
DISASTERS
PROGRAM
Disasters Response
Coordination System
(DRCS)
CONOPS
CONCEPT OF OPERATIONS
May 2026

Status (Initial or Revision)	Document Revision	Effective Date	Description of Change
Baseline	Initial	06/13/2024	Develop an initial baseline of the Disasters Response Coordination System (DRCS) Concept of Operations.
	Proofreading	4/07/2026	Proofread and offer suggested updates

Document History Log

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1.0 Background

This Concept of Operations (CONOPs) documents NASA's Disasters Program's approach in supporting the response to a disaster through the Disasters Response Coordination System (DRCS). It includes information about what should happen, when, and at whose direction, and identifies specialized resources necessary to support incident coordination. This CONOPs documents the DRCS' methods to support disaster response operations efficiently and consistently, enabling response organizations to leverage the best available science to inform decision-making.

1.1 About the Disasters Response Coordination System (DRCS)

The DRCS is a core program element of the Disasters Program within NASA's Earth Science Division (ESD). The DRCS represents a one-NASA approach to support emergency management decision making and response activities. The DRCS consists of the Disasters Response Coordination Office (DRCO) aligning and integrating the contributions across six NASA Centers which lead Earth science research and technology–Ames Research Center in California, Goddard Space Flight Center in Maryland, Jet Propulsion Laboratory in Southern California, Johnson Space Center in Texas, Langley Research Center in Virginia, and Marshall Space Flight Center in Alabama – Center Response Coordinators (CRCs), ESD programs and assets, and Subject Matter Experts (SMEs) within NASA and external to NASA. The DRCS leads the coordination of data, information products, and other materials that inform and aid situational awareness and decision support to disaster response professionals during active disaster response. The DRCO is a project office based at NASA's Langley Research Center (LaRC). Figure 1 depicts the "hub-and-spoke" model used by the DRCS to leverage Earth science and technology resources across NASA centers.

The DRCS provides pre- and post-incident Earth observation data, imagery, damage assessments, and subject matter expertise to support the situational awareness and decision support actions during disaster response.

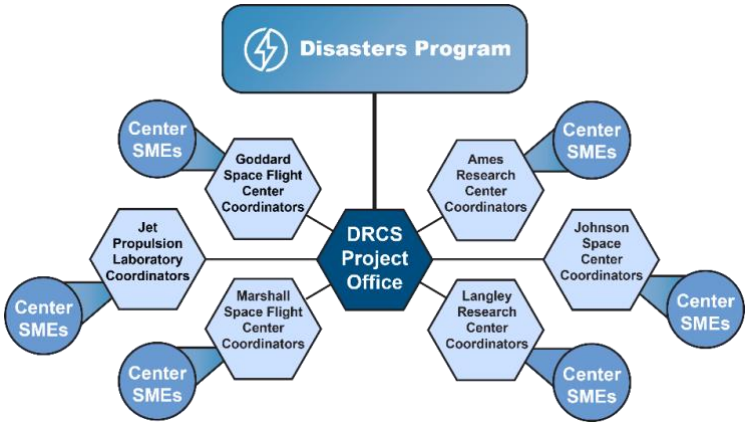

Figure 1. DRCS Organization Model

Leveraging NASA's capabilities and expertise with publicly available data products provides a potent tool for decision support to guide disaster response activities. For this reason, the DRCS is designed to provide a systematic approach for applying the best available science to address post-incident response questions and requirements. In doing so, the DRCS endeavors to bridge the "last mile" connecting the most relevant Earth science capabilities to be applied in meeting the response needs of emergency managers domestically and globally.

1.2 Scope

This CONOPs addresses the Disasters Program's disaster response support roles and responsibilities. The DRCS has the capability to provide information to support response organizations domestically and internationally, improving situational awareness and decision

support through Earth observations. This CONOPs extends the "One-NASA" approach of leveraging existing agency capabilities to provide more effective support towards emergency preparedness and response.

1.3 Planning Assumptions

The following assumptions guide this CONOPs:

- The DRCS does not have a direct life-saving or life-sustaining mission in disaster response. The DRCS provides support and aid to decision makers for enhanced situational awareness and decision-support during disaster response. As a result, the DRCS does not operate on a 24/7 basis. Instead, it responds to emergency management community needs based on available resources.
- "Disaster response" is considered as the phase of disaster management that includes the life saving and life sustaining activities that address the threat posed by a hazard.
- Disasters may occur with or without notice.
- Incidents for which the DRCS could support will vary in duration and scope, ranging from hyper-local to national to multinational catastrophes. These incidents may include multiple convergent hazards and generate cascading impacts to the built environment, people, critical infrastructures, and supply chains.
- The DRCS prioritizes information, expertise, and assistance requests based on operational need and available resources.

1.4 Disaster Response Support

Earth science data and knowledge inform decisions at all levels of society in disaster response. Good information shared with trust enables decisions that guide actions that reduce risk. Technical aspects of how hazardous natural events, such as hurricanes, earthquakes, wildfires, tsunamis, and droughts occur require knowledge of geophysics, physical geography, climatology, and other disciplines. However, the delineation between a "hazardous natural event" and a "disaster" ultimately depends on its location and its impact on humans. As the intensity and frequency of natural hazards continue to increase, communities and economies face growing risk. The DRCS uses an all-hazard approach to disaster response support covering natural hazards (such as hurricanes, earthquakes, wildfires, tsunamis, extreme heat, and severe weather) as well as technological hazards (such as oil spills, hazardous materials releases, and infrastructure failure).

> ***Response Tip:*** *Publicly available, open science Earth observation data in disasters is often best suited for areas and hazards that are more rural, remote, isolated or otherwise difficult to understand the full scope of the impacts of the disaster.*

Once activated, the DRCS establishes a team to collect, analyze, and deliver Earth observation data, imagery, analyses, and subject matter expertise to the requesting emergency management organization(s) based on their operational needs.

The DRCS translates NASA Earth observation data and research into actionable applications that help emergency managers understand and respond to natural hazards before they become disasters. The DRCS leverages data and Earth observation expertise to rapidly create and distribute accurate information to a wide range of stakeholders, improving disaster response practices. The DRCS provides the best available low latency information possible which can be experimental or research grade data products. These products

may not be appropriate for operational use. These products are intended to enhance situational awareness or to supplement or corroborate other data products.

1.4.1 Delivering Data and Information

The NASA Disasters Program provides partners with data, mapping, and imagery to help provide situational awareness and inform decision-making before, during, and after disasters. These resources are provided on request by emergency management and disaster response organizations to support their life-saving and life-sustaining activities.

The NASA Disasters Mapping Portal[1] takes disaster-related geospatial data and puts it into understandable, usable formats for use by emergency managers, interagency organizations, and the public. The goal is to bridge the gap between science products and the people who can use the data to assist in preparedness and response.

The kinds of data and information that is often requested and delivered by the DRCS include those which visualize the area impacted by a disaster, "derived" products that highlight insights in the impacts of the disaster on the built environment, and "value-add" products that provide further spatial analysis to describe specific assets, locations, or observed impacts for decision support.

All data on the Portal is freely and openly available without any login requirements. Data are provided as map and/or image services as the primary methods for dynamically accessing geographic information systems (GIS) information in common applications. Static data snapshots can also be downloaded or ingested into organizations' own GIS, including access to non-public data (e.g., imagery via Commercial Satellite Data Acquisition[2]) for selected agencies[3] to support response activities during activations.

1.4.2 Delivering Subject Matter Expertise

The DRCS has expertise and active research that targets a broad spectrum of hazards and disasters, including floods, hurricanes, earthquakes, volcanoes, tornadoes, and landslides, as well as combined hazards and cascading impacts. When disasters impact communities, the DRCS collects and distributes relevant science-based imagery, data, and/or damage assessments to provide response organizations and governments with actionable data to aid in preparedness and recovery. The DRCS and its network of partners assist with hazard assessment, evaluating severity, and identifying impacts near vulnerable infrastructure and lifelines, especially in remote areas where observations are sparse.

1.5 DRCS Response Cycle

The DRCS Response Cycle (Figure 2) is intended to reflect the dynamic nature of incident monitoring, screening, support, and response operations.

[1] https://maps.disasters.nasa.gov/

[2] https://www.earthdata.nasa.gov/esds/csda

[3] *The scientific community may use commercial datasets that are acquired by NASA for scientific purposes in adherence to vendor-specific terms and conditions. All data requests must be approved by CSDA via submitting the authorization request form. Once verified, the user will be provided with additional information on how to request and access data.*

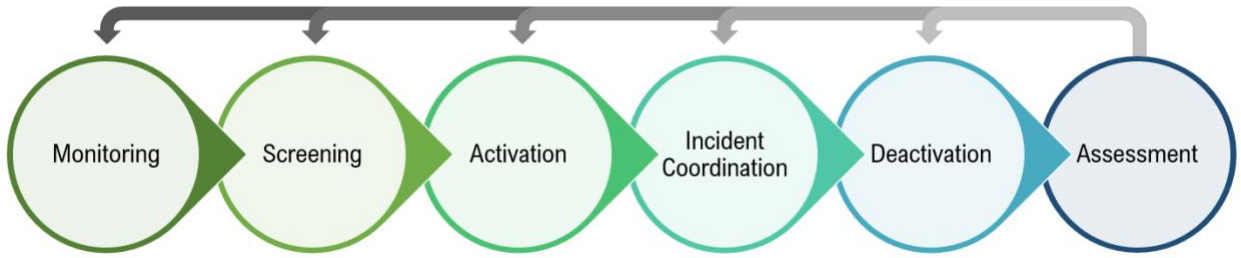

Figure 2. DRCS Response Cycle

In practice, the implementation of this cycle is intended to be iterative with emergency management partners to ensure their goals and objectives are supported to the extent practicable by the DRCS's core capabilities. In considering each of these stages, the DRCS maintains a focus on equity, local primacy, and openness to data and subject matter expertise.

2.0 Monitoring, Screening, and Activation

2.1 Monitoring

Incident monitoring is a critical and ongoing element of the DRCS response cycle. The DRCS utilizes the inputs received from its interagency, intergovernmental, and other partners globally. These inputs inform when, and if, further engagement is needed to leverage DRCS capabilities. They also can set into motion further actions taken by the DRCS to better understand the nature and extent of a hazard, its potential impact on human populations, and whether local stakeholders will require further assistance from the DRCS. Figure 3 captures the monitoring stage.

2.1.1 Monitoring Considerations

When a request is received but before a disaster occurs, the DRCS uses robust monitoring, forecasting, and global detection networks to examine several considerations that determine whether to initiate the next steps in the incident response process. Some of those considerations include, but are not limited to:

- Hazards forecasted to have a high probability of significantly impacting human populations, and/or
- Hazards projected to have a high impact and/or affect areas with diminished response capacity.

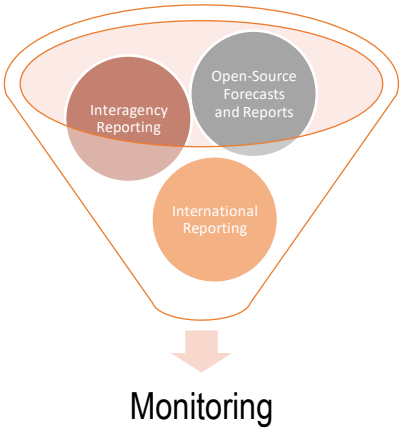

Figure 3. DRCS Monitoring Phase

There are well-established mechanisms domestically and internationally for declaring disasters, escalating incident response requests to higher governance authorities, and making appeals for external assistance. The DRCS recognizes that these requests constitute cause to further examine these incidents for the potential to engage DRCS capabilities, based on requests. Some of these mechanisms that the DRCS monitors include, but are not limited to:

- International – Activations of the International Charter Space and Major Disasters

- Domestic – Presidential Disaster Declarations (before[4] and after the declaration)

2.2 Screening

The DRCS conducts a rapid screening process in three fundamental stages to evaluate the next steps in the Disasters Program's support for disaster response. These stages designed to ensure the "best fit" for the available support DRCS can provide from NASA data and expertise as well as the need to ensure the most effective and efficient delivery of DRCS capabilities. Figure 3 outlines the overall process for screening.

Eligibility

Requestor organizational eligibility is broad and includes, but is not limited to:

1) Units of Federal, state, Tribal, territorial, or local government supporting disaster response;
2) Units of international governments[5] supporting disaster response;
3) National or international-level private/non-profit organizations supporting disaster response.

Request Content

Requests for DRCS assistance should be emailed to DRCS@nasa.gov. Requests should include the following information:

1) Define the area(s) of interest;
2) Specify the response question(s) or desired outcomes that the data product is expected to answer or support (e.g., "Where is the water?", "What locations have lost power?", and "Which roadways are potentially impassable?").
3) Specify the products or expertise requested (e.g., hazard extent, hazard characteristics, impacts observed, impacts to built environment, and concerns about future impacts[6]); and
4) Specify the timeframe needed for the data product to be useful.

Requests can be received in advance of a disaster and are typically based on high confidence forecasts or warnings. Requests that support disaster recovery or mitigation decision support are welcome but are expected to be less time sensitive than disaster response-related requests and will be evaluated on a per-request basis.

Example Requests

NASA DRCS has experience screening a wide range of requests from emergency management organizations supporting disaster response. That experience has shown that there are some requests that are more challenging to fulfill than others because they lack specificity. Table 1 below includes a comparison of contrasting requests showing how specificity can help expedite the delivery of time-sensitive information.

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[4] *Based on request, the DRCS may support pre-declaration activities to inform situational awareness and decision support, but these activities do not supplant the roles and responsibilities of authorities stipulated in the Stafford Act for domestic disaster declarations.*

[5] *Inclusion of countries on the Designated Countries list are only allowable on a case-by-case basis based on US State Department direction. https://www.nasa.gov/wp-content/uploads/2023/08/designated-country-list-4.21.2023.pdf. DRCS support of international disaster response is typically done in close coordination with the designated lead USG agency.*

[6] *Further description of the available products and DRCS core capabilities is available at https://appliedsciences.nasa.gov/what-we-do/disasters*

Table 1. Request Comparison Examples

Request Type	Broad Request – Wildfire Support	Targeted Request – Wildfire Support
Area of Interest	*"This is the worst fire in our state's history"*	*"Focus on County A, B, and C"*
Response Question	*"Need to understand how bad the fire is going to become"*	*"Need tracking of fire perimeter, potential new starts, and intersection with built infrastructure"*
Products Requested	*"Send us everything you've got"*	*"FEDS fire perimeter; BlackMarble night time lights; and Multispectral Imagery"*
Timeframe Requested	*"As soon as possible"*	*"Need fire perimeter within 1 day and updated daily, other products within 48 hours"*
Screening Outcome	DRCS will likely need to respond to requestor to gain more specifics of expected outcomes and data needs.	DRCS will have clearer expectations of the requirements and may inquire about the need for the levels of detail for value-add products.

2.2.1 Request Intake

The screening process starts with the receipt of a request from an eligible requestor supporting the disaster response for an impacted community. **All** DRCS activations are preceded by receiving an eligible request.

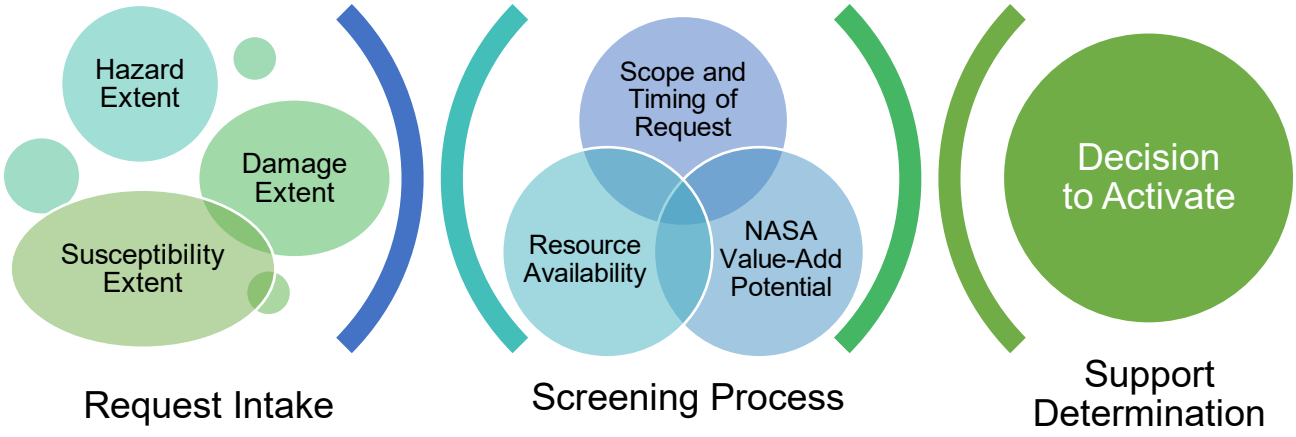

Figure 4. DRCS Screening Phase

Intake

Generally, requests for DRCS assistance fall into three broad categories for Earth observations, data, information, and subject matter expertise:

- Hazard Extent → Description of the size, composition, or other attributes of the hazard of concern that has a physical presence which can be detected by Earth observing systems

(e.g., observations of flooded areas, composition of volcanic plumes, or changes in land features)

- Damage Extent → Description of impact to built or ecological environment from a hazard that has a physical presence which can be detected by Earth observing systems (e.g., artificial light changes showing likely power outages, changes in physical features, estimates of damage to the built environment)
- Susceptibility Extent → Description of areas which may have increased susceptibility to the impact of hazards (e.g., characterization of community access to emergency services or healthcare, increased risk posed by compounding hazards, or pre-incident conditions that may exacerbate disaster impacts)

2.2.2 Screening Process

The primary objective of the screening process is to identify the availability of DRCS capabilities that may support the fulfillment of the request received. Screening activities are also routinely conducted when invited to participate in interagency or intergovernmental pre- or post-incident coordination calls/meetings where the unmet geospatial data needs may be shared and refined for DRCS consideration. This process entails the evaluation of several key considerations that include, but are not limited to:

- Validation of requestor eligibility.
- How the DRCS can uniquely support through data/information, derived science products, and expertise.
- Determination of resources available to support the request.
- Verification that the DRCS can provide the requested products in the requested timeframe.

If the outcome of evaluating these considerations suggests that the DRCS cannot directly support the request, the DRCS will refer the request to either an existing resource or another partner agency that may be more well-suited to provide support.

2.2.3 Support Determination

Based on the outcome of the evaluation of the screening process, the DRCO will determine whether to activate or not.

2.3 Activation

The DRCS activation is a key step that follows the completion of the rapid screening because it engages the necessary response capabilities to support the fulfillment of the received request. Figure 5 captures the activation process overview.

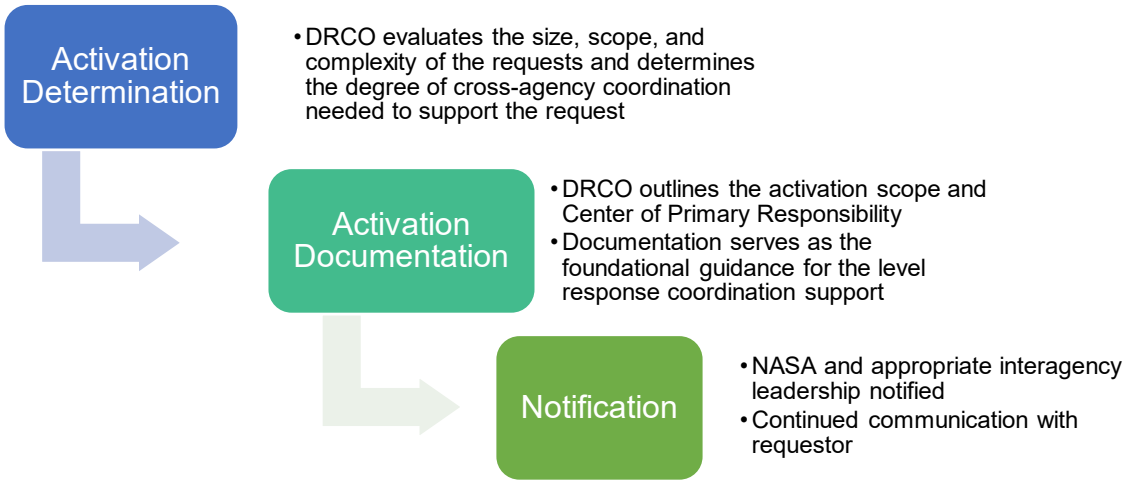

Figure 5. DRCS Activation Phase

2.3.1 Activation Level Determination

The DRCO provides internal guidance to set the initial level of cross-center collaboration that is likely required to fulfill the request. This is *not* a proxy for the severity or importance of an incident. This guidance is used by the Event Team and the DRCO to best calibrate the expected level of effort to support the incident coordination. Considerations used by the DRCO to set the initial level are informed by:

- Requestor's severity designation of the incident
- Complexity of the hazard and the data products required
- Involvement of additional SME capabilities, airborne campaigns, or other supplementary resources
- Number of requestors for the same incident
- Volume of requests received and datasets or products to be generated and shared

Because the coordination level is largely focused on calibrating the DRCS activities, it can change over time as more information becomes available and the needs of the incident response become clearer. The DRCO is responsible for working with the Event Lead to regularly re-assess the coordination level.

2.3.2 Activation Documentation

Activation documentation is maintained through internal management systems and are issued by the DRCO to signal to the Center of Primary Responsibility that disaster response support activities are both requested and authorized. The activation orders will establish the internal documentation and will include, but are not limited to:

- Scope of the incident and products/expertise requested
- Event Lead designation

- Event Team designation
- Resourcing expectations/limitations

As additional requests emerge or the requirements to support the incident change, the activation documentation is updated to maintain a consistent system of record for the Event Team to reference and sustain focus on the requested products.

2.3.3 Notification

The DRCO takes the lead role in communicating the activation status to NASA's Earth Science Division leadership and applicable interagency partners. In addition, ongoing communication with the requestor is primarily transferred from the DRCO and directed to the Event Lead. The Event Team establishes a plan for regular communication with the requestor(s) to ensure continuity of information sharing both internally with leadership and with the partners being supported.

Additionally, if the request is received from a unit of local government, the DRCO will coordinate with established points of contact at the state level to maintain a common operating picture among intergovernmental partners.

3.0 Incident Coordination

Incident coordination is the phase when the DRCS is fully engaged and focused on identifying, leveraging, and utilizing the best available science to support the disaster response decision-making. As a request-driven process, the DRCS operates with a user-centric approach and endeavors to utilize the unique capabilities across all of NASA to support impacted communities globally. This phase generally includes the bulk of the time, effort, and corresponding product development to fulfill request(s) received for the incident. Figure 6 captures the overall incident coordination process and Figure 8 reflects the data product development and delivery sequence.

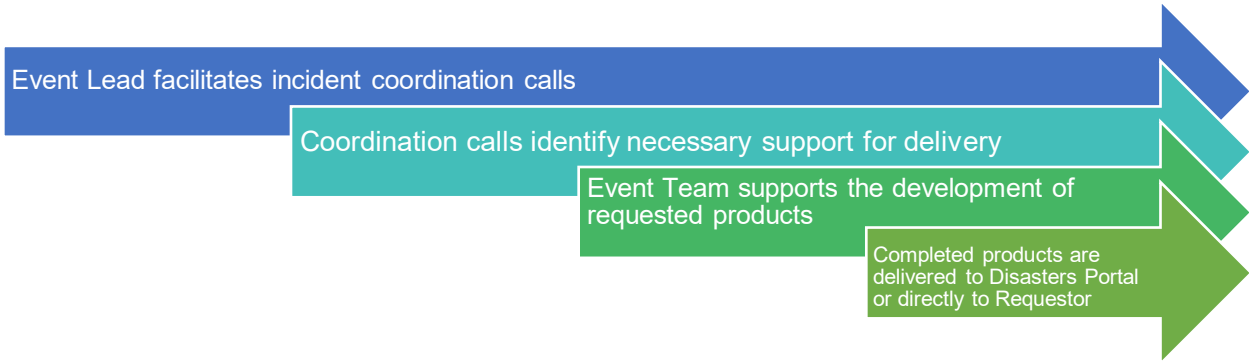

Figure 6. DRCS Incident Coordination Phase

3.1 Incident Coordination Activities

Incident coordination activities are primarily guided by the results of the screening and activation phases in establishing the required products, support, expertise, and science needed to be delivered to the requestor. As outlined in the activation order the Event Lead is charged with the role of leading the Event Team of subject matter experts to derive the necessary data, information, actions, and expertise to fulfill the request received.

In this way, the Event Lead facilitates the Event Team as a community of practice to identify the best available science, products, data, information, and expertise to both fulfill the request and optimally satisfy the fundamental issue or question posed by the requestor. Figure 6 depicts an

example of how this process can unfold for an incident showing lines of coordination in response to a flooding hazard.

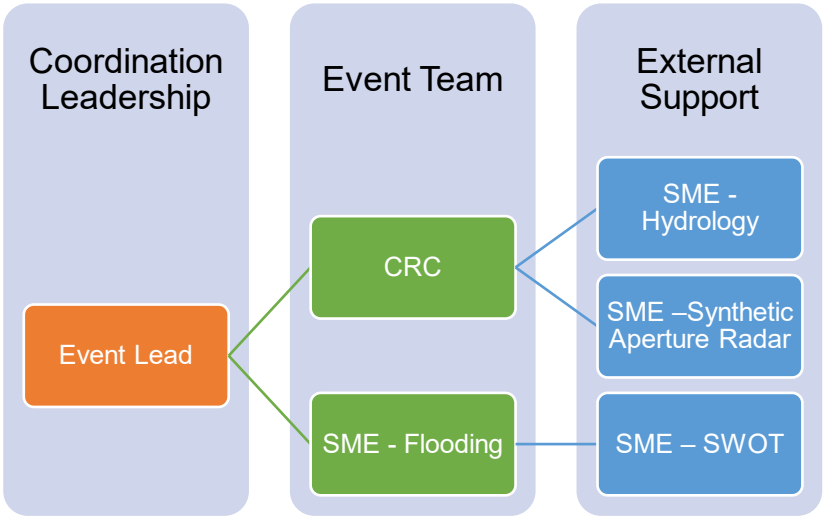

Figure 7. Incident Coordination (Flooding Example)

In the example shown in Figure 7, the DRCS has been activated in response to a flooding incident. In this example, the Event Lead is responsible for leading the team to identify the necessary products and expertise to satisfy the request. The Event Team is comprised of CRCs and SMEs that have expertise in products available at their respective Centers. In this example, the Event Team then has the capability to "reach back" into the capabilities available in their Center or outside of NASA to receive targeted support from SMEs in topics relevant to the request.

3.2 Product Development and Delivery

All product development in support of a request is contingent on the availability of resources (namely the available science, observations, latency, funding, and staff). The Event Team will implement the development of the products or provision of subject matter expertise to fulfill the request within the requested timeframe. If additional resources are required, those recommendations are made through established channels.

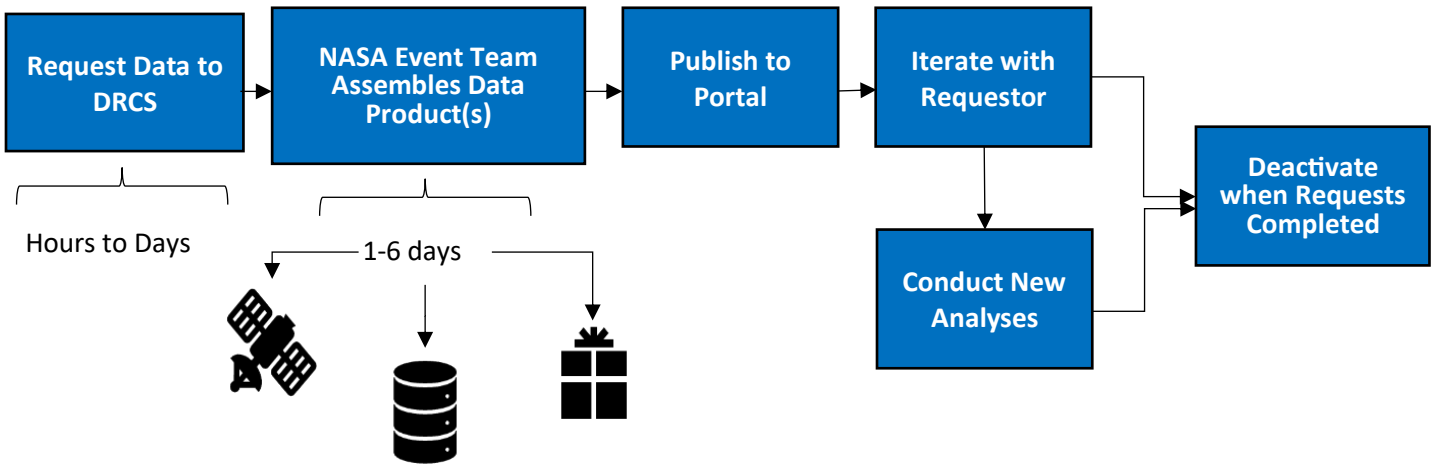

Figure 8. Data Production Sequence of Delivery

Timing of the delivery of data is contingent on critical factors like the timing of satellite overpasses, data acquisition, post-processing, and eventually the "packaging" of the information to be published to the Disasters Portal.

Upon completion of the requested products, the materials are either delivered directly to the requestor or posted to the Disasters Mapping Portal[7] with additional discoverability via the wider ArcGIS Online ecosystem. Once posted to the portal, the products, data, and information are openly available to the public for use in decision support and future research.

3.3 Request Fulfillment

The Event Lead and DRCO coordinate with the requestor to verify they have received the needed resources and to determine if there are any follow-up requests. If follow-up requests are raised, they are screened according to the same process outlined in this CONOPs. Note that this does not necessarily require an additional activation; some follow-on requests can, depending on the geographic and hazard similarity to the existing activation, be considered part of the same activation.

3.4 Transition to Steady State Recovery Support

Depending on the nature of either initial or follow-up requests, the timescale or products requested may be more well suited through a longer-term engagement between DRCS SMEs and the requestor. Subject to the availability of resources, requests that are not driven by incident response needs may be transitioned to the broader support available from the NASA Disasters Program and the SMEs resident throughout the agency. This is accomplished by coordinating with the Program leadership team to determine whether additional support or research-related requests align with programmatic and budgetary objectives of the Centers and program.

4.0 Deactivation

Upon verification from the requestor that their request is fulfilled or if 72 hours have elapsed since the last communication received following DRCS communication outreach, the DRCO will make the decision to proceed to the deactivation of the DRCS. Once deactivated, the DRCO will amend the activation documentation to indicate the support provided and the date on which the DRCS stands down. Notification of the deactivation will follow similar pathways as the activation process and alert NASA Earth Science Division leadership, appropriate interagency partners, and applicable requestors, users, and stakeholders. The DRCO will resume monitoring of the incident to identify if a need for re-activation occurs.

4.1 Implementation of After-Action Assessment

Following deactivation notice, the DRCO will facilitate the after-action review process among the DRCS internally and solicit feedback externally. The after-action assessment process is critical to the ongoing refinement and process improvement of the disaster response support provided by the DRCS to disaster impacted communities. This process will be calibrated based on the coordination level assigned to it by the DRCO, which will provide for a scaled approach to the feedback requested to balance the need for information with time. Full description of the after-action assessment process can be found in section 6.3.

4.2 DRCS After-Action Assessment Considerations

Internally, the after-action assessment process will focus on improving the efficiency and effectiveness of the DRCS response process. Across all incident levels, the after-action review will consider the following, but not limited to:

[7] https://disasters-nasa.hub.arcgis.com/

- Event summary
- Description of coordination actions
- Value-add contributions for requestor
- Feedback from the requestor about the utility of products delivered
- Areas for improvement

In addition, the after-action assessment process will conduct follow-up outreach with requestors to receive feedback on the utility of the products, timeframes, and overall incident coordination process.

5.0 Roles & Responsibilities

5.1 Disaster Coordination Roles & Responsibilities

Improved disaster response outcomes often stem from strong engagement and relationship-building before a disaster occurs or during "blue-sky" times. All NASA offices play a role in "blue-sky" to increase DRCS readiness and build the resilience of communities. NASA implements these roles through day-to-day, non-disaster missions as well as preparedness planning, which occurs regardless of disasters. Similarly, all offices play a role in disaster incident coordination to support a One-NASA response to support science-driven decision-making. These roles are implemented when needed to support the impacted communities, subject to the availability of resources.

Table 2. Roles and Responsibilities

ROLE	"BLUE-SKY" RESPONSIBILITIES	DISASTER COORDINATION RESPONSIBILITIES
NASA Disasters Response Coordination Office (DRCO)	• Conduct incident and hazard monitoring • Lead and support DRCS-wide readiness activities • Lead and implement DRCS continuous improvement activities • Support national-level engagements with domestic, international, non-profit, and private sector partners	• Conduct incident screening and activation processes • Maintain a common operating picture of DRCS assistance activities • Conduct notifications of activations and deactivations to applicable leadership • Provide guidance and coordination support to CRCs for incident response • Identify potential long-term recovery requirements and conduct necessary coordination to identify DRCS capabilities to provide support, as appropriate • Provide the staffing for the National Response Coordination Center (NRCC), when activated by FEMA

ROLE	"BLUE-SKY" RESPONSIBILITIES	DISASTER COORDINATION RESPONSIBILITIES
NASA Center Response Coordinator (CRC)	• Conduct regional, state, and local outreach and engagement in designated region • Support readiness activities internal to their Center's network of SMEs • Maintain and grow subject matter expert network	• When designated by the DRCO, serve as an Event Lead or on an Event Team • Conduct timely outreach to SMEs to solicit potential products that can support requestor requirements • Serve as SMEs depending on individualized areas of expertise for data product production or expertise consultation • Provide coordination and communication support with users who may be impacted within their designated region
Subject Matter Expert (SME)	• Participate in readiness activities • Identify opportunities for leveraging research activities for post-disaster application • When applicable, support long term recovery requests	• Serve on an Event Team when designated by the DRCO and support the development and publication of products related to the DRCS activation • Maintain situational awareness of disaster response and incident coordination activities to proactively identify opportunities for applying relevant and timely research
NASA Centers	• Provide ongoing management support for DRCS activities • Engage in regular DRCS governance activities for policy development and coordination readiness	• Support post-incident coordination requests from the DRCO • Enable CRC and SME engagement in fulfillment of DRCS activations • Provide mission support and administrative assistance to enable incident coordination activities
NASA Disasters Program	• Provide strategic oversight and direction of the DRCS • Support the growth and development of the DRCS network	• Provide strategic and policy guidance for DRCS activations • Coordinate across Earth Science Division programs to facilitate requisite support for DRCS coordination activities
Requestor	• Engage with DRCS readiness activities • Promote pre-disaster collaboration engagements	• Provide incident requests to DRCS@nasa.gov for screening • Provide clarifying guidance for requests to identify intended outcome of NASA DRCS engagement • Provide user feedback for the after-action review

ROLE	"BLUE-SKY" RESPONSIBILITIES	DISASTER COORDINATION RESPONSIBILITIES
Event Lead	• N/A	• Lead incident coordination for each activation when designated by the DRCO • Provide expertise to interpret requestor inquiries and organize a pathway for Event Team to support product development • Convene Event Team as needed (based on incident level) to effectively utilize capabilities across NASA centers • Recommend additions to the Event Team to the DRCO based on the maturation of the incident coordination • Make product requests to NASA centers to fulfill incident coordination requirements • Complete after-action review assessments when deactivated
Event Team	• N/A	• When designated by the DRCO, support the Event Lead through the incident coordination process • Provide subject matter expertise to prepare necessary data, information, or expertise products for delivery to the requestor • Complete after-action review assessments when deactivated
Center of Primary Responsibility	• N/A	• Provide administrative and mission support for designated Event Lead and Event Team in the fulfillment of their responsibilities • Coordinate with DRCO and NASA Disasters Program to adjudicate resource requirements

5.2 U.S. Regional Coordination Designations

To support the coordination between requestors and external users in "blue sky" periods and after a disaster, the DRCS has pre-defined regional assignments for domestic disasters. The regions used are consistent with those used by other Federal agencies like the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), and the Department of Health & Human Services (HHS). The DRCO has designated each of the six NASA centers with regional assignments to support pre-disaster preparedness and post-disaster coordination.

Requestors should submit all support requests for the DRCS via email to the DRCS at DRCS@nasa.gov. The DRCS routes all requests to the applicable lead NASA center.

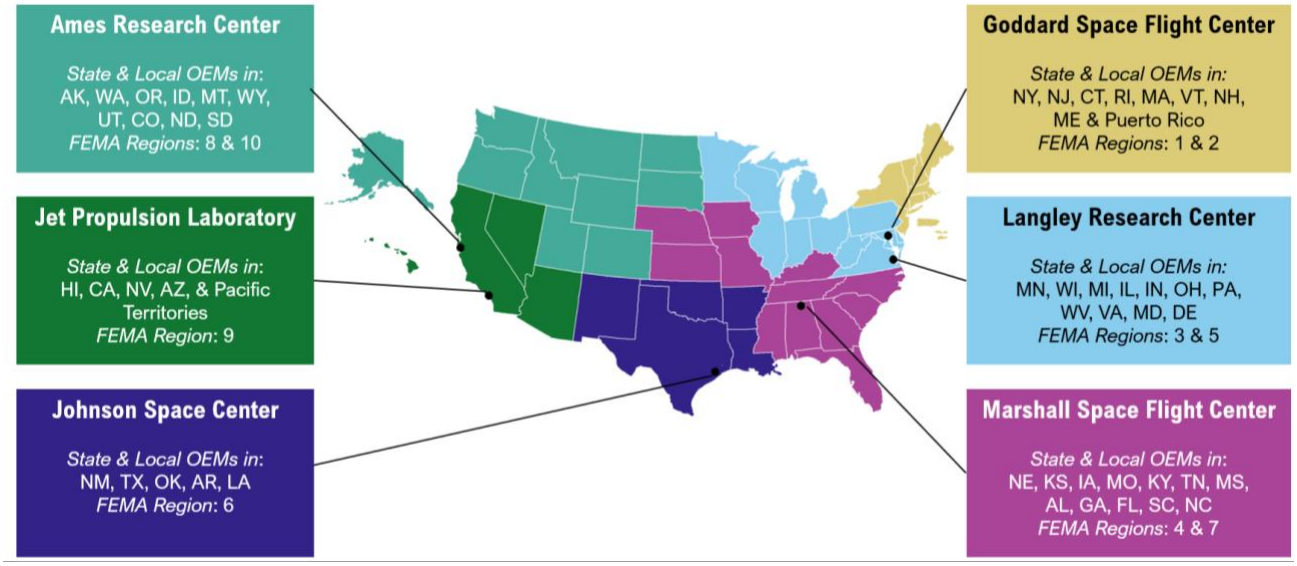

Figure 9. CRC Regional Coordination Designations

5.3 International Coordination

The DRCS works in conjunction with the established networks such as The International Charter Space and Major Disasters[8], ESA's Copernicus Emergency Management Service[9], the United Nations System, UN OCHA Global Disaster Alert and Coordination System (GDACS)[10], and the U.S. Department of State. The primary objective of the DRCS is to provide timely decision-support data, information, and subject matter expertise to our global partners through the agency's existing relationships and through the established lead USG agency. With that objective in mind, the DRCS sustains several key goals for international coordination:

1) Increase opportunities for bilateral and multilateral collaboration for disaster relief;[11]
2) Support time-sensitive requests to complement efforts undertaken by existing international organizations and sovereign governments; and
3) Reduce the risk for duplication of effort by proactively engaging with international partners to collaborate on pre-disaster preparedness initiatives.

The process by which international partners can engage the DRCS is similar to domestic engagements. The DRCS engagement is request-driven and is screened according to the criteria outlined in Section 2.2. The DRCO takes an additional step the in the screening process for international disaster events, coordinating with NASA Earth Science Division management, the NASA Office of International and Interagency Relations (OIIR) and the U.S. Department of State to sustain common visibility of requests received and DRCS activities in response.

[8] https://disasterscharter.org/web/guest/home
[9] https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Emergency_services
[10] https://www.gdacs.org/About/overview.aspx
[11] *Inclusion of countries on the Designated Countries list are only allowable on a case-by-case basis based on US State Department direction.* https://www.nasa.gov/wp-content/uploads/2023/08/designated-country-list-4.21.2023.pdf

The DRCO will designate the Event Lead and Event Team to best align with fulfilling an international request based on the size, scope, and complexity of the DRCS activation. Since the DRCS relies on the existing relationships and networks of its partners, there are no pre-designated international regions for CRCs.

All support requests for the DRCS are expected to be submitted via email to the DRCS at DRCS@nasa.gov.

6.0 Data Standards and Interoperability

In consideration of NASA's wider mission to support open-source science[12], all web services and data products that can be released as such are available to the public with no sign-in required. Associated science teams review these products for quality control through their established processes. These products are intended to enhance situational awareness or to supplement or corroborate other data products and are generally not considered to be final or authoritative.

The DRCS publishes all primary data products on the portal as ArcGIS Representation State Transfer (REST) Endpoint Map, Feature, or Image Services. The DRCS also includes associated Open Geospatial Consortium (OGC) formats such as Web Mapping (WMS) or Feature (WFS) Services to better accommodate open-source software interoperability and data requirements. Supplemental products such as dashboards, applications, or story maps utilize these products and others to deliver added value via enhanced visualization or collation of disparate sources, including from other agencies and partners. The DRCS publishes data products in this manner to make the available data as interoperable as possible so the emergency management community can integrate the data into their native environment to conduct their own analyses.

Additionally, the source data of most primary products listed above are posted for download in widely supported formats such as Esri Shapefiles or Geographic Tag Image File Format (GeoTIFFs) on the Disasters download directory[13]. As the services published are derived from these source files, the underlying available data and metadata are identical.

All products follow generalized, intuitive short-name and long-name naming conventions with standards forthcoming. The DRCS collects standardized metadata from associated science teams and data providers delivering the source data products. This metadata has several required entries and ensures that:

- Metadata properly attributes data providers, curators, and processors
- Descriptive information regarding the source (e.g., satellite, model) provides context to the products.
- Usage instructions give users guidance on getting started with the products.
- Terms of use note the caveats of these best available products and any potential limitations therein.

7.0 Continuous Improvement and Readiness

The DRCS is intended to be an evolving and innovative system for how NASA can provide data, information, and subject matter expertise to support disaster response. This CONOPs and supporting documentation

[12] https://science.nasa.gov/researchers/open-science/
[13] https://maps.disasters.nasa.gov/download/

retain a central priority to iterate and adapt to the changing needs of the emergency management community to improve the accessibility and usefulness of Earth observation data and information.

7.1 DRCS Approach to Continuous Improvement

In order to most effectively support the disaster response community, the DRCS will pursue a systematized approach through a Monitoring, Evaluation, and Learning (MEL) model to drive adaptation and efficacy. Led by the DRCO, the DRCS MEL activities will include the collection of metrics and key performance indicators (KPIs) aligned with its goals, a robust after-action assessment process centered around collection of lessons learned, and a review cycle to take these inputs and feed them back into the DRCS procedures. This process is essential to ensure that the CONOPs – and how the DRCS manages preparing for and responding to disasters – is continuously optimized and accurately reflects the current Disasters Program's resources, the capabilities of its federal and local partners, and the changing response landscape of disasters.

The intention behind the DRCS MEL activities is that they will support:

- Application of lessons learned to streamline and improve processes for enhanced effectiveness
- More efficient data collection and reporting processes, analysis, and use of data and information to inform action and change
- Insights into the DRCS fulfillment of key management requirements and objectives
- Engagement of partner organizations in the MEL process to understand pain points, needs, and assess results and findings from an external perspective
- Establishment of effective procedures for collecting and adapting to feedback from users/partners
- Equity and accountability across the DRCS network and its cohort of CRCs
- Enhanced recognition for CRC efforts and the totality of their contributions to the DRCS
- Efficient and effective expenditure of money and resources
- Compliance with NASA policies and standard practices
- Creation of a pathway for improving science or technological gaps through requestor engagement, feedback, and innovation of applying the best available science for disaster response

7.2 After-Action Assessment

The DRCS conducts preliminary after-action assessments following each activation. Additionally, aggregated assessments for seasonal hazards (e.g., wildfires, hurricanes, etc.) and/or clustered, cascading hazards (e.g., floods resulting in landslides, etc.) may be conducted. After-action assessments serve as the foundation for evaluation and compilation of lessons learned.

For after-action assessments, the DRCO works with the Event Lead and Event Team to gather information on the activation and discuss and identify opportunities to improve DRCS processes, advance research and the products developed and their scientific impact, and promote further collaboration with partners throughout the activation cycle.

The Event Lead (or a designee) is responsible for soliciting feedback from the initial requester relating to DRCS products, processes, and their use of the information received. The DRCO will compile an after-action assessment report based on inputs from the DRCS and requestor at a

level of detail consistent with the level of incident activation. The findings identified in the assessment and recommendations will be compiled and reviewed quarterly by the DRCO for consideration to optimize processes and adjust strategies.

7.3 Lessons Learned Process

The Lessons Learned Process is managed by the DRCO and consists of semi-annual reviews of after-action assessments to focus on short-term improvements to the activation process in addition to a more expansive annual review for longer-term modifications. It also includes updated training across the DRCS network to ensure awareness of the process improvements, incorporation in regular planning updates, and to advance cohesion in coordination across future activations.

The semi-annual reviews of metrics, KPIs, and after-action assessments gather insights into potential short-term improvements. These semi-annual reviews will be conducted by the DRCO, and any resulting changes to the activation process will be socialized with the CRCs and training modules updated where appropriate.

The annual review includes information from the semi-annual reviews, as well as an overarching review of the DRCS activation cycle and the response process in general, the products developed for decision support, and engagement with partners. Metrics and KPIs will be included in the annual reviews along with insights from activations and after-action assessments to identify potential longer-term changes to the overall processes, partnerships, and products developed. Modifications considered will incorporate input based on the after action review process and will be determined by the DRCO and the Disasters Program leadership.

7.3.1 Earth Observation Data and Disaster Response Training

Training is a critical element to ensuring a robust and coordinated response. The DRCS personnel require training for their respective roles in order to fully support the DRCS mission for a wide range of incidents. Overall, training will prioritize these objectives:

- All relevant training material should be updated, as needed, or after the CONOPs has been revised
- Internal training will be accessible by all internal audiences and incorporate necessary feedback mechanisms to allow for continued improvement
- As resources become available, external training will be made available to support capacity building of external audiences and will be incorporated into the continuous improvement cycle
- When feasible, the DRCS will leverage existing training courses, materials, and modules available across the Earth Science Division and its partners to keep the DRCS team current on the latest science, data capabilities, analytics, or other relevant facets of innovation that can support disaster response

7.3.2 Disaster Response Exercises

The CONOPs should be exercised at least once annually. This may be accomplished by activating for a “real world” event, creating an internal exercise, and/or participating in an external exercise with partners. The DRCO is responsible for selecting, designing, and/or facilitating exercises that are appropriate for DRCS participation. Exercises will provide the DRCS opportunities to build relationships with external stakeholders during “blue sky” and identify areas for process improvement. Identified improvements are paired with the regular advancement and improvement of the DRCS processes, plans, and procedures.

The DRCS will participate in state, tribal, territorial, and local exercises to promote readiness of the DRCS and its engagement with external partners, subject to the availability of resources. These engagements are intended to enable stronger readiness for utilizing NASA's Earth observation data and expertise for real-world incidents. The DRCO will adjudicate requests from state, tribal, territorial, and local agencies like the incident screening process.

Exercise planning involves designing, developing, conducting, and evaluating. It includes the following elements:

- Identifying goals and objectives
- Obtaining appropriate input from stakeholders (e.g., government agencies; private sector; nongovernmental organizations)
- Designing realistic scenarios based on hazards, vulnerability, and risk overall
- Ensuring exercises are performance based and subject to evaluation
- Conducting and executing exercises
- Meeting exercise and evaluation requirements and doctrine

To the furthest extent practicable, the DRCO will coordinate exercise participation with the National Exercise Program[14].

7.4 Engagement with External Organizations

The DRCS places emphasis on targeted and pro-active outreach that begins ahead of disasters. This includes both domestic and international organizations with a focus on national, state, local, tribal, or territorial governments and non-profits in the disaster response sector. The DRCS coordinates with its partners, collaborators, and users during all phases of the preparedness cycle. These organizations can include international and domestic response agencies and stakeholders, along with local agencies and resource partners. These relationships are built, strengthened, and leveraged in a variety of ways to better inform the CONOPs of roles and responsibilities during and after a major disaster. DRCS will coordinate preparedness efforts with external partners that help inform the implementation of the CONOPs to include:

- Exercise and training participation
- Participating in interagency and local working groups
- Sharing, reviewing, and soliciting input on preparedness and response plans
- Establishment of pre-disaster agreements and joint planning to codify roles and responsibilities to support incident coordination

NASA has a longstanding history of facilitating beneficial partnerships with commercial industries, U.S. government agencies, international entities, and academia. While these partnerships vary widely in scope and breadth, all help to accomplish the Disasters Program's mission objectives by enabling opportunities for collaboration with domestic and international partners. Partnership agreements within the DRCS are used to: 1) support the needs of the external partner where the partner reimburses government expenses (reimbursable partnership), or 2) achieve a mutual goal when working collaboratively on a no-exchange-of-funds basis (non-reimbursable partnership).

[14] https://www.fema.gov/emergency-managers/national-preparedness/exercises/about

7.5 Plan Composition and Maintenance

The CONOPs is composed with input from all offices across the DRCS network and is intended to be an evolving framework. Plan improvement is provided through readiness activities, the after-action assessment process, exercises, and annual planning review cycles.

The DRCO will lead, manage, evaluate, and update the CONOPs. Updates to supporting planning materials will occur at least annually and as areas for improvement are identified that strengthen the DRCS capabilities.

Where applicable, the DRCS will also participate in other agencies' disaster plans and develop additional plans as part of the Disasters Program's disaster response improvement cycle, to include:

- Hazard Season Reviews
- After-Action Reporting
- Compliance with Office of Inspector General (OIG) and Government Accountability Office (GAO) audit findings

Appendix A: Acronym List

ARC	Ames Research Center
CRC	Center Response Coordinator
CONOPs	Concept of Operations
DRCS	Disasters Response Coordination System
DRCO	Disasters Response Coordination Office
ESD	Earth Science Division
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System(s)
GSFC	Goddard Space Flight Center
HHS	Department of Health & Human Services
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KPI	Key Performance Indicator
LaRC	Langley Research Center
MEL	Monitoring, Evaluation, and Learning
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
OIG	Office of Inspector General
OGC	Open Geospatial Consortium
OIIR	Office of International and Interagency Relations
SMD	Science Mission Directorate
SME	Subject Matter Expert
SWOT	Surface Water and Ocean Topography
WFS	Web Feature Service
WMS	Web Map Service