

Headquarters U.S. Air Force

Integrity - Service - Excellence



**Air Force
Science,
Technology,
Engineering,
and Math
(STEM)**

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- **POTUS and Congressional Interest**
- **Air Force STEM categories**
 - Workforce Development
 - Outreach
 - Research
- **Excellent work being done in AF STEM (AQ, A1, AFRS), but hard to capture and coordinate across organizations**

To Own the Technical Baseline and maintain technological superiority, we must attract, recruit, and develop STEM talent!



Air Force STEM

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Policy and Governance:

Assure technologically superior warfighting capabilities

- White House Office of Science & Technology Policy
- Congressional STEM Authorities - Defense Acquisition Workforce Development Fund, Section 219, Military Children Outreach Pilot
- OSD STEM Development Office
- Assistant Secretary of the Air Force for Acquisition (SAF/AQ) Functional Authority
 - AF STEM Advisory Council (AQ Chairs; Bright Horizons STEM Workforce Strategy)
 - Scientist and Engineer Advisory Council; AF Engineering Enterprise Strategic Plan
- Air Force STEM Outreach Executive Agent (AFRL/EN)

STEM Outreach: *Attract and Inspire K-12/NDSEG*

- K-12 Activities at ~25 Air Force Installations
- Partnerships: Air Force Association, Civil Air Patrol
- La Luz Academy
- STEM Competitions: Junior Science and Humanities Symposia Program, StellarXplorers, CyberPatriot, First Lego League, First Robotics, etc...
- DoD STARBASE
- National Defense Science and Engineering Graduate Fellowship Program

STEM Workforce Development: *Recruit, Retain and Develop*

- Science, Mathematics & Research for Transformation
- US Air Force Academy
- Air Force Institute of Technology
- ROTC
- AFRL Scholars Program
- Advanced Course in Engineering (ACE) Cyber Bootcamp

STEM Research: *Discover, shape, and champion basic science*

- Basic Research
- Minority Leaders Prog
- University Nanosat Prog
- Defense University Research Instrumentation Program
- Awards to Stimulate and Support Undergraduate Research Experiences
- Presidential Early Career Award for Scientists and Engineers





- **Congressional Authorities and Interests:**
 - **Defense Acquisition Workforce Development Fund:** Extends AF ability to attract high quality grads, employment & retention incentives
 - **Section 219:** Allows DoD Science and Technology Laboratory Directors to use up to 3% of all appropriated funds for 4 categories of projects, including workforce development
 - **National Defense Education Program:** OSD Program Element that funds Workforce Development and STEM Outreach programs
 - **FY15 NDAA Section 233:** Recent special emphasis on DoD's role in STEM outreach to military dependents in K-12
 - **Strong interest in diverse STEM workforce**



- **White House Office of Science & Technology Policy**
 - STEM Consolidation
 - 5-year STEM Education Strategic Plan: Federal agencies to “coordinate and leverage” STEM assets to increase impact
- **OSD STEM Development Office - ASD(R&E)**
- **AF STEM Advisory Council (AQ Military Deputy Chairs)**
 - National Research Council Study recommendation
 - Advises SECAF/CSAF on STEM human capital and outreach
 - Bright Horizons 2.0: Air Force STEM Workforce Strategy
- **Scientist and Engineer Advisory Council (AQR Chairs)**
- **Air Force Scientist Advisory Panel**
- **Air Force STEM Outreach Executive Agent (AFRL/EN)**



STEM Workforce Development

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- **STEMAC, SEAC, and AFSAP (Bright Horizons and Eng Enterprise)**
- **Defense Acquisition Workforce Development Fund**
- **Science, Mathematics & Research for Transformation**
- **US Air Force Academy**
- **Air Force Institute of Technology**
- **ROTC**
- **AFRL Scholars Program**
- **Advanced Course in Engineering (Cyber bootcamp)**
- **ETC...**



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AF STEM Inventory

AF Officers – 5 Core AFS assigned to 61 AFS

Comm./ Computer	Civil Engr.	Engineers	Scientists	Weather	Total
2,624	1,248	3,560	991	567	8,990

AF Civilian Professionals – 51 Occupational Series assigned to 13 Career Fields

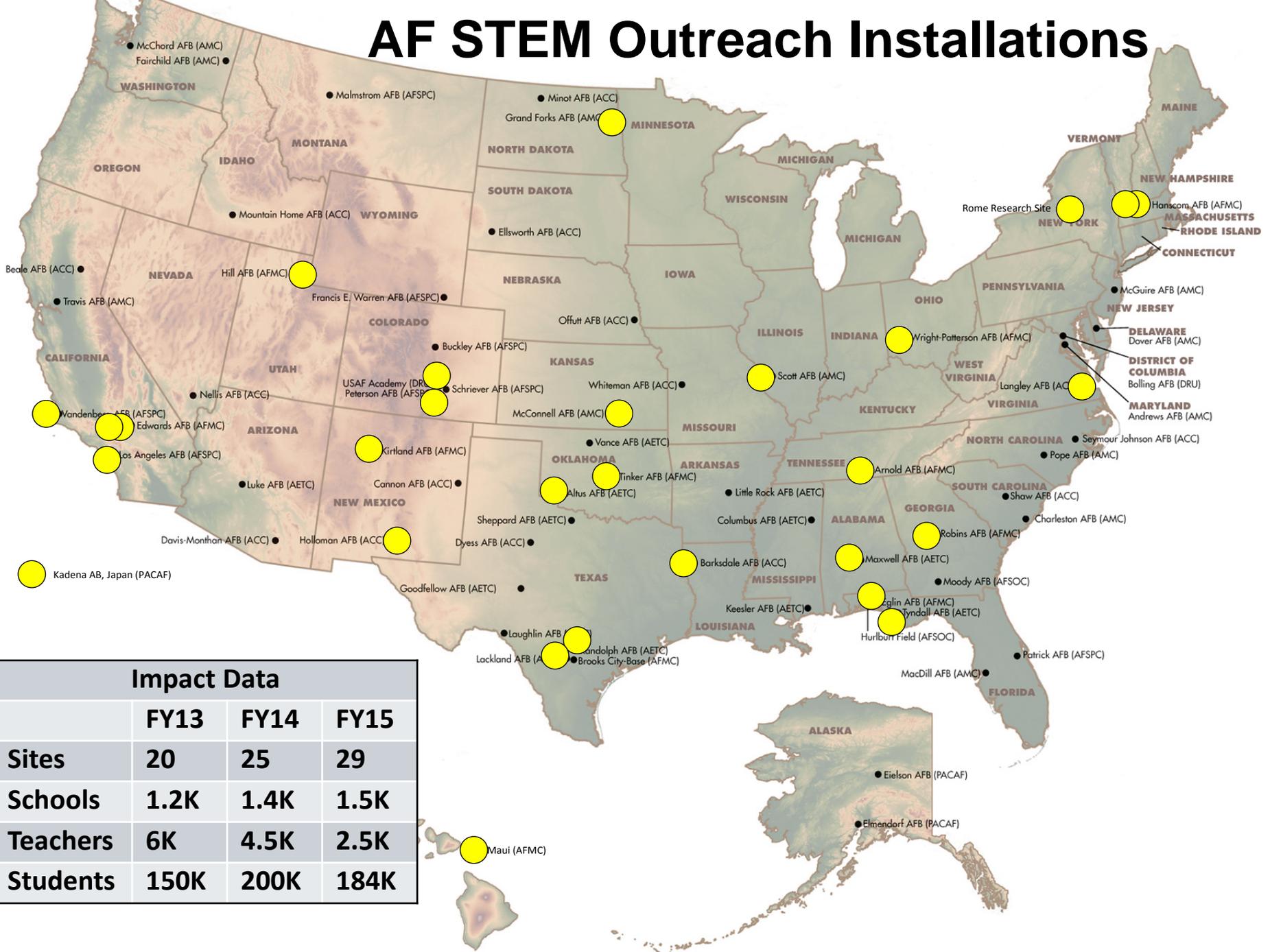
Life Science	Biological Science	Medical	Engineers	Physical Sciences	Ops Rsch/ Computer Sci.	Total
144	235	27	12,727	1,058	2,075	16,266

AF STEM Core Assigned = 25,256



- **Air Force STEM Executive Agent coordinates K-12 STEM activities across the Air Force enterprise**
- **Air Force STEM Outreach Objectives:**
 - Goal 1 - Institutionalize and Coordinate STEM Outreach throughout the Air Force.
 - Goal 2 - Leverage Industry, Schools, and other Government Agencies' STEM Outreach Investments and Initiatives.
 - Goal 3 - Increase the Effectiveness and Diversity of the Air Force Investment in STEM Outreach.
- **Air Force hosting 2016 Junior Science and Humanities Symposia National Competition at WPAFB**

AF STEM Outreach Installations



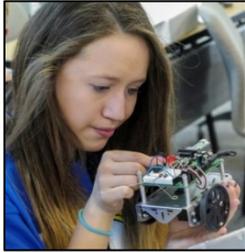
Impact Data

	FY13	FY14	FY15
Sites	20	25	29
Schools	1.2K	1.4K	1.5K
Teachers	6K	4.5K	2.5K
Students	150K	200K	184K



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K-12 STEM Outreach – AFRL La Luz Academy



Over **90,000** students from **404** schools in 65 NM districts

- ★ Students: 2200 5th Grade
(per year) 1600 Middle School
100 High School
- ★ Teachers: 150
(per year)
- ★ AFRL S&E's: 60 (per year)

Activities:

- Mission to Mars (5th Grade)
- DoD STARBASE (5th Grade)
- TECH (Middle School)
- Robot Systems (Middle School)
- STEM Challenge (High School)
- STEM Expeditions (K-12)

- ★ 68% minority participation
(60% Hispanic/8% Native American)
- ★ 49% Female participation
- ★ 2013 Federal Laboratory Consortium –
STEM Team Award
- ★ Named SAF Flagship Program – 2010



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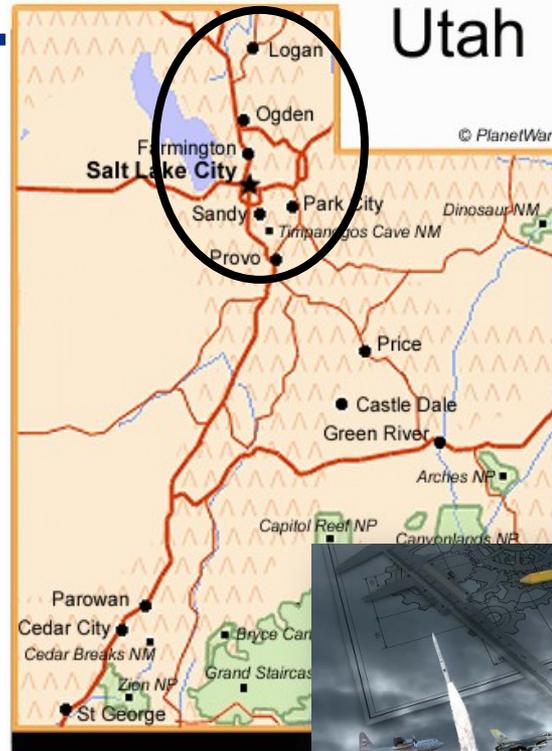


Team Hill STEM Program Overview

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Programs Supported:

- Get Scienced
- Code.Org training
- Hour of Code
- SheTech
- MESA
- Utah STEM Action Center
- Utah STEM Festival
- VEX Robotics
- Hi-Gear
- FIRST regional competition
- SeaPerch underwater robotics
- ASM Teacher Camps
- Mission to Mars
- Science Olympiad
- Science Fair judging
- E-Cybermission
- Career Days
- CyberPatriot
- Future City
- Expanding Your Horizons
- Project Lead the Way
- STARBASE and STARBASE 2.0
- Monthly library STEM events i.e. Fly to Learn
- Salt Lake Valley Eng. & Sci. Career Fair
- Junior Achievement- Geek Squad Academy
- Wasatch Engineering Education Partnership
- Park City Center for Advanced Prof. Studies
- Tutoring for Next Gen Kids w/ DWS
- Support of UVU and WSU Prep Programs
- FIRST Tech Challenge, FIRST Lego League
- Student, teacher and counselor tours



2013 STEM Statistics:

33,209 students
 1,252 teachers
 257 schools
 997 military volunteers
 291 civilian volunteers

2014 STEM Statistics:

50,258 students
 1,203 teachers
 557 schools
 601 military volunteers
 620 civilian volunteers

- \$110K/yr NDEP funding
- \$325K/yr STARBASE funding



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StellarXplorers

- HAF/CX requested SAF/AQR establish STEM Outreach competition on the Space side of our business, similar to AFA's CyberPatriot (Jun 2014)
- SAF/AQR engaged AFA and kicked off a team to develop the StellarXplorers pilot (Jul 2014)
- Five teams of high school students tackled a problem of orbital design using Analytical Graphics, Inc's satellite toolkit (Apr 2015)
- SECAF announced partnering with AFA to establish program (Apr 2015)
- AFA grew StellarXplorers to 27 teams across the globe in 2016





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STEM Research

- **Basic Research Portfolio**
- **Minority Leaders Research Collaboration Program**
- **University Nanosat Program**
- **Defense University Research Instrumentation Program**
- **Awards to Stimulate and Support Undergraduate Research Experiences**
- **Presidential Early Career Award for Scientists and Engineers**



AF Basic Research Manager

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Mission: We discover, shape, and champion basic science that profoundly impacts the future Air Force.

- **Identify Breakthrough Research Opportunities – Here & Abroad**
 - **55 Program Managers interacting with leading scientists and engineers across the globe**
 - **3 International offices (London, Tokyo, Santiago)**
 - **Sponsored 89 scientific workshops and symposiums in FY 2014**
- **Foster Revolutionary Basic Research for Air Force Needs**
 - **1405 extramural research grants at 220 U.S. universities**
 - **295 intramural research projects at AFRL, USAFA, AFIT**
 - **2065 Principal Investigators, 3750 grad students, 625 post-docs supported**
- **Transition Technologies to DOD and Industry**
 - **907 funded transitions (follow-on-uses)**
 - **AFRL is the principal transition path**
 - **90 STTR small business - university contracts**

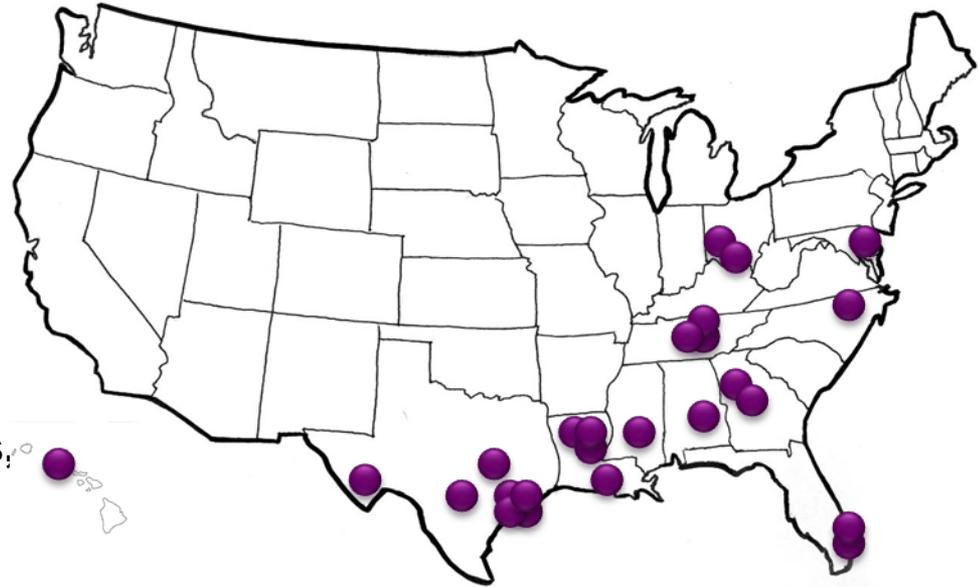
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Minority Leaders Research Collaboration Program

- Initiated in 2005
- Focuses on HBCU/MI
- Congressional funding (FY05-FY15)
- Resulted in employment of 8 scientists and 10-15 interns/yr
- Technical focus on nanotechnology, electro-optical materials, composites, manufacturing technologies
- Currently: 25 University Participants working on 58 Technical Efforts





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