Wallops Flight Facility Support of NASA Science & the Commercial Launch Industry

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Wallops Role in Supporting NASA Science

GSFC/Wallops

- ***Suborbital & Small Orbital Research Carriers***
  - ***Sounding Rocket Program***
  - ***Balloon Program***
  - ***Airborne Science Program (piloted aircraft & UAS)***
  - ***Smallsats***
- ***Wallops Research Range***
  - ***Launch Range (including Mobile Range)***
  - ***Research Airport***
- ***Earth Science Research***
- ***Technology Development***
  - ***Carrier and payload support systems, mission ops., & instrument development***

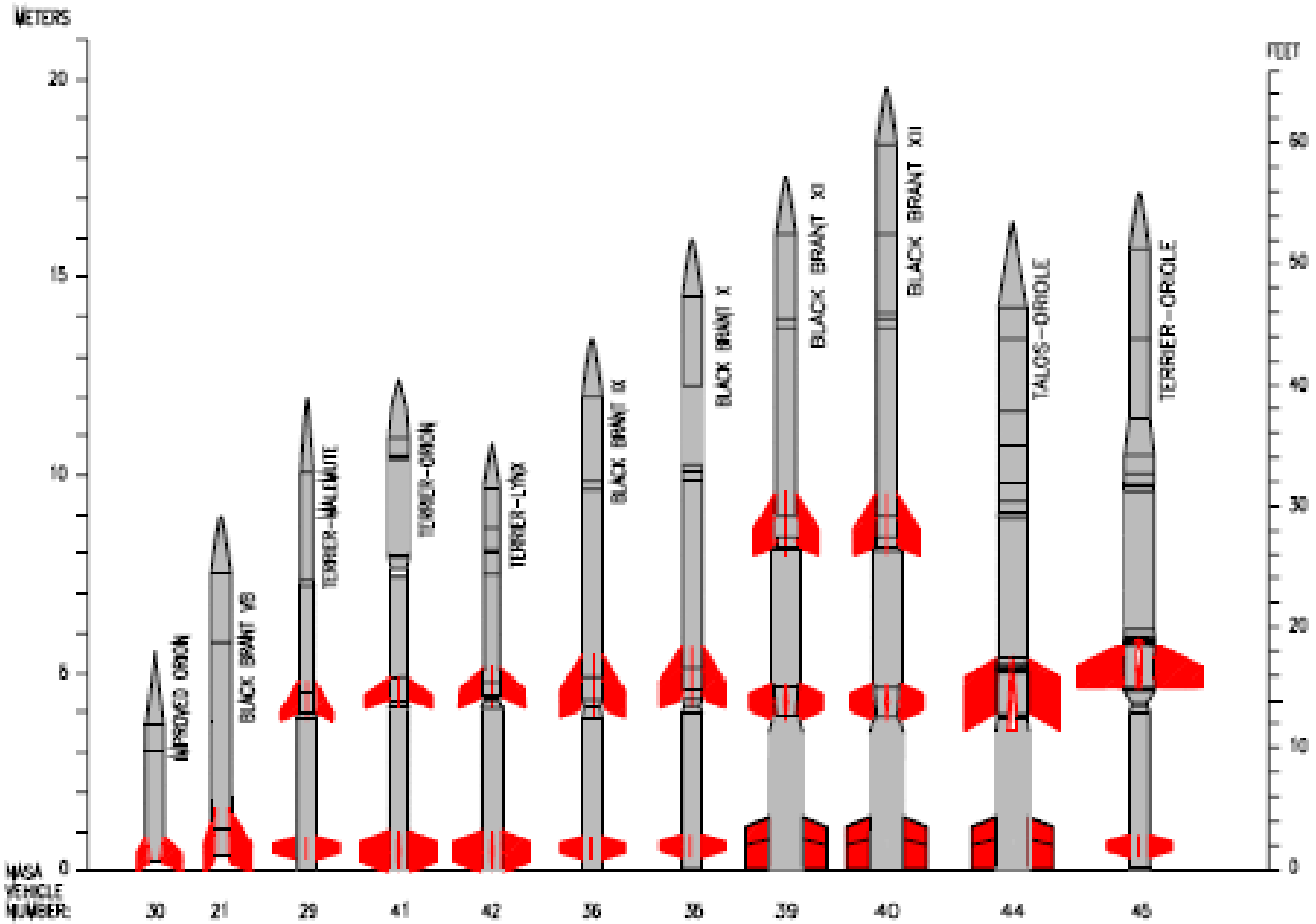
Sounding Rocket Program

GSFC/Wallops

- *20+ missions conducted annually*
  - *Selected via ROSES*
  - *Supports Astrophysics, Heliophysics, & Planetary*
  - *Mission lifecycle average <2 years*
- *Program structure*
  - *Small civil service program office*
  - *In-house technology development program*
  - *Missions implemented through a single contractor*
  - *Suite of launch vehicles composed of both commercially procured and surplus military motors*
- *Contractor responsible for end-to-end implementation*
  - *Mission analysis*
  - *Spacecraft development*
  - *Instrument/spacecraft I&T*
  - *Vehicle & support system integration*
  - *Launch operations*

Current Sounding Rocket Program Vehicles

GSFC/Wallops



Current SRP Vehicle Performance

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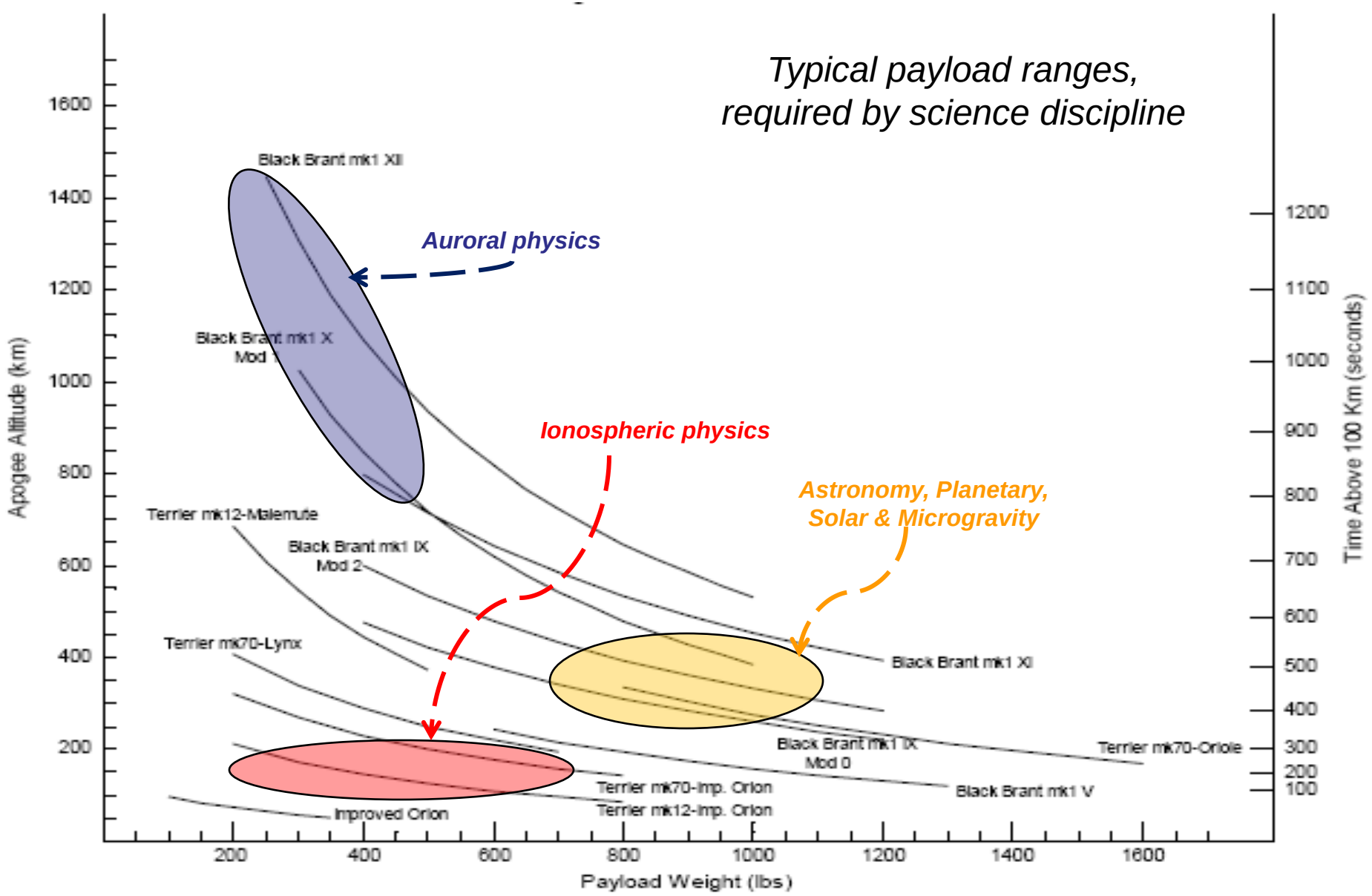
Typical payload ranges, required by science discipline



Sounding Rocket Launch Sites

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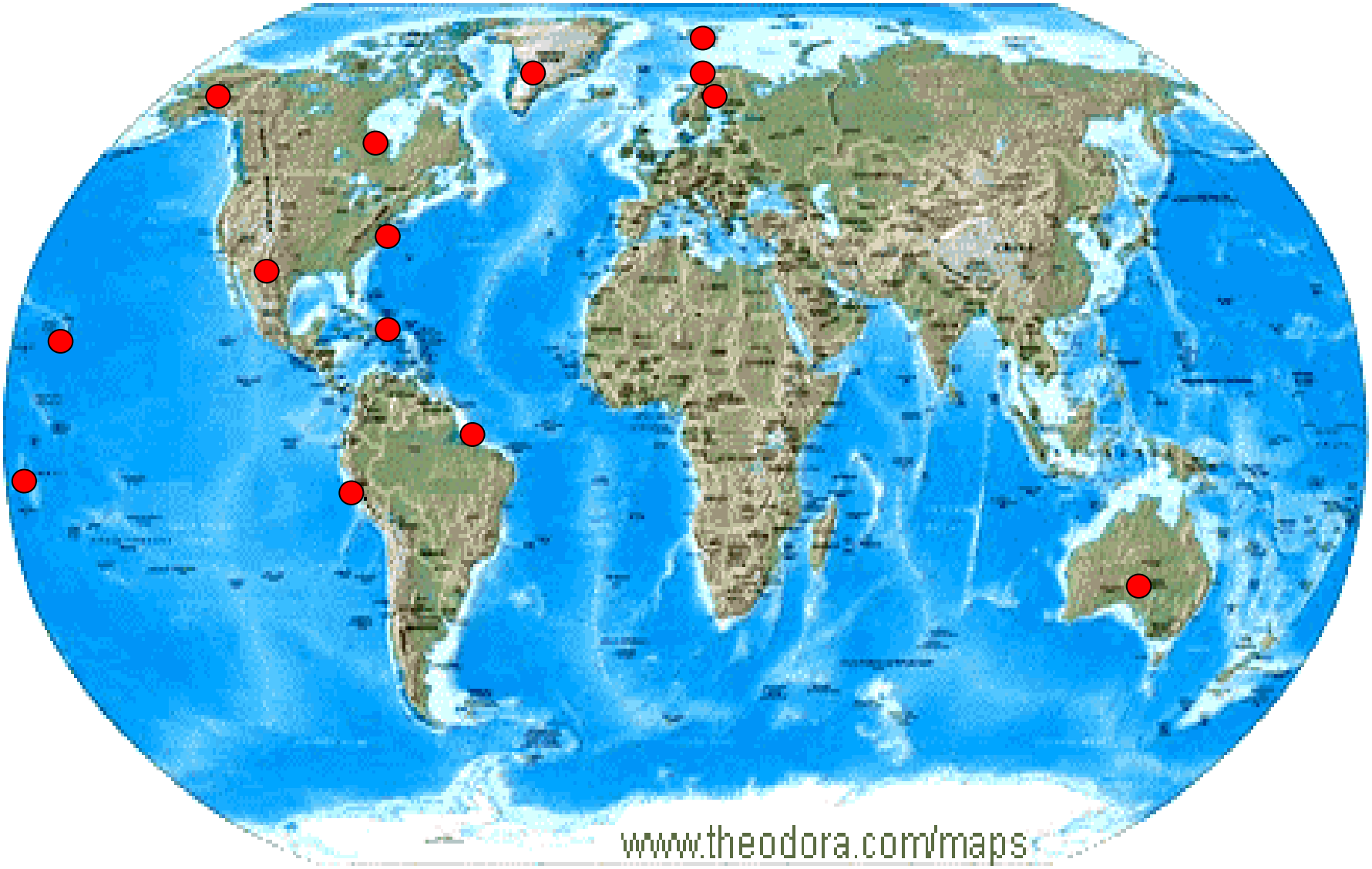

Science Requirements of Sounding Rockets

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- ***Worldwide launch capability to meet science requirements***
  - ***Polar (e.g., auroras, magnetic fields)***
  - ***Equatorial (e.g., ionospheric physics)***
  - ***Southern hemisphere (e.g., astronomy)***
- ***Launch on demand to meet dynamic science events***
  - ***Examples: auroras, thunderstorms, eclipses, solar events***
- ***Exposed, deployed, multi-body, & chemical payloads***
  - ***Supporting ionospheric physics & atmospheric chemistry***
- ***Arcsecond payload pointing***
  - ***Supporting astronomy, planet-finding, etc.***

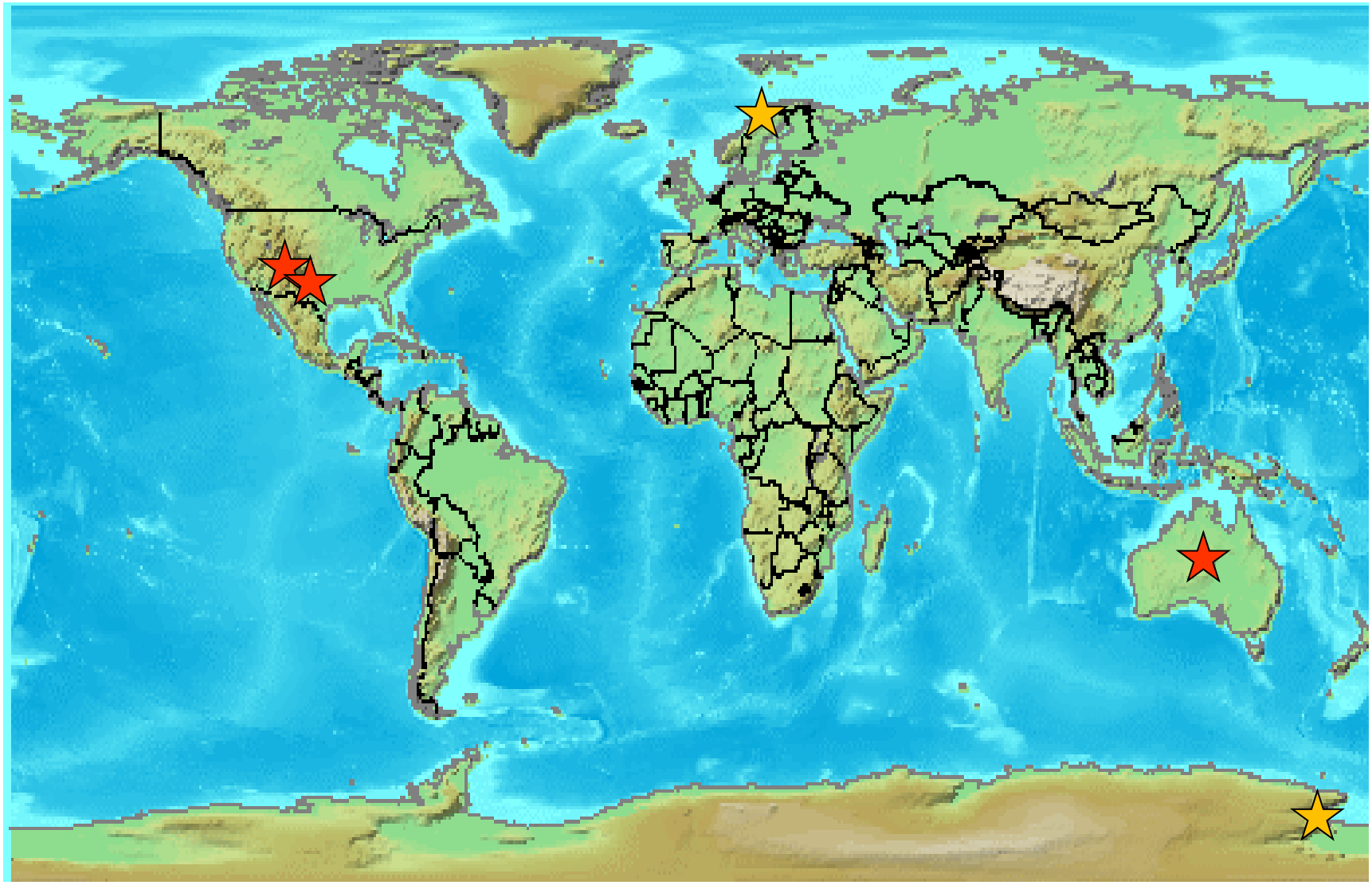
Balloon Program

GSFC/Wallops

- ***~15 missions annually***
  - ***Selected via ROSES and other competed efforts***
  - ***Sponsored by NASA/SMD/Astrophysics***
- ***Program structure***
  - ***Small civil service program office***
  - ***In-house technology program***
  - ***Missions implemented by single contractor***
- ***3 classes of Missions***
  - ***Conventional (zero-pressure): < 2 days***
  - ***Long Duration: Up to 54 days***
  - ***Ultra-Long Duration (super-pressure): ~100 days***
- ***Performance***
  - ***Balloon sizes up to 60 MCF***
  - ***Payload capacity up to 8,000 lbs.***
  - ***Float altitudes between 100-160K feet***
  - ***Worldwide launch sites***

Balloon Program Launch Sites

GSFC/Wallops



Key Science Points

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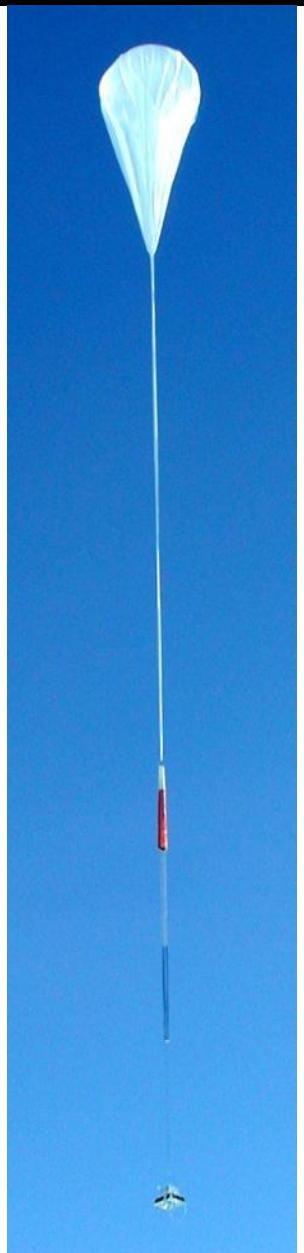
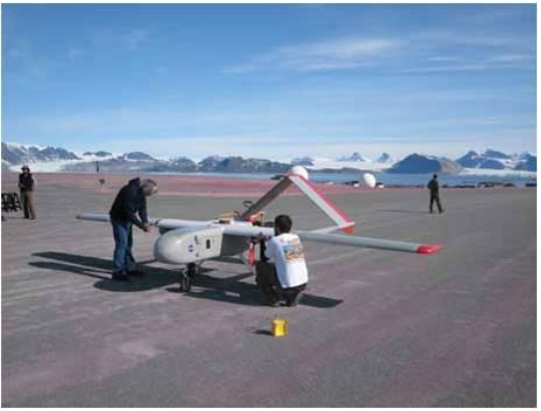


- *New arc-second pointing system expected to enable new research areas (e.g., planetary)*
- *Typical mission implementation models*
  - *Conventional: Investigators deliver complete gondola system to launch site for launch*
  - *Long Duration Ballooning (LDB) & Ultra-LDB: Investigators deliver instrument to CSBF for Integration & Test with CSBF science support systems; Payloads then shipped to foreign launch site.*

Airborne Science Program

GSFC/Wallops

- **Sponsored by SMD/Earth Science**
  - Missions defined by NASA/SMD/Earth Science Division
  - Worldwide deployments
  - Typical missions: Greenland/Antarctica ice mapping, air quality sampling, natural disasters, shoreline mapping
- **Wallops-provided platforms**
  - NASA-owned P-3B
  - Commercial IDIQ contracts (piloted aircraft & small UAS)



- **Program Structure**
  - Small NASA/WFF program office
  - For NASA aircraft, modifications typically designed by WFF engineering, implemented by in-house contractor
  - For contract aircraft, contractor responsible for aircraft modifications
  - NASA provides airworthiness certification

Wallops Fabrication, Integration, & Testing Capabilities

GSFC/Wallops

Electro-Mechanical Fabrication Facility

Telemetry Ground Stations

Integration Labs

Thermal Vac

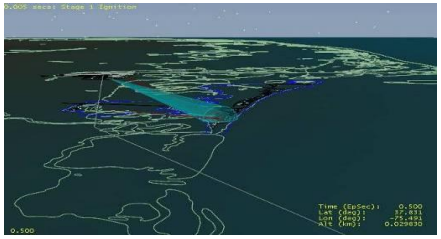
Bend Testing

Spin Deployment Facility

Magnetic Calibration Facility

EMI/RFI Test Chamber

Vibration Test



Mission Planning Lab

Attitude Control System Lab

Moment-Of-Inertia Testing

Spin Balance

GPS Simulation & Test Lab

Antenna Patterning Chamber

Thin Film Material Test Lab

Clean Room/Tents

Wallops Research Range

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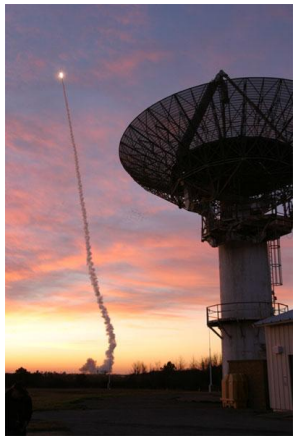

- *NASA owned & operated*
  - *16,000 launches conducted since 1945*
  - *Suborbital & small/medium class orbital*
- *Primary mission is supporting NASA priorities*
  - *Science & technology*
  - *Education*
  - *Commercial*
- *End-to-end launch site services*
  - *Processing & operations facilities*
  - *Launchers & runways*
  - *Tracking & data services (fixed & mobile)*
  - *Range Safety*
  - *Logistical services*

WFF Support of Commercial Launch Providers

GSFC/Wallops

- *NASA/WFF has supported >30 commercial rocket developers over the last 20 years*
- *Partnership with Mid-Atlantic Regional Spaceport supporting operation of a commercial spaceport*
  - *MARS support of government-sponsored missions via existing NASA contract*
  - *MARS support of commercially-licensed missions through commercial contract, with NASA support via existing Space Act Agreement*
- *NASA/WFF & MARS provide an integrated seamless suite of launch site services*

WFF Technical Assistance Options

GSFC/Wallops

1. *Research Range operations*
2. *Integration & Testing Services*
3. *Engineering consulting (based on workforce availability*

Support can be implemented via

- *Government sponsor (NASA or other federal customer)*
- *Space Act Agreement*
- *Commercial contract with MARS (for launch services)*

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