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Lidar and Radar Remote Sensing at Sandia National Laboratories

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Sandia National Laboratories

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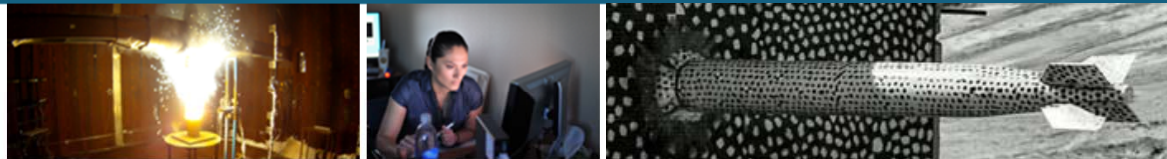
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Lidar and Radar Remote Sensing at Sandia National Laboratories



Ray Bambha

Sandia National Laboratories

925-294-3391



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.



DOE-ARM Operational Remote Sensing Measurement Locations



North Slope of Alaska



Eastern North Atlantic



Southern Great Plains

Equator

- ARM Site
- Other Facilities and Deployments

See:
<https://www.arm.gov/tour/>

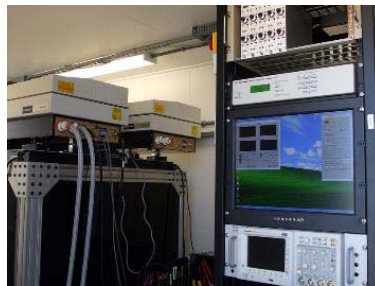
Atmospheric Lidar Mentorship for the DOE-ARM Program



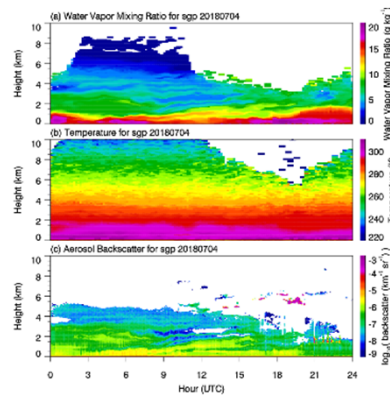
Raman Lidar profiling of water vapor, aerosols, and temperature



SNL



DOE-ARM SGP



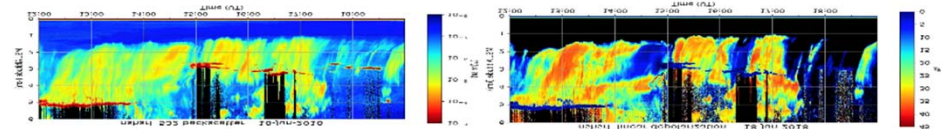
High Spectral Resolution Lidar for detailed profiling of aerosols



U. Wisc - SSEC



AMF2 - Antarctica



Upgrade in progress: dual wavelength and scanning capabilities in 2020

- Areas for collaboration:
- New multi-measurement retrieval algorithms for clouds and aerosols
 - Studies of atmospheric phenomena and climate model validation

Pathfinder Radar ISR Solutions

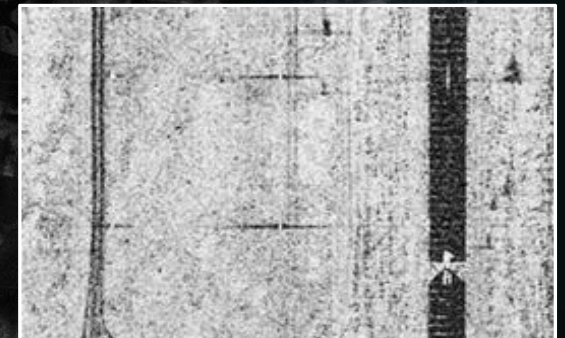
3+ decades of experience delivering pathfinder ISR solutions for complex, critical and urgent national security problems (FFRDC)

- ▶ All Weather, Day or Night
- ▶ High Resolution, Optical-like
- ▶ On-board and Real-time Processing
- ▶ Flexible platform and TPED (Tasking, Processing Exploitation and Dissemination) configuration

Sandia Radar ISR: www.sandia.gov/radar/



**High Resolution
SAR/VideoSAR**



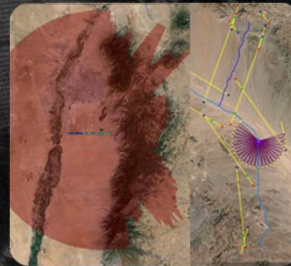
**High Resolution
CCD/VideoCCD**

Complete Mission Solutions

▶ Provider of end-to-end solutions that leverage physics, engineering, and data and information science to support national security decision making

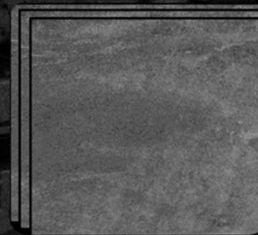
▶ **Mission Engineering**

- ▶ Pre-Mission Analysis & Flight Planning
- ▶ Highly customized TTPs and CONOPs
- ▶ Continuous performance assessments
- ▶ Analyst Training in SAR phenomenology



▶ **Real-time Processing**

- ▶ Real-time Delivery of Multiple Image Products to Analysts
- ▶ Image Formation
- ▶ Change Detection Products
- ▶ Transmission of Real-time Products



▶ **Advanced Sensor Exploitation**

- ▶ Predictive Intelligence
- ▶ Human Factors
- ▶ Advanced Exploitation Techniques



▶ **Analyst Training**

SAR imagery integration into Processing Exploitation and Dissemination cycle is difficult at best.

Hard Problems

- Ultra-wideband software defined RF detection capabilities
- Real time low size weight and power processing
- Effective and efficient human machine interfaces
- Extraction of information from physics represented by SAR imagery
- Ultrawide-band, high-frequency planer antenna technologies
- Complex scattering signature analysis and measurements
- Integration of next generation system on a chip FPGA capabilities

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