

## WHO WE ARE

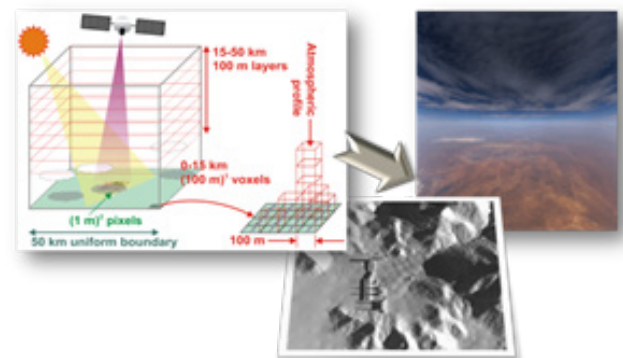
- We are a nationally known resource for our expertise in a variety of fields related to spectroscopy, remote sensing and imaging, combustion and propulsion technology, and radiative transfer processes.
- Our scientists and engineers consult with clients from government, prime contractors and industry to address their technology needs and develop innovative solutions

## CAPABILITIES

- Physics-based modeling
- Concept analysis
- System & experiment design
- Prototype development & testing
- Trade studies to facilitate customer decision making & product decision making
- Collaboration & licensing opportunities are available for software, hardware technologies, or customer specific solutions

## WHAT WE DO

- We conceptualize & construct physics-based computational chemistry and biochemical models for complex problems in chemistry, physics, optics and biology.
- We validate and customize these models to the specific user's application.
- We devise and write phenomena-based data analysis scientific software to apply to customer-owned sensor data, cognizant of intellectual property and security needs.



MCSce Generation of Hyperspectral Data

## OUR VALUE

- Our technology
- Our pool of scientific and engineering talent
- Approaching problems from multiple pathways
- Over 30 years of experience in contract research & development
- Our staff conducts science, writes, presents, & supports programs & products

## OUR APPLICATION AREAS

- Remote Sensing Analysis & Instrumentation
- Atmospheric Phenomena and Radiative Transfer
- Chemical Processes and Reactions Modeling
- Combustion Sensing and Control
- Biomedical Sensing, Imaging and Processing

## ATMOSPHERIC RADIATIVE TRANSFER (RT) AND SCENE MODELING

- Comprehensive models of all radiation sources including material emission, absorption, reflection and scatter to predict radiative effects at a sensor
- MODTRAN® atmospheric RT, a standard of the remote sensing industry
- MCSce Monte Carlo Scene Simulator models hyperspectral data from 3D elements including topography, buildings, clouds & varying atmosphere
- Specialized RT models of the upper atmosphere (SAMM™), rocket plumes and other environments



## SPECTRAL REMOTE SENSING ALGORITHMS

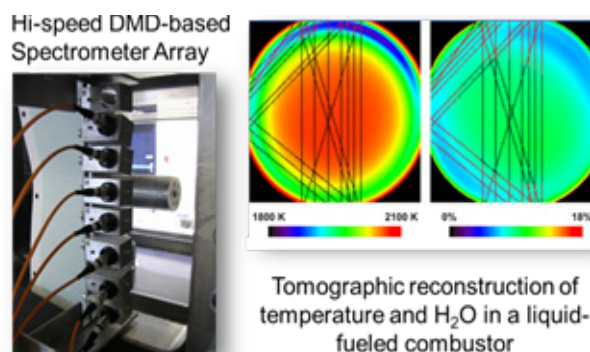
- We have applied expertise in radiative transfer to develop atmospheric correction algorithms FLAASH® and QUAC®
- Retrieve reflectance from radiance using in-scene information and MODTRAN® RT forward model
- Applications:
  - Remote identification of solid, liquid and gaseous materials,
  - Detect signals in cluttered backgrounds,
  - IS&R, land management, disaster management.



FLAASH Corrected Hyperspectral Data

## INSTRUMENTATION FOR SPECTRAL SENSING COMBUSTION CONTROL

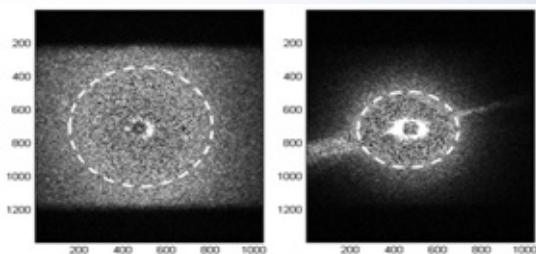
- Develop and demonstrate advanced instrument prototypes:
  - Hyperspectral and high speed imaging and non imaging spectrometers,
  - Monitoring and control of combustion processes,
  - Integrated processing software based on SSI data analysis algorithms.
- Sensor system design and performance modeling.
- Field test panning and support



Spectroscopic Combustion Chamber Measurements

## BIOMEDICAL APPLICATIONS

- Apply advanced computational models, detection algorithms and spectroscopic techniques developed for DoD to biomedical problems



CELLS Coagulation Monitor Concept

## COMPUTATIONAL CHEMISTRY AND PHYSICS

- Capability to model large molecules and complex reaction chemistry, interactions, and spectra:
  - Surface, liquid and gas reaction rates,
  - Biomolecules, nanostructures, and solid-state,
  - Gas & condensed phase, and interfaces
- Computational fluid dynamics with complex chemistry and radiation
- Applications: flowfield and spectral signature prediction, combustion, biochemical interactions, high energy chemistry, new materials and chemistry, hazardous chemical identification and remediation