATION ON GAS PLUME

SIGNATURES *Ben Miller, David W. Messinger**, DIRS, Center for Imaging Science,
blm7787@cis.rit.edu, dwmpci@cis.rit.edu

Gaseous effluents are most easily detected in hyperspectral imagery spanning the MWIR/LWIR region. In this region, thermal emission is the dominant source of radiation. The signature of the gas is driven by the contrast in temperature of the background and the plume itself. Gases that are warmer than the background will be seen in emission, while those that are cooler will be seen in absorption.

The first step in the detection and identification of gaseous plumes is to remove the effects of the atmosphere from the pixel spectra. In the thermal band, this involves accounting for the upwelling radiance and the atmospheric transmission. Several algorithms exist for the compensation of the atmosphere including In-scene Atmospheric Compensation (ISAC), Autonomous Atmospheric Correction (AAC), and Canonical Correlation Regression (CCA). This study looks at which atmospheric compensation has the least negative impact on the gas signatures in the MWIR/LWIR region.