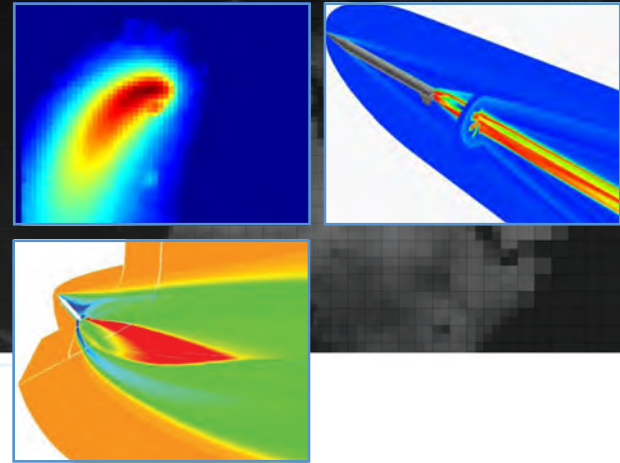


# PRSM

## Propulsion-Related Signature Modeling

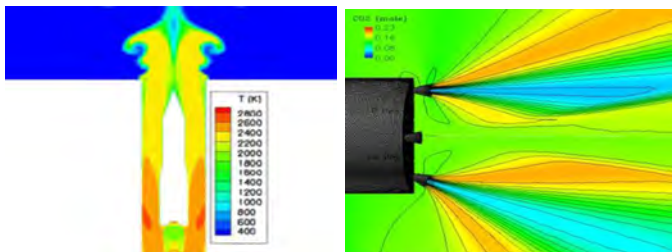


**Propulsion-Related Signature Modeling (PRSM)** provides the capability to simulate boost and post-boost target phenomenology scenes from missile launch through re-entry to include plumes, effluent trails, wakes and plume induced body heating. This modeling capability is required to support BMDS system trade studies such as sensor band-pass selection, noise equivalent target (NET) requirements and dynamic range beyond pre-existing experimental measurement databases.

### Model Development and Application:

The overall program is directed at the development, validation and dissemination of models and experimental measurement techniques capable of accurate characterization of all propulsion sub-system related signatures.

Propulsion-related signature modeling provides strong continuing support to the on-going Missile Defense Elements and Programs. The tools must cover the altitude range from sea level to space for a variety of sensor applications and range from the highest achievable fidelity—to engineering models for integration into real time HWIL and Digital Simulations.



### Current Modeling Capabilities:

- Rocket Performance/Combustion Assessments
- Continuum thru Rarefied Plume Flowfields
- Passive and Active Signatures
  - UV/VIS/SWIR/MWIR/LWIR
  - LADAR and RADAR Attenuation/RCS
- Post-Boost Phenomena and Countermeasures

The program has implemented a coordinated approach to accomplish these objectives. The process starts with basic research to determine controlling mechanisms and rates as well as the formulation & validation of submodels. Component models are then developed to individually treat the propulsion subsystem, flowfield and radiation transport parts of the problem. The component models & model interfaces are then upgraded as validation data becomes available from laboratory experiments and MDA flight tests. These activities proceed concurrently with efforts to apply the latest modeling & simulation capability to support nearer term high-priority requests and to transition the upgraded toolkits to the BMDS user community.



### Examples of “Real World” Propulsion Related Events

- Silo/TEL Launches
- Boost Phase Plume Signatures
- Staging Events/Thrust Termination/Booster Burnout
- Boost Maneuvering such as Angle-of-Attack
- Interceptor DACS Plume Characterization

