Spectral Sciences Incorporated

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Who We Are: Spectral Sciences Inc. (SSI) is a nationally known resource for expertise in a variety of fields related to spectroscopy, remote sensing and imaging, combustion and propulsion technology, and radiative transfer processes. SSI scientists and engineers consult with clients from government, prime contractors, and industry to address their technology needs and develop innovative solutions. Projects are guided from concept through stages of development to a sound prototype, often in collaboration with industrial partners and academia.

What We Do: We conceptualize and 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 design and build advanced electro-optic instruments to meet customer analysis and performance needs. We devise and write phenomena-based data analysis scientific software to apply to customer-owned sensor data, cognizant of intellectual property and security needs. Small and large-scale customer challenges are approached responsively with quick turn-around. SSI would like to collaborate with you to solve your technical problems, and improve your efficiency and speed to market.

SSI Capabilities include phenomenological modeling, concept analysis, system and experiment design, prototype development and testing, and trade studies to facilitate customer decision-making and product development. Collaboration and licensing opportunities are available for software, hardware technologies, or customer specific solutions.

SSI's Value is in the technology we develop and the pool of scientific and engineering talent that we have drawn from a variety of disciplines. We often approach problems from multiple pathways. With over thirty years of experience in contract research and development, we know how to write winning proposals and deliver quality products. Our staff conducts science, writes, presents, and supports programs and products through maturity, as needed.

SSI Application Areas:

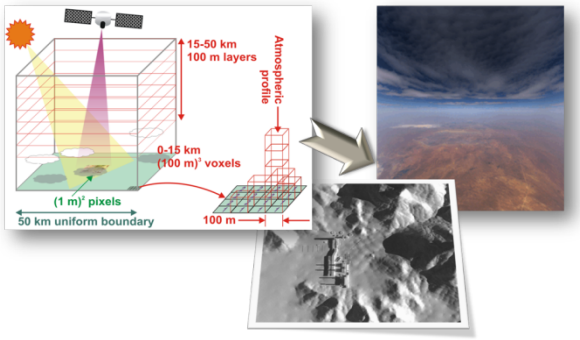
- Remote Sensing Analysis & Instrumentation
- Atmospheric Phenomena and Radiative Transfer
- Chemical Processes and Reactions Modeling
- Combustion Sensing and Control
- Biomedical Sensing, Imaging and Processing

Business Information:

- Founded 1981, Burlington MA, 15 mi. from Boston
- 30 PhD, 4 MS/BS Scientists and Engineers
- 30K ft^2 office building with 3800 ft^2 laboratories and 400 ft^2 classified processing center
- 172 node Beowulf parallel computing cluster and multiple computing platform options
- Customer base: Air Force, Army, Missile Defense Agency, Intel agencies, DoE, National Laboratories, NASA and associated prime contractors
- Collaborations with large & small businesses, major universities

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.
- SSI is well known for MODTRAN®5 atmospheric RT, a standard of the remote sensing industry.
- MCScene 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.



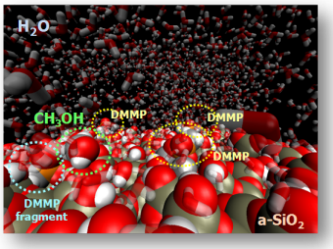
MCScene Generation of Hyperspectral Data

Spectral Remote Sensing Algorithms:

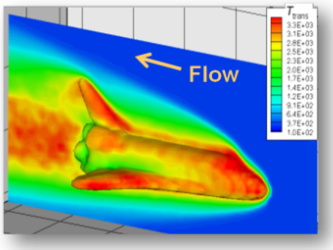
FLAASH Corrected Hyperspectral Data

- SSI 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.

Computational Chemistry and Physics:



eraction of Chemical Warfare Agent Simulant DMMP and fragments with SiO_2 Surface



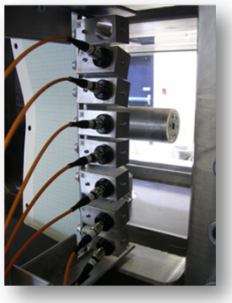
Temperature of Flow Surrounding Space Shuttle in Orbit

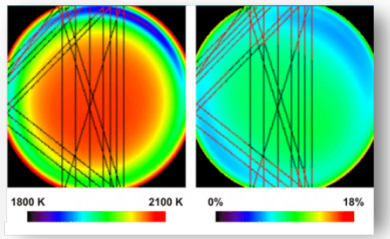
Micro- and Macro- Scale Interaction Models

- 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.

Instrumentation for Spectral Sensing and Combustion Control:

Hi-speed DMD-based Spectrometer Array

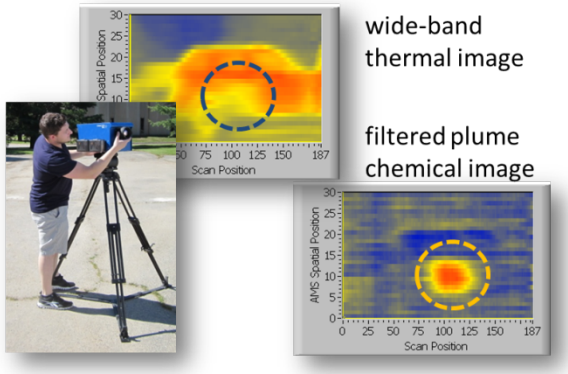




Tomographic reconstruction of temperature and H_2O in a liquid-fueled combustor

Spectroscopic Combustion Chamber Measurements

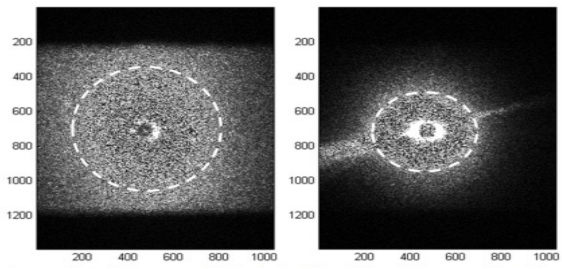
- Develop and demonstrate advanced instrument prototypes:
  - Hyperspectral and high speed imaging and non-imaging spectrometers,
  - Monitoring and control of combustion processes,
  - Integrated processing software based on SSI data analysis algorithms.
- Sensor system design and performance modeling.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



TRACER Portable Hyperspectral Imager with Rapidly Adaptable Chemical Filter

Biomedical Applications:

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



CELLS Coagulation Monitor Concept