SM-GASS

Survey Modernization – Geophysical Airborne Sensor Suite

The Survey Modernization-Geophysical Airborne Sensor Suite (SM-GASS) delivers advanced geospatial information for US Marine Corps (USMC) survey efforts as well as intelligence, surveillance, and reconnaissance missions. The Space Dynamics Laboratory (SDL) and the USMC developed this sensor suite for small unmanned aerial systems (sUAS) using mostly commercial off-the-shelf components and a custom-designed mount. SM-GASS offers improved data fidelity, faster collection time, and larger area coverage than existing data sources.

The light detection and ranging (LiDAR) and multispectral imaging (MSI) systems provide point clouds and imagery that enable geophysical feature categorization, extraction, and visualization, helping fill voids in geospatial data. SM-GASS also includes a Global Navigation Satellite System (GNSS) base station that increases the accuracy of temporally enabled, 3D position data.

COMPLETE SYSTEM IMPLEMENTATION

SDL collaborated with the USMC to develop, design, test, integrate, and deliver SM-GASS according to the Department of Defense's acquisition process. The SDL team is experienced in requirements definition and market research to design the best solution. SDL also assists with proof of concept, system integration, fielding, and sustainment, offering customers complete system implementation from a single expert partner.

DEVELOPMENT LIFECYCLE

- Requirements Definition
- Market Research
- Concept Design/User Input
- Proof of Concept
- System Integration
- System Fielding/ Ongoing Sustainment

INTEGRATED SENSOR SUITE

SM-GASS includes LiDAR and MSI sensors mounted on the SkyRaider® sUAS platform. SDL designed and manufactured the electronics and mount that integrate sensor and platform.

LIDAR

Collects point clouds and panchromatic imagery.

Phoenix LiDAR Systems®
MiniRANGER-3 LITE

MSI

Collects spectral, thermal IR, and panchromatic imagery.

AgEagle®
MicaSense Altum-PT™

UTAH STATE UNIVERSITY
SPACE DYNAMICS LABORATORY®

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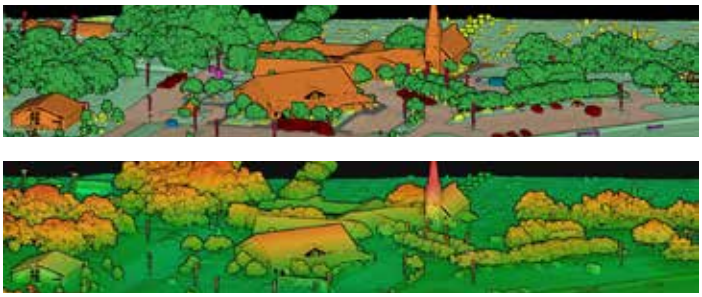
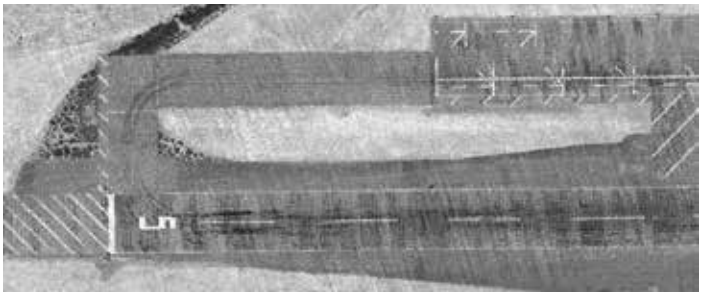
SAMPLE COLLECTIONS

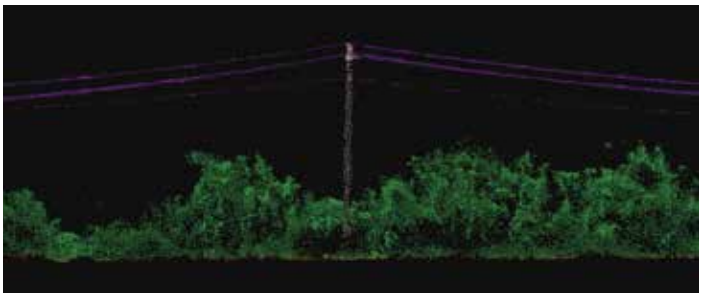
POINT CLOUD IMAGERY



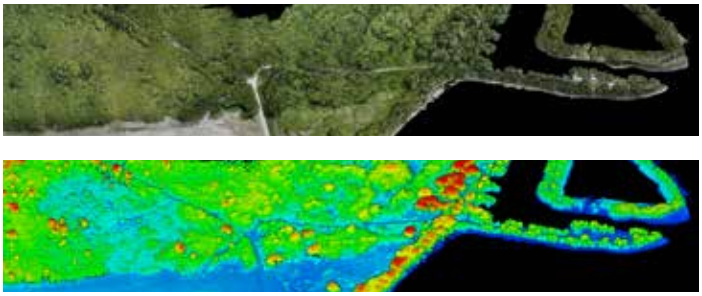
Point cloud colorized by RGB values (top) and classification (bottom) showing a portion of a 15-minute, 30-acre collection capturing an urban environment at 175 points/m².



Point cloud colorized by return intensity (white is weaker, black is stronger) showing a portion of a 50-minute, 250-acre collection capturing an airfield at 430 points/m².



Point cloud cross section colorized by classification showing a portion of a 15-minute, 30-acre collection capturing heavy vegetation at 175 points/m².

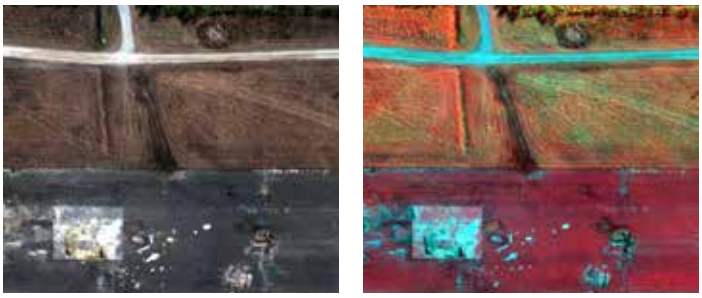


Point cloud colorized by elevation (top) and RGB values (bottom) showing a portion of a 5-hour, 800-acre collection capturing a heavily vegetated port and runway at 200 points/m².

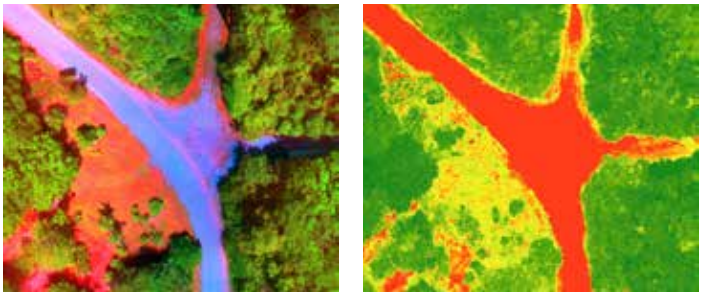
MSI IMAGERY

Pan-sharpened RGB (left) and true-color composite (right) showing a portion of a 30-minute, 30-acre collection capturing an urban environment at 3 cm/pixel.

Digital Surface Model (blue is 0 m, red is 3 m) overlaid on a true-color composite of a 30-minute, 30-acre collection capturing a Helicopter Landing Zone (HLZ) at 3 cm/pixel.



True-color composite (left) and false-color composite (right) showing a portion of a 30-minute, 18-acre collection capturing a damaged runway at 2 cm/pixel.



Moisture false-color composite (left) and Normalized Difference Vegetation Index (NDVI) (right) showing a portion of a 3.5-hour, 165-acre collection capturing heavy vegetation at 4 cm/pixel.