

Goddard  
COMM & NAV COMMUNITY  
FORUM

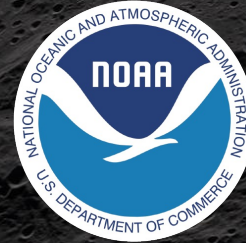
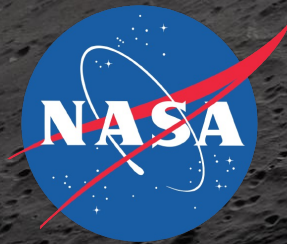
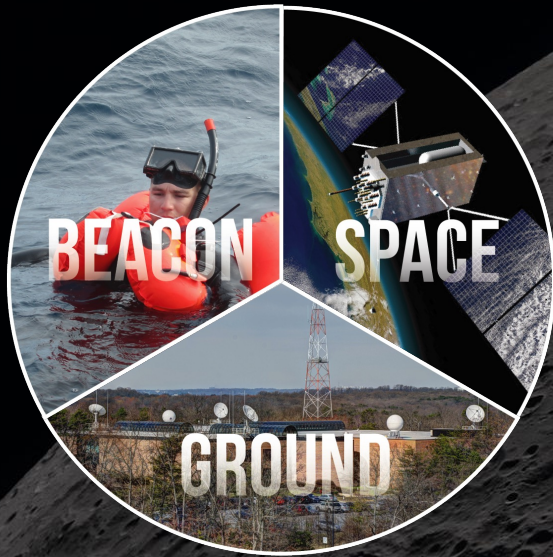


# SEARCH & RESCUE

GETTING EXPLORERS HOME SAFELY



# NASA Search & Rescue: Enabling Human Exploration on Earth and In Space



# The NASA Search and Rescue Portfolio

*All of these efforts will help humans exploring Earth or space remain safe throughout their voyage.*



Advance Beacon Technology



Support Human Exploration



Conduct Studies and Analyses



Upgrade Space Segment - MEOSAR



# Two-Way Communications: U.S. SARSAT Readiness

# U.S. TWC Readiness & SARSAT Ground System

- U.S. SARSAT Ground Segment is tracking Two-way Communication (TWC) requirements and specifications
  - No LUT changes anticipated (pending decision on need to enable SGB rotating field #4)
  - Most of the heavy lift is on the TWC service providers and RCCs.
  - U.S. Mission Control Center (USMCC) is fully compliant with current TWC specifications and will continue to remain so.
- USMCC changes are minimal
  - Possibly 3-4 more updates between now and October 2027 to keep in alignment with TWC progress in C-S
  - Need for recommissioning of ground segment to support TWC is TBD.

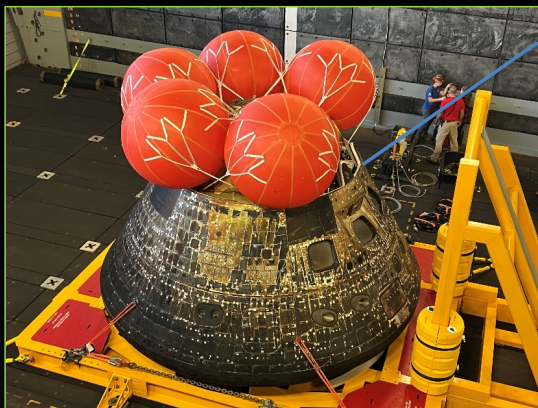
U.S. remains engaged on concept and requirements development at C-S level, and the associated impacts to the U.S. system.

# Mission ARTEMIS

*Our Journey Back to the Moon*



# NASA SAR's Role for Artemis Missions

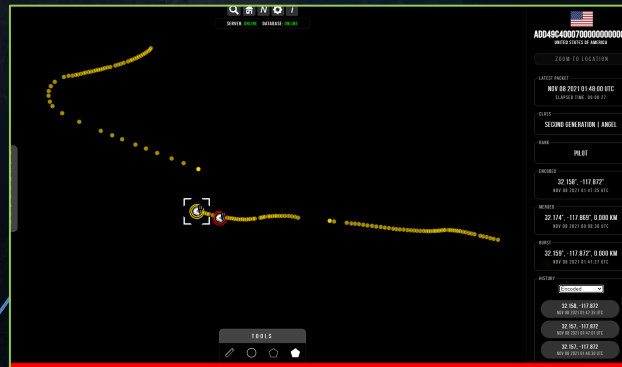


Provide real-time Orion location



Real-time beacon performance evaluation

Track Orion during launch, re-entry (under parachutes) and Splashdown



# NASA SAR Ground Station



NASA SAR Ground Station consists of LEO/GEO/MEO Local User Terminal (LUTs).

FGB and SGB simulation and monitoring capabilities

Supports SARSAT R&D, tech development, system monitoring and anomaly resolution.

Dedicated support for NASA Human Space Flight Missions (Artemis, SpaceX, Soyuz, Starliner).

# GSFC SAR Ground Station & MCC-Houston

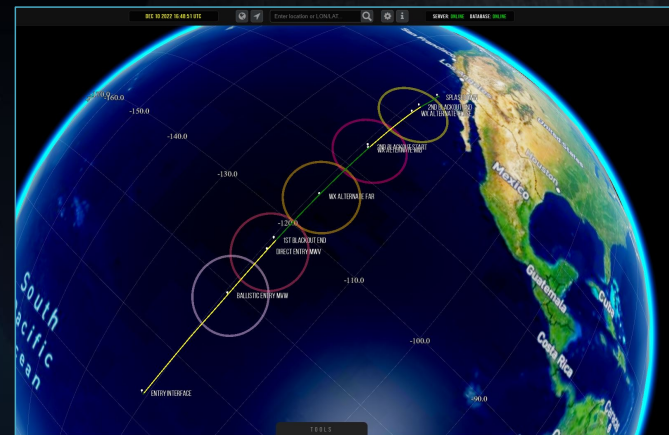
Geographically valuable location to support all crewed NASA missions

Customize antennas to track capsules (Artemis, Soyuz, SpaceX, Boeing)

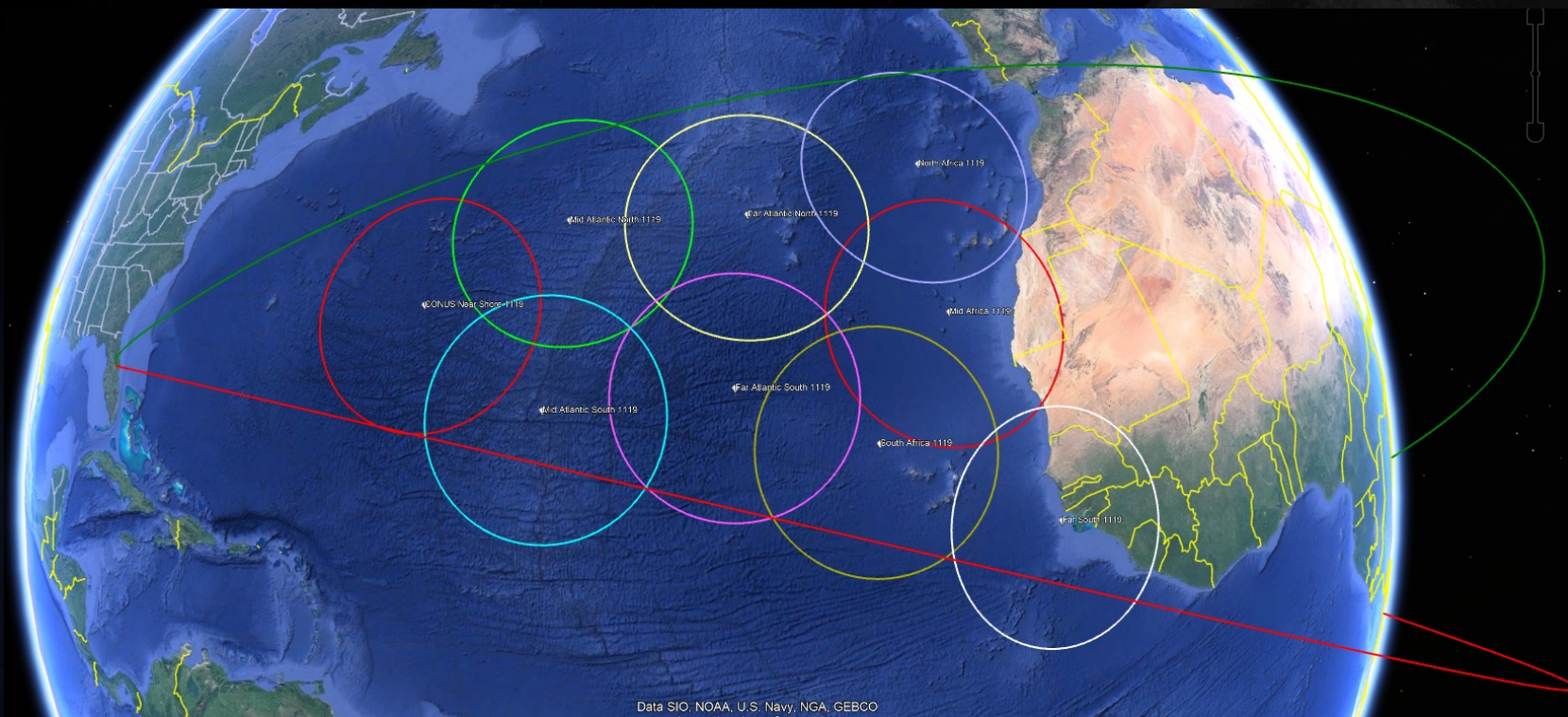
Provide location data to Artemis Flight Director via Landing Support Office

System can track into Russia to support Soyuz launch/landing

Work directly with SpaceX/Boeing to support all crewed missions to ISS



# Artemis Ascent Corridor SAR Support – *Why SAR Coverage Matters*





# NASA'S ANOEL BEACONS

# ANGEL (Advanced Next-Generation Emergency Locator)

National Aeronautics and  
Space Administration



ANGEL was built for the Artemis crew for their historic return to the Moon.

Upon reentry and splashdown, or in the unlikely event of a launch abort scenario, ANGEL allows for rapid, accurate location of each crew member should they need to egress from the Orion capsule.



# ANGEL Performance Example

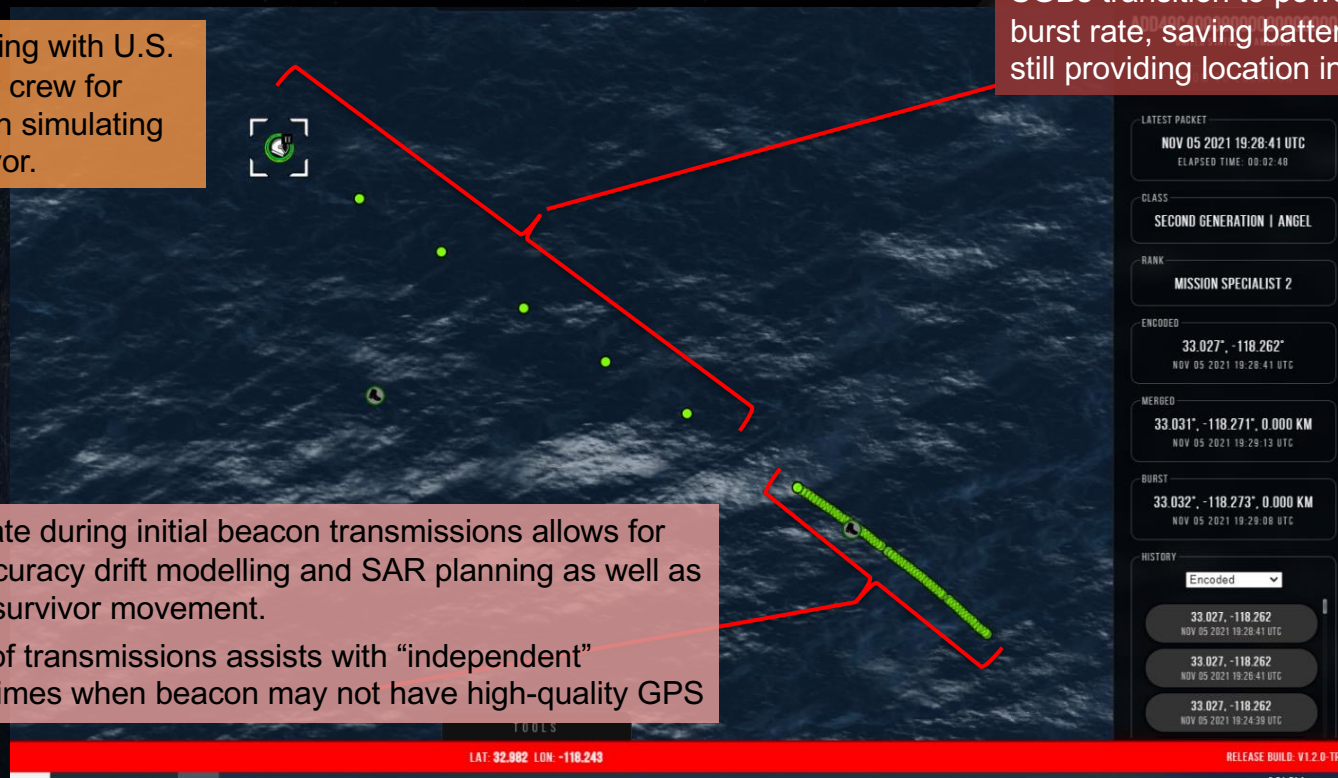
## Floating Astronaut Modernizing Assured Geolocation

Data from testing with U.S. Navy recovery crew for moving beacon simulating in-water survivor.

SGBs transition to power-saving burst rate, saving battery life while still providing location information.

Increased rep-rate during initial beacon transmissions allows for future higher accuracy drift modelling and SAR planning as well as key insight into survivor movement.

“Front-loading” of transmissions assists with “independent” location during times when beacon may not have high-quality GPS



National Aeronautics and  
Space Administration



# NASA SAR Office & Artemis II Mission

# Artemis II Testing

- Participating in URT-11 and 12 for Artemis II
- Beacon detection prior to splashdown
- Crewed missions require more intensive testing
- Leverage NASA and SARSAT capability for crewed safety
- Limited burst detection prior to splashdown

# Artemis II Mission Support

National Aeronautics and  
Space Administration

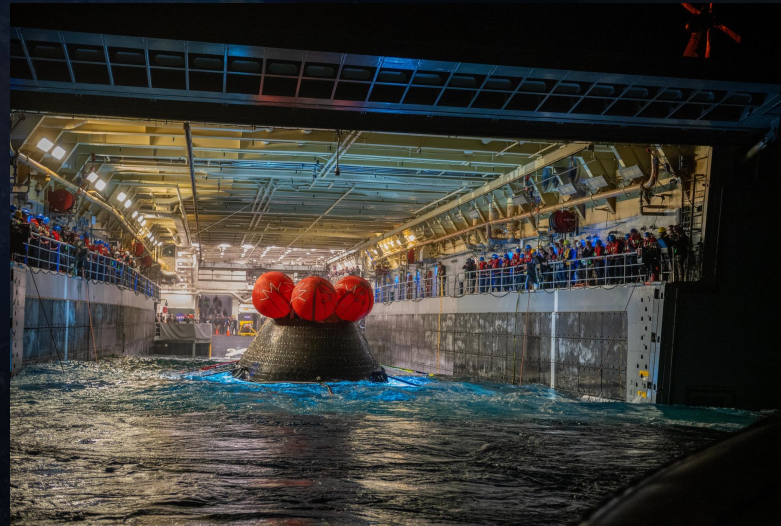


- First-generation vehicle beacon system activates upon main chute deploy (406/243/121.5 MHz).
- Emergency egress of crew into life raft initiates manual activation of the ANGEL beacon (carried by each crewmember).
- NASA SAR Office personnel support from the NASA Ground Station and Goddard, Mission Control Center – Houston, and on board the recovery vessel, U.S.S. John P. Murtha in the South Pacific.



# NASA SAR Office Recovery Team

- Coordinated with U.S. Navy and Air Force
- Provided Navy and NASA Exploration Ground System (EGS) teams with immediate location data
- Real-time tracking of SAR beacons and recovery assets



# QUESTIONS?

National Aeronautics and  
Space Administration



# FOR FURTHER INFORMATION...

USCG SARSAT

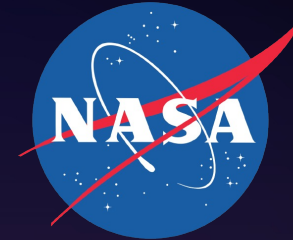
<https://www.navcen.uscg.gov/sarsat>

SARSAT-NOAA

<https://www.sarsat.noaa.gov/>

COSPAS-SARSAT

<https://www.cospas-sarsat.int/en/>



NASA Search and Rescue Office

<https://www.nasa.gov/goddard/esc/sar/>