U.S. AIR FORCE

USSF

AFRL

# One AFRL - Two Services

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DAF TECHNOLOGY EXECUTIVE OFFICER

# Commander's Intent and Priorities

# Space is critical today for the U.S. economy and national security.

SPACEX x12,000

amazon x3200

Remote sensing – communication, banking

GALACTIC

planet. See change. Change the world.

BLACK|SKY Be The First To Know

India tests anti-satellite weapon, 2019

**1969**
**~1500 objects, ~7 nations in space**

**Today**
**~$10^4$ objects; human-operated, ~90 nations; commercial**

# Space is critical for future exploration and utilization opportunities.


Future exploration

Economic Drivers

DSI DEEP SPACE INDUSTRIES

LUNAR RESOURCES

PLANETARY RESOURCES

**Russia and China have weaponized space**

# Space as Part of U.S. Strategy



Military spacepower cannot unilaterally win wars, but like landpower, seapower, airpower, or cyberpower, its success, absence, or failure could prove catastrophically decisive in war.

## DESIRED CONDITIONS

The space domain is secure, stable, and accessible. The use of space by the United States and our allies and partners is underpinned by sustained, comprehensive U.S. military strength. The United States is able to leverage our use of space to generate, project, and employ power across all domains throughout the spectrum of conflict.

## CENTRAL CHALLENGE

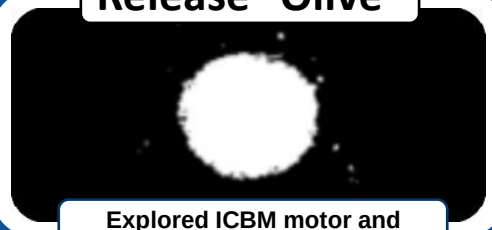
The U.S. defense space enterprise was not built for the current strategic environment. The intentions and advancements of potential adversaries in space are threatening the ability of the United States to deter aggression, to protect U.S. national interest, and to fight and win future conflicts.

## SPACEPOWER

The sum of a nation's capabilities to leverage space for diplomatic, information, military and economic activities in peace or war in order to attain national objectives.

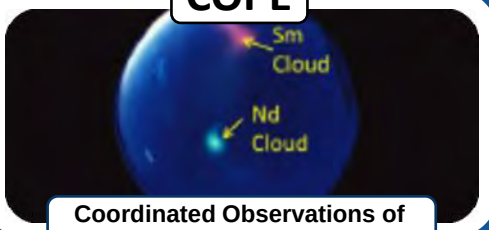
# Space is not new to AFRL

**1960 — Release "Olive"**



Explored ICBM motor and upper atmosphere interactions

**1980s — COPE**




Coordinated Observations of Polar Electrodynamics

**1992-1996 — MSTI-1, 2, 3**

Miniature Sensor Technology Integration program

**1998, 2000 — MightySat-1,2**

Small satellite technology testing program

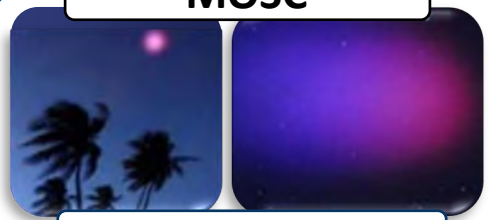
**2003, 2005 — XSS-10, XSS-11**

eXperimental Small Satellite

**2006, 2009 — TacSats 2 & 3**

Tactical Imager/Tactical Comm, Hyperspectral Imager/Tactical Comm

**2012 — MOSC**

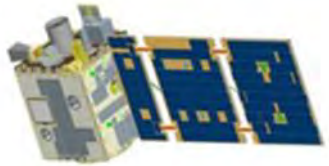


Metal Oxide Space Clouds

**2015 — GEARS, GEARS2**

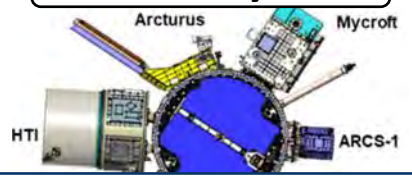
Cubesats testing commercial SatComm connections

**2015 — ANGELS**



Autonomous Nanosatellite Guardian for Evaluating Local Space

**2015 — EAGLE/Mycroft**




Missile warning, SSA, Protection/GEO, SSA 4th Gen InspectorSat

**2017 — ROSA**

Rollout Solar Array on the International Space Station

**2020 — NTS-3**

First Space Vanguard

# Enabling Space Integration

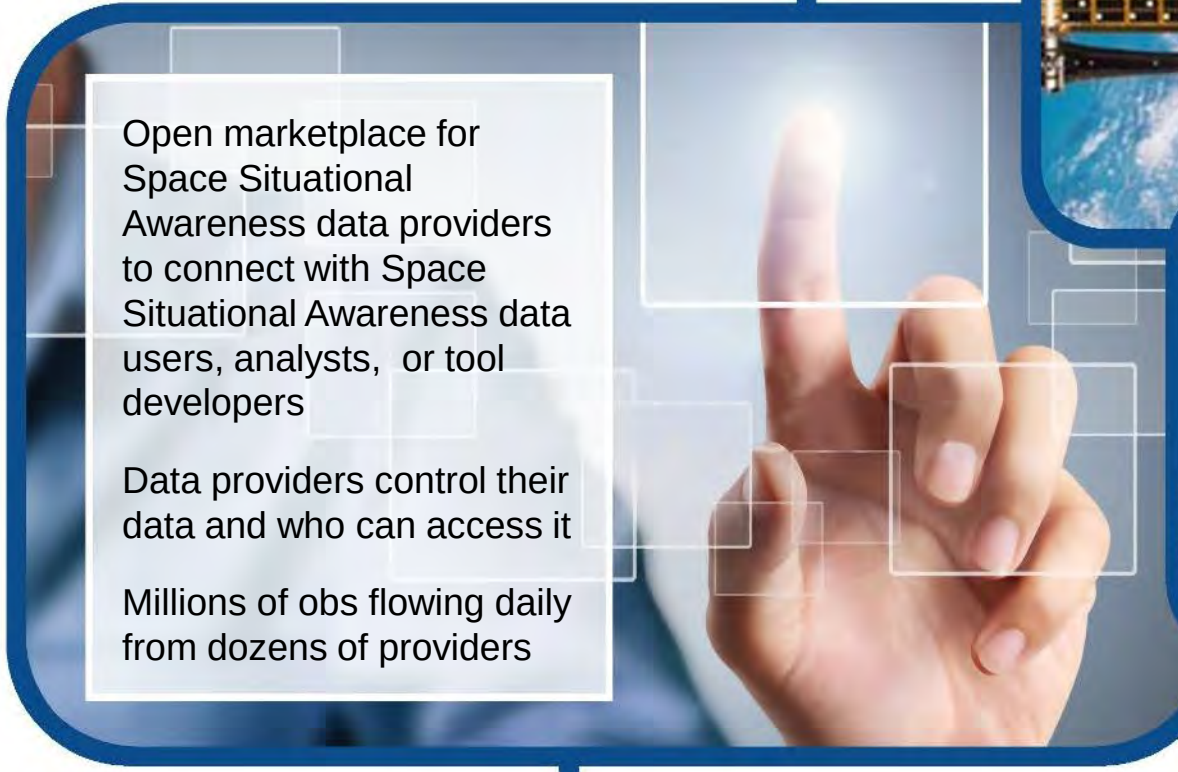
## Multi-domain Tech Transitions

### Unified Data Library

Open marketplace for Space Situational Awareness data providers to connect with Space Situational Awareness data users, analysts, or tool developers

Data providers control their data and who can access it

Millions of obs flowing daily from dozens of providers



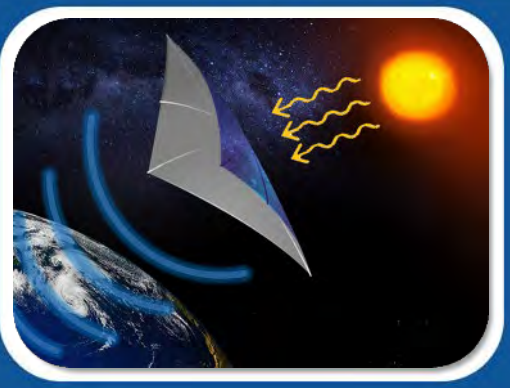
### Carbon Composites

### NTS-3

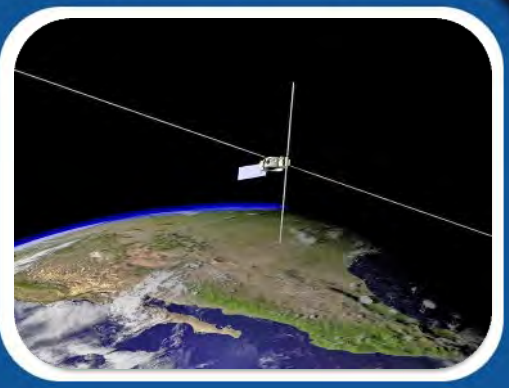
# AFRL is on the forefront of space technology

NAVIGATION TECHNOLOGY SATELLITE – 3 (NTS-3)

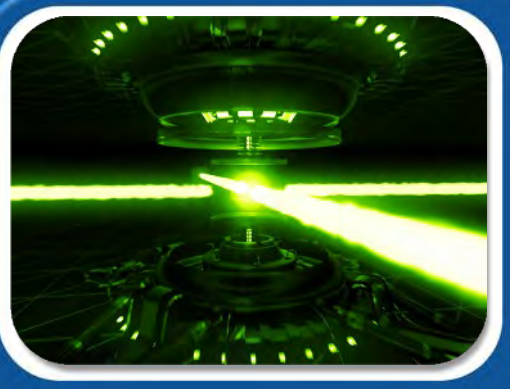
ADVANCED SPACECRAFT ENERGETIC NON-TOXIC (ASCENT) PROPELLANT



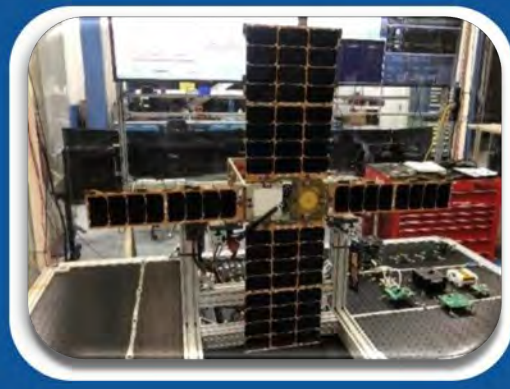
SPACE POWER BEAMING



DEMONSTRATION AND SCIENCE EXPERIMENTS (DSX) SATELLITE



QUANTUM SENSING AND TIMING



SMALL SATS AND HYBRID ARCHITECTURES

SPACE LOGISTICS AND ADVANCED ROBOTICS


SPACE DOMAIN AWARENESS

# AFRL Space Technology Facilities

## Battlespace Environment Laboratory

Cold Atom Lab | Imaging Spectroscopy Calibration Lab | Plasma Chemistry Lab

## Existing Facilities – 55 Bldgs

- 402,000 Sq Ft – Kirtland AFB, NM
- 3 new buildings under construction

EO/IR Facilities | Space Electronics

IRREL Characterizes Focal Plane Arrays

Nuclear Radiation Simulation Lab

IRREL Mobile Characterization

## Spacecraft Technology Facility

Composite Fabrication And Testing Capabilities | Unique Test Equipment | Resilient Bus Experiment Lab (REBEL)

## Aerospace Engineering Facility

Gryphon Lab | SmallSat Integration

## New Research Facilities

Deployable Structures Experiments Lab (DeSEL)

Space Vehicle Component Lab

## AFRL NM Tech Engagement

AFRL New Mexico @ Q Station

AFRI-UNM Center of Open Innovation for Agile Manufacturing

AFRL Innovation Lab

# AFRL Space Technology Facilities

## Starfire Optical Range

Providing SDA tech to the community

## AMOS – Air Force Maui Optical and Supercomputing Site

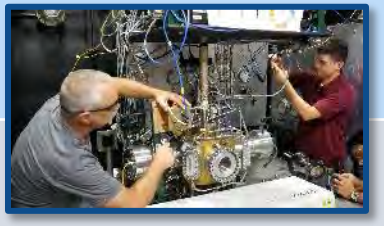
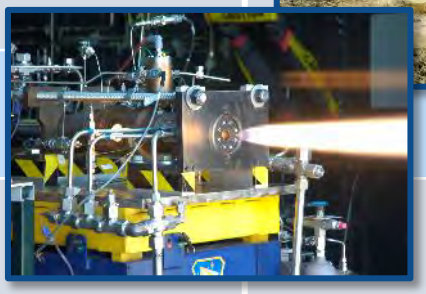
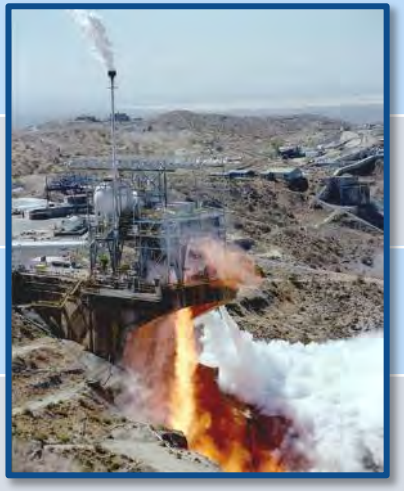
Developing laser guidestar, adaptive optics

## Satellite Assessment Center

Assessing vulnerability to protect satellites

# AFRL Space Propulsion Facilities


- National Asset for US & Industry
- 65 sq miles
- $10.2B in infrastructure
- Dual Use facilities

| | BENCH LABS | SUBSCALE TESTING | HIGH THRUST |
|---|---|---|---|
| FLIGHT PROTOTYPE | **Experimental Test Cells**<br>**Chemistry & Propellant Labs** | **Altitude and Space Environment Simulation Facilities**<br>• Micro-newtons → 50,000 lbs thrust | **High Thrust Facilities**<br>• 19 Liquid engine stands, up to 8,000,000 lbs thrust<br>• 13 Solid Rocket Motor pads, up to 10,000,000 lbs thrust |
| FULL-SCALE DEVELOPMENT |  |  |  |
| SUBSCALE TESTING |  | |  |
| PROOF OF CONCEPT |  | | |
| EXPLORATORY RESEARCH | | | |

# One AFRL = Depth and Breadth of Entire AFRL Team

## TYPES OF EMPLOYEES

**1,200** Military (USAF/USSF)

**5,100** Civilians

**4,700** Contracted Positions

## SCIENTISTS & ENGINEERS (S&Es)

**Three** out of every **five** government civilians are S&Es

## EDUCATION

**70%** of S&Es hold a Master's degree or higher

**36%** hold a Ph.D.

## BUSINESS PROFESSIONALS

Program Management, Finance, Contracting, Acquisition, Security, Information Technology, and many more…

**Extensive Diversity and Inclusion Outreach Initiatives**

**700+ billets to space: access to entire AFRL team**

# Existing Science & Technology (S&T) Ecosystem

# TEO and Deputy TEO for Space - Focal Points for USSF S&T Execution

## Emphasizing the path for space-focused science and technology programs

- Determining Space S&T needs and priorities
- Developing and Maintaining Space S&T strategic Plan
- Providing direction and oversight of the Space S&T portfolio across executing organizations
- Developing the Space S&T element of the USSF POM
- Interacting, coordinating, collaborating, and partnering across the larger Space S&T community within the DoD, industry, private sector, other government agencies, and international

U.S. AIR FORCE USSF

ONE AFRL

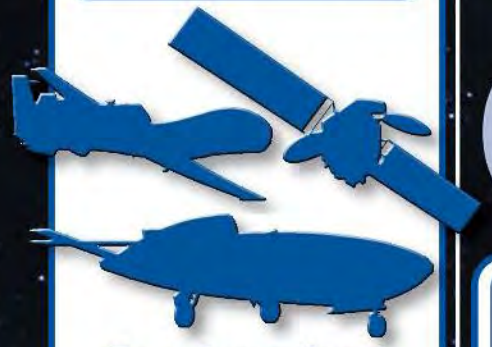
TEO
Brigadier General
Heather Pringle

Deputy TEO for Space
Dr. Kelly Hammett

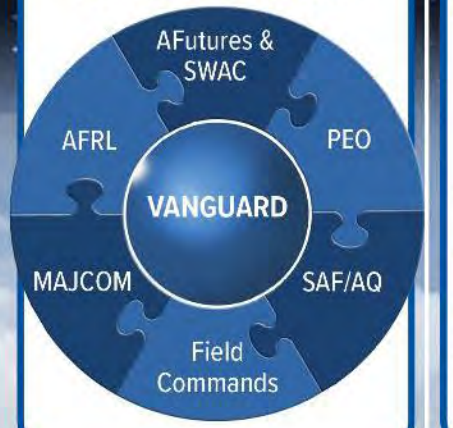
# WE ARE CHANGING

BECOMING MORE
RESPONSIVE
COMPETITIVE
TALENT DRIVEN
AGILE

## NEW VALUE PROPOSITION



Transformational




## NEW BUSINESS PROCESSES

WARTECH
Competitive Pipelines
Service to Connect
New SAB Approach

## NEW RESOURCE ALIGNMENTS AND TOOLS

6.3 Portfolio Restructure
6.3 Program Element Restructure
Deepening and Expanding Talent

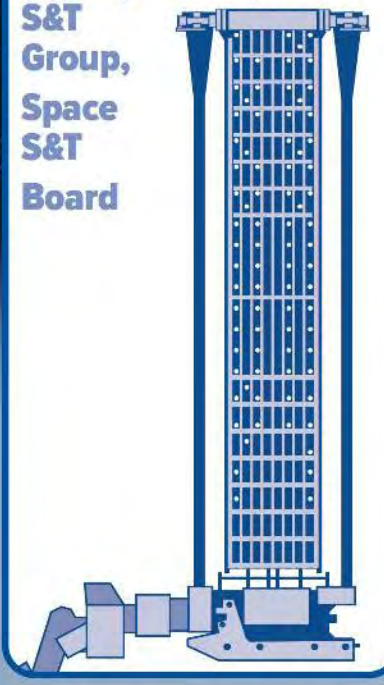
## NEW ENTERPRISE ORGANIZATIONAL CONSTRUCTS

Transformational Capabilities Office (TCO)

Partnerships
AFWERX & SpaceWERX Center of Excellence

## PARTNERSHIP WITH USSF

Dedicated S&T Resources Multi-domain Technologies Deputy TEO, Space S&T Group,
Space S&T Board



# Underlying Tenets for ***One AFRL – Two Services***

- Today's threat require multi-disciplinary solutions
- Cross-discipline collaboration enhances outcome
- AFRL has deep, strong space history expertise
- Eliminates duplication and reduces overhead to optimize and stretch limited research funding
- Leverage shared lab facilities, test assets, tools
- Enables robust, multi-domain Digital Enterprise
- Established Deputy TEO for dedicated support
- Efficient, agile, and collaborative engagement

**Best return on investment for limited Department of the Air Force resources**

# Questions?