Satellite Domain Task Areas

Task Area 1: Studies, Analyses and Reports

The Contractor shall prepare studies, numerical models, assessments, analyses, including requirements analyses, and reports focusing on current and future satellite systems, including satellite concepts, in an effort to understand outcomes, define issues, or highlight problems and areas for improvement. Program studies and analyses will involve creating, evaluating, analyzing, and reviewing specified supported systems or specified scientific research projects, relevant data, the using or developing of appropriate analytical methods and tools, and formulating results and recommendations for Government consideration. The Contractor will conduct special studies that require a resource lacking bias for or against a particular solution. The program studies, analyses, reports, and support may include, but are not limited to, the following areas:

1.1 Provide services for modeling and simulation analysis of satellite systems.

1.2 Provide services to develop and deploy satellite-based observing systems technologies to enable the documentation of Earth System variability and to enable model-based prediction and other decision support capabilities for evaluation techniques and analysis.

1.3 Provide services for requirements analysis, trade-off analysis and requirements traceability, assist in assessing overall system architectural alternatives, help conduct regular independent evaluations of the status of satellite programs and climate sensor continuity missions, assist the Government with developing algorithms, and support execution of calibration and validation activities.

1.4 Provide services for economic and socio-economic analysis of system architecture portfolios and for mission concept, ground and flight system, and system architecture studies.

1.5 Provide services for the coordination and planning needed to ensure alignment of the Data Environment with the Global Earth Observation System of Systems architecture and principles.

1.6 Provide services for comprehensive assessments aimed at integrating, optimizing, and sustaining observing systems.

1.7 Provide services for planning for, and optimizing, data architecture, data storage, data stewardship, data processing, and data dissemination capabilities.

1.8 Provide services for technology transition planning, technology assessments, technical reviews of white papers and proposals, special technology evaluations, and general technical assistance on satellite systems and satellite system observing systems and their architectures.

1.9 Provide services to analyze and recommend investment strategies for operational and research observing systems, using new/established/customized procedures, tools, and algorithms.

1.10 Provide services for operations analyses and assessments aimed at integrating and consolidating satellite command, control, and communications functions.

1.11 Provide services for User System Readiness Planning.

1.12 Provide strategic planning, policy analyses, trade studies, economic assessments, and system and function criticality analyses of program requirements and programs.

1.13 Provide services to update, develop, or identify specifications and standards for system engineering, schedules, and to identify critical technical performance measurement parameters.

1.14 Provide analyses of satellite program radio frequency systems.

1.15 Provide research and development studies of radio frequency spectrum utilization for the purpose of relocating operational frequencies within the allocated Federal spectrum.

1.16 Provide services to coordinate such studies and exchange results with other NOAA organizations, NASA, mission partners and other agencies, including NTIA and FCC, and with international organizations, including but not limited to the World Meteorological Organization (WMO), Committee on Earth Observation Satellites (CEOS), and Coordination Group for Meteorological Satellites (CGMS).

1.17 Provide services to the Government recommending technical standards and programmatic approaches to efficiently achieve future objective-integrated architectures. This includes defining target enterprise architecture across NESDIS systems and developing a roadmap to reach the target from the baseline architecture in incremental steps, as driven by the infusion of new and enhanced mission systems and capabilities into the evolving architecture framework.

Task Area 2: Applied Research and Consulting
The Contractor shall provide scientific, engineering, and other required professional or technical expertise to conduct applied research and perform analyses to support related activities. The
Contractor shall provide services to program managers and policymakers in developing state-of-the-science models, selecting new technologies for development, and determining if further program performance information is needed. The Contractor shall provide services to identify and apply the appropriate methodologies needed to test particular technologies or answer specific research or programmatic questions. Services for applied research and consulting activities may include, but are not limited to, the following:

2.1 Provide assessments of the concept of operations, system architecture, system utility, program plans and schedule, and test and integration adequacy for observing systems pre and post-launch and for on-orbit performance of NOAA satellite systems.

2.2 Provide services for, and participate in, reviews including but not limited to: system definition and system requirements reviews, preliminary and critical design reviews, test and operational readiness reviews, and end-item pre-shipment reviews.

2.3 Provide services in aeronautical, space, and ground systems engineering; radio frequency engineering analysis; and associated disciplines.

2.4 Provide services to assess the impacts of satellite observations and observing systems on Numerical Weather Prediction, weather forecasting, and environmental monitoring.

2.5 Provide coordination support between system owners, users, and integrated product teams to assist in clarifying requirements and support design, development, test, integration, and operational transition activities.

2.6 Provide services to develop solutions for optimizing integration and consolidation of command, control, and other operational procedures.

2.7 Provide services for plans for the development of future environmental satellite systems by performing trade studies and conducting analyses for potential satellite investments as directed by the Government.

2.8 Provide services for all activities associated with pre-launch, launch, early orbit checkout, post-launch activities, and Launch Failure and Anomaly Investigations for operational management of NOAA satellites. Provide services for ground engineering verification and validation activities, test and analysis for sensor characterization activities, and for pre-launch Calibration and Validation (Cal/Val), post-launch Intensive Cal/Val, and Long Term Monitoring functions for satellites and sensors.

2.9 Provide services to integrate United States military, civilian, and foreign meteorological spacecraft/sensor capabilities with common NOAA spacecraft/sensor system capabilities.

2.10 Provide services for analyses and studies in support of developing, acquisition, upgrading, maintaining, and checkout of NOAA satellite ground systems.

2.11 Provide services for interface testing and verification of ground segments associated with the Ingest, Product Generation and Distribution, Command, Control, and Communications (C3), Network Communications, Antennas, Mission Management Center, and flight software including telemetry and command uplink, and mission data downlink functions at satellite ground stations.

2.12 Provide services to space systems associated with sensors, launch, and spacecraft issues, including identifying and resolving technical issues associated with the compatibility and integration of Government sensors and spacecraft.

2.13 Provide technical advice and support on remote sensing licensing and regulatory compliance.

2.14 Develop and assure currency of technical maintenance requirement documents.

2.15 Provide science for operational and planned space-based instrumentation, sensor characterization, raw observations through to the final derived data products and applications and assist the Government in the managing, research, testing, design, developing, implementing, user engagement, calibration, validation, verification, maintaining, and documenting of algorithms and products.

2.16 Provide development of space weather product algorithms and Cal/Val of space weather data and products.

2.17 Provide research and development of new satellite products and application methods to improve and expand the use of satellite data for global and regional environmental monitoring, prediction, and assessments.

2.18 Provide scientific and technical services to develop, evaluate, and implement new algorithms from current and future NOAA and international partners' geostationary and polar-orbiting satellites, and support the development and implementation of systems to process them through to create products meeting the needs of identified users.

2.19 Provide scientific and technical services for the development and implementation of NOAA programs involving ocean remote sensing using satellites, manned aircraft, and unmanned aerial vehicles; provide technical support for the development and management of remote sensing data on the world's oceans; and create satellite-based products, tools, and interpretative guidance that meet user needs for oceans and coastal zone information.

2.20 Provide scientific and technical services to collect and analyze *in situ* observations through direct field observation; installing and collecting logged and telemetered sensors; and collating data from NOAA, domestic, and international partners to support environmental information needs in the world's oceans, and use these alone or in combination with remotely-sensed data to create products, tools, and interpretive guidance that meet user needs for oceans, Arctic, and coastal zone information.

2.21 Provide scientific services to develop and operate oceanographic and hydrodynamic models for use alone or in combination with *in situ* and remotely sensed data to create products, tools, and interpretive guidance that meet user needs for oceans, Arctic, and coastal zone information.

2.22 Provide services for site selection and field experiments related to Cal/Val of ground-based and space-borne instrumentation and science algorithms as well as analyzing, applying, and documenting the results.

2.23 Provide scientific and technical services on the use of satellites and satellite data to improve analysis, forecasts, and warnings for global, regional, and mesoscale events; support development of advanced products and production capabilities from new or existing environmental satellite systems and data for weather forecasting and monitoring of the earth ocean-atmosphere system.

2.24 Provide services to develop methods to collect data from NOAA developmental and operational data streams, including from National Centers for Environmental Prediction (NCEP) numerical forecast models, operational satellites, derived satellite products and ground and other *in situ* observing systems, including archived data from National Centers for Environment Information (NCEI) and develop and provide model-based products, and merged quality documented research data sets to the science community.

2.25 Provide design and testing services of new science algorithms, data processing and analysis systems, and interfaces that enable greater interaction among scientists and facilitate development of optimized multi-source blended products, data fusion, and big data analytics that incorporate various multi-spectral, multiplatform satellite, *in situ* and model data.

2.26 Provide development and application services of inter-satellite relative and absolute calibration of level 1 data (or raw data record), produce satellite data sets and calibration tables, as well as documentation and support for the Global Spacebased Inter Calibration System.

2.27 Provide services to develop and implement systems for post-launch calibration of remotely sensed measurements across the spectrum (visible, infrared, and passive/active microwave sensors) using calibration and validation techniques based on observations of land surface targets, the lunar surface, deep convective clouds and information from ocean buoys, shipboard measurements, land stations, aircraft observations, simultaneous nadir overpass, and simultaneous conical overpass methods and from inter-comparisons of different spacecraft instruments.

2.28 Provide development, test, operation, and enhancement services of the NOAA satellite integrated and cross platform calibration and validation system for characterizing and trending instrument performance by using pre-launch thermal vacuum test data and post-launch in-orbit measurements.

2.29 Provide services for the space sensor simulator including support for development of advanced forward radiance models for passive and active sensor simulations.

2.30 Provide services for system and software integration and for establishing standards for software data formats that support the transition from research to operations and maintenance. Provide support to enable cost-effective development of software resources and to provide reliable delivery and algorithm stewardship.

2.31 Provide services for visualization, education, and outreach to improve the use of remote sensing observations. This includes support for training and education for users to enable them to understand and use the data effectively for forecasts, research and climate studies along with developing training materials, data sets, websites, and satellite analysis tools. It also includes support for education, community, and outreach activities, including developing visualizations (visual media that shows changes with time or highlights specific points through animation) for newsworthy scientific results to heighten public awareness.

2.32 Provide science and services for sensor science and technology applications to conduct research on operational and planned satellite observing systems by conducting cross-cutting programs including planning new satellite instruments, algorithm research and design, calibration activities, validation monitoring of operational and planned satellite instruments, instrument anomaly investigations, and developing and analyzing long-term satellite data sets for studying and assessing Earth system variability.

2.33 Provide scientific, technical, and technology applications support to accelerate and improve the quantitative use of research and operational satellite data in weather and climate analysis and prediction models related to satellite data assimilation. This includes supporting a suite of operational models to meet current needs as well as a research and development program for improved performance and new capabilities for future generations of environmental models and geophysical products.

2.34 Provide scientific services for research-to-operations algorithm and software development and maintenance, software and algorithm life-cycle replacement, software and product validation, operational implementation of display and product-production software, application demonstrations, documentation of scientific algorithms and applications, and routine user interaction in support of systems for near-real-time imagery and derived-product distribution and application.

2.35 Provide services for transition of satellite missions to operations, including preparations for and execution of satellite handover and transition of ground systems to operations.

Task Area 3: Data Collection and Surveys
The Contractor shall provide services collecting, preserving, and providing access to the Nation's environmental data. These services will support NOAA program managers in evaluating and employing state-of-the-art-data collection technologies. Data collection and survey services may include, but are not limited to, the following:

3.1 Provide services for data collection and conducting surveys. Surveys may require contractors to identify and apply appropriate evaluation methodologies and research designs needed for a specified scientific research project. The Contractor shall be required to support data analysis and develop final reports of results and recommendations. Additionally, collection

may require the ability to access databases from appropriate sources, construct databases, and consult with other experts as required.

3.2 Provide scientific and technical services to design, develop, configure, test, and integrate into operations new or improved algorithms, software applications, datasets and products, scientific databases, standards, processes, tools, capabilities, systems, and associated training and technical documentation for data processing, ingest, archive support, access, stewardship, and providing environmental information and services to users.

3.3 Operate and maintain applications, datasets and products, scientific databases, standards, processes, capabilities and systems for data processing, collection, ingest, archive support, access, stewardship, and providing environmental information and services to users, including conducting user training, education, outreach, and engagement.

3.4 Research, investigate, analyze, plan, coordinate review, and recommend adaptations/modifications of products, applications, systems and services, as well as technical and business operations, for compatibility with administrative, legislative, security, procedural requirements, and shared interfaces with external systems and organizations.

3.5 Research, analyze, plan, prototype, test, demonstrate, evaluate, coordinate, and review proposed new and adapted products, applications, systems, services, and processes to exploit advancements in science and technology for improvement such as in data quality assurance, quality control, data preservation, stewardship, software engineering, cloud computing and storage, data dissemination, GIS, lifecycle cost reduction, scientific, technical, and logistic obsolescence mitigation.

3.6 Plan, coordinate, facilitate, host, conduct/perform, brief, prepare publications, and provide other support as requested for applied scientific research, studies, analyses, data collecting, evaluations, reviews, working groups, panels, assessments, conferences, symposia, and hearings..

3.7 Perform technical program and project management functions as a developer and integrating contractor for accomplishing programs, projects, and activities.

3.8 Provide development, improvement, operations, and sustainment for quality management systems (QMS) including adoption of the CMMI framework, configuration management system (CMS), document & record management system (DMS), and best practices identified in the PMBOK(R), BABOK(R), SWEBOK(R) and other standards that may be identified as applicable.

3.9 Provide development and provision of user education, public outreach, engagement, feedback collection, surveys, and training for data and information products, user access systems, and user services.

3.10 Apply subject matter expertise in the physical, natural, and social sciences, in engineering, and in technical specialties needed.

Task Area 4: Program and Project Management
The Contractor shall provide program and project management services to assist in program execution, program control, program assessment, program improvement, and program measurement. This support may be required at any point in the full lifecycle of a program from system requirements definition through operations and maintenance. Services may also include assisting in developing assessments, reports and plans, providing logistics support and technical

training, conducting independent reviews, and education and outreach activities. Program and project management services may include, but are not limited to, the following:

4.1 Provide services to develop scientific assessments and information products to enhance public education and guide governmental action.

4.2 Provide services to develop and analyze NOAA's integrated observation architecture consisting of blueprints, standards, processes, and investments needed to build an integrated observational capability that delivers higher-value data and products to end-users.

4.3 Provide services to develop and analyze NOAA's integrated environmental data management architecture that consists of the blueprints, standards, processes, and investments needed to build an integrated environmental data management capability that delivers higher-value data and products to end-users.

4.4 Provide services to perform system engineering and operations and logistics management planning to describe the generic life cycle roadmap and milestones of the key systems engineering and operations and logistics activities to be accomplished.

4.5 Provide assistance developing program baselines for performance, schedule, and cost, including review and evaluation of relevant contractor data deliverables.

4.6 Provide assistance creating procedures for and developing work breakdown structures, and planning and defining systems.

4.7 Provide assistance to the performance of various risk assessments, system utility analyses, cost/risk analyses, and formal risk management processes including risk management planning, risk mitigation, and risk tracking and reporting.

4.8 Provide Earned Value Management data analysis services for assigned programs and projects in accordance with ANSI / EIA-748.

4.9 Provide assistance developing and maintaining Program and Project Plans and System Engineering Management Plans to describe the generic life cycle roadmap of the key systems engineering activities to be accomplished by phase and to identify the organization that will be responsible for their accomplishment.

4.10 Provide assistance developing Test and Evaluation Master Plans and Validation and Verification Plans.

4.11 Provide services for systems requirements analysis, documentation, traceability, criticality, validation and management activities, configuration and change management activities, and system architecture development activities.

4.12 Provide assistance formulating program budgets and financial and cost estimating activities required for program execution.

4.13 Provide services to maintain and manage NOAA's observing and data/information management systems requirements and their corresponding databases.

4.14 Provide technical services to plan and execute technology transition.

4.15 Provide independent program assessments and program reviews.

4.16 Provide development and maintenance of long and short-range planning, including time lines and budget estimates.

4.17 Provide management services to NESDIS offices and programs, including all administrative duties.

4.18 Provide technical, analytical, and scientific services, including leading or participating in NOAA meetings, project gate reviews, and planning work sessions.

4.19 Provide programs and projects with assistance in executing their allocated requirements traceable to the NESDIS Strategic Plan(s) by identifying required activities and transitioning them into tactical operations that guide the Government in conducting engineering analysis and acquisition activities for major systems.

4.20 Provide assistance in developing and formulating contract technical requirements packages and implementation procedures to assist in guiding each program's prime System Contractor.

4.21 Serve the Government in evaluating and selecting system verification and validation guidelines applicable to Government programs. Contractor verification efforts may include assisting the Government to ensure justification, derivation, traceability, and complete allocation of requirements for systems.

4.22 The Contractor shall provide the following services for NESDIS satellite programs:

> 4.22.1 Provide facilitation services to reviews of NESDIS satellite programs by independent review teams. Scope of reviews may include review and assessment of planning, implementation and execution activities and status including: 1) organizational and management approach, including NOAA and NASA oversight; 2) availability of resources; 3) budget; 4) schedule; 5) technical approach; 6) technology readiness; and 7) risk identification and management.

> 4.22.2 Provide services to the Government's Flight, Ground, and Program test & evaluation and validation and verification (V&V) efforts, including test engineering services in defining a Program V&V plan, the Program Cal/Val Plan, and other Project V&V documents.

> 4.22.3 Provide engineering services to Ground Segment projects, including the antenna system encompassing technical management, schedule, architecture concept, requirements definition, and verification.

> 4.22.4 Provide Flight Segment integration and test services in the systems' engineering, integration, and testing of the spacecraft bus and instruments.

> 4.22.5 Provide Operation elements and technical and functional services for the management, analysis, design, integration, testing, deployment, operations, and maintenance of planned Mission Operations.

4.23 Provide assistance meeting instrument functional and performance goals in accordance with Government procedures for instrument data processing algorithms and instrument performance from raw measurement to level 1b product data.

4.24 Provide Flight and Ground Programs technical and instrument teams to serve NESDIS satellite systems. Provide technical support to the design, implementation, and evaluation of all phases of mission solutions for NESDIS satellite systems.

4.25 Provide services to the Government in fulfilling program property management responsibilities.

4.26 Provide management analyst services to NESDIS programs and offices including, but not limited to: drafting communications for diverse audiences, technical presentations and background papers, talking points, and briefing papers, drafting analyses and assessments relating to internal process and quality improvements, performing business management

support functions such as strategic and business planning, change management, business process re-engineering, performance measurement, training development, schedule and resource tracking, and requirements and action item administration.

4.27 Provide preparation, processing, tracking, and maintenance of documentation for procurements and grants and agreements.

4.28 Provide program and project management and miscellaneous services on an *ad hoc* basis.