



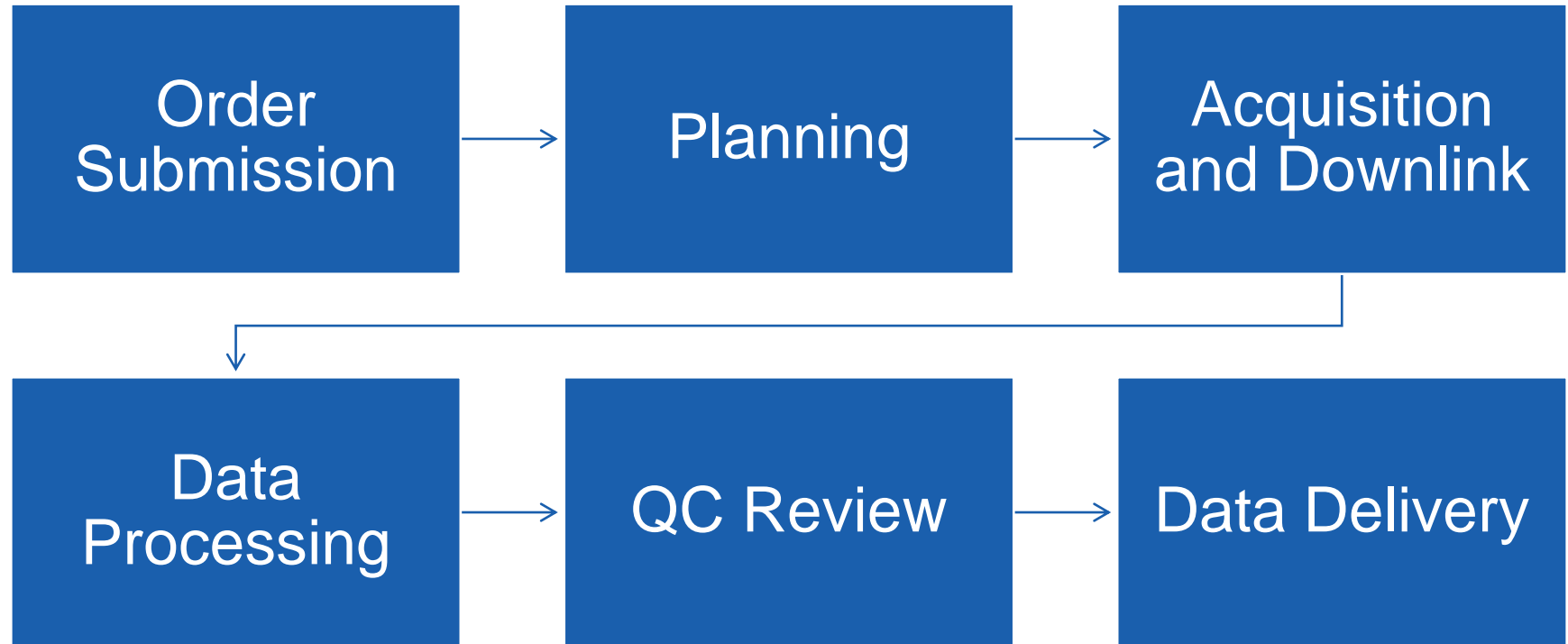
**TCloud Use for DESIS Data and Best Practices**  
**Heath Lester**  
**Teledyne Brown Engineering – Geospatial**

## **Overview**

- ▶ **DESIIS Tasking Data Flow (From Order to Delivery)**
- ▶ **TCloud Ordering Best Practice Recommendations**
- ▶ **TCloud Features and Enhancements**
- ▶ **Contacts and Reference Information**

# **DESIIS Tasking Data Flow (From Order to Delivery)**

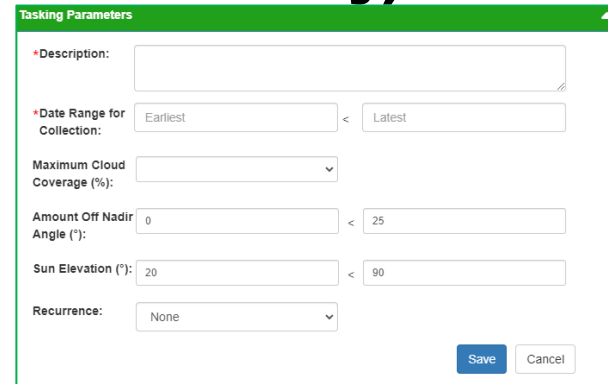
# DESIS Tasking Data Flow (From Order to Delivery)



# DESIS Tasking Data Flow (From Order to Delivery)

## ▶ Order Submission

- Critical criteria (Tasking Parameters):
  - Date Range for Collection – the longer the better
  - Off Nadir Angle
    - 0 to 45 deg (ISS port) , 0 to -5 deg (ISS starboard) cross-track
    - Note: we are limited to global coverage at latitudes between 55N and 52S
  - Sun Elevation Angle – 20 to 90 deg
    - Note: L2A cannot be processed below 20 deg
  - Cloud Cover – Percentage of AOI that could be cloud covered and still be sufficient to collect data
    - Order parameter and quality assessed in ranges (e.g. clear, 0 – 25%, etc)
  - Recurrence – Options are None, Standing, Interval

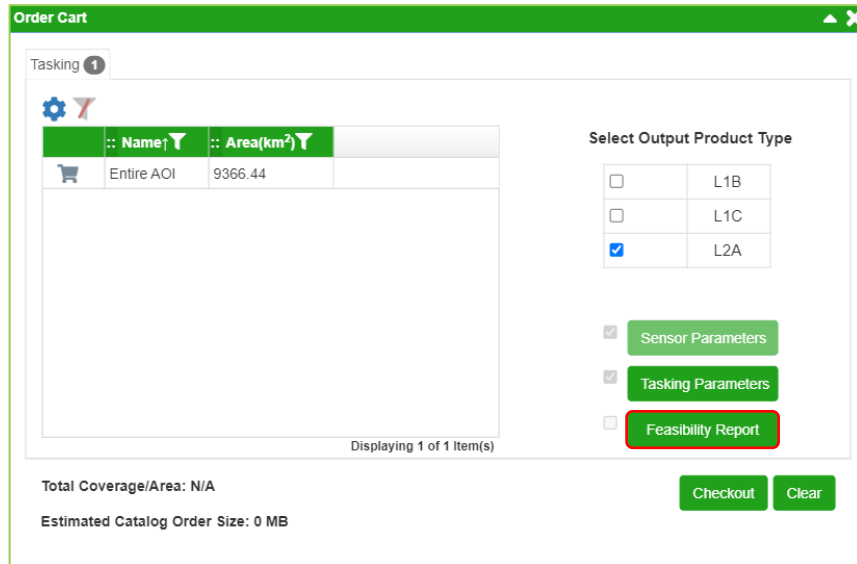


The screenshot shows a 'Tasking Parameters' dialog box with the following fields:

- Description:** A text input field.
- Date Range for Collection:** Two input fields for 'Earliest' and 'Latest' separated by a '<' symbol.
- Maximum Cloud Coverage (%):** A dropdown menu.
- Amount Off Nadir Angle (°):** Two input fields for '0' and '25' separated by a '<' symbol.
- Sun Elevation (°):** Two input fields for '20' and '90' separated by a '<' symbol.
- Recurrence:** A dropdown menu with 'None' selected.
- Buttons:** 'Save' and 'Cancel' buttons at the bottom right.

# DESIS Tasking Data Flow (From Order to Delivery)

- Feasibility
  - Calculated during Order Submission and is function of ‘access time’.  
Generally dependent on Order Duration, Off-Nadir Angle, and/or Sun Elevation Angle.



**Order Cart**

Tasking 1

Name	Area(km <sup>2</sup> )
Entire AOI	9366.44

Select Output Product Type

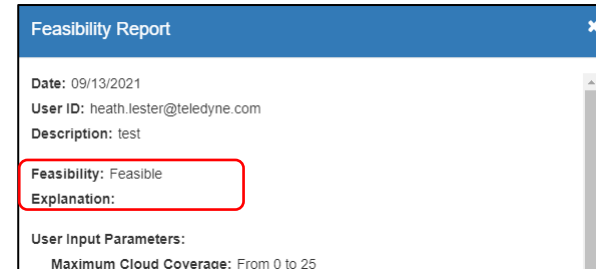
<input type="checkbox"/>	L1B
<input type="checkbox"/>	L1C
<input checked="" type="checkbox"/>	L2A

Sensor Parameters  
 Tasking Parameters  
 Feasibility Report

Displaying 1 of 1 Item(s)

Total Coverage/Area: N/A  
Estimated Catalog Order Size: 0 MB

Checkout Clear

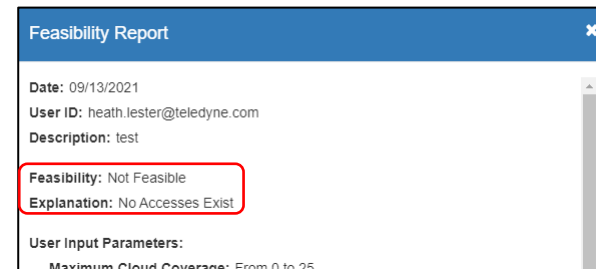


**Feasibility Report**

Date: 09/13/2021  
User ID: heath.lester@teledyne.com  
Description: test

**Feasibility: Feasible**  
Explanation:

User Input Parameters:  
Maximum Cloud Coverage: From 0 to 25



**Feasibility Report**

Date: 09/13/2021  
User ID: heath.lester@teledyne.com  
Description: test

**Feasibility: Not Feasible**  
Explanation: No Accesses Exist

User Input Parameters:  
Maximum Cloud Coverage: From 0 to 25

# DESIS Tasking Data Flow (From Order to Delivery)

## ▶ Planning

- Planning software takes many of the tasking parameters, ISS ephemeris, and earth rotation correction into account to produce collection opportunity windows.
- Cloud cover predictions for AOIs are assessed using an external cloud cover forecast source that we have found to be a bit more accurate and more planning friendly (lat/lon and time adjustable) than other sources.

## DESIS Tasking Data Flow (From Order to Delivery)

- All order collection opportunities for each window are assessed for, but not necessarily limited to...
  - Associated ground coincidence collect or specified 'higher interest' period (coordinated beforehand).
  - End collection date and remaining potential collection opportunities.
  - Number of previous collections (and how recent); if recurrence is set to Standing or Interval.
  - Cloud cover forecast; even more so if the recurrence is set to None.
- Additionally, the ISS is a dynamic platform where certain activities can affect the collection opportunities we may have.



# DESIS Tasking Data Flow (From Order to Delivery)

## ► Acquisition and Downlink

- Operations are supported 8x5 and off-hours, as necessary.
- Depending on when collection occurs (e.g. Mon – Thur versus weekend) can be 24 – 72 hours from collection to downlink.
  - FIFO philosophy, but exceptions made for critical/time sensitive collections.
- Occasionally, last minute ISS dynamic events (e.g. debris avoidance maneuver) can affect planned acquisitions.
- Telemetry required for processing downlinked the following day.

# DESIS Tasking Data Flow (From Order to Delivery)

## ▶ Data Processing

- Processing begins at the point of delivery and based on order criteria.
- Email notification sent to user once data for an order received for processing (order name and scan ID omitted).
- Processing levels
  - L1A – Raw archive data (*Not a deliverable product*)
  - L1B – Top-of-atmosphere (TOA) radiance
    - Radiometric and Sensor corrections applied
    - Sensor-oriented
  - L1C – Orthorectified TOA radiance
    - Sensor distortion removed
    - Map projection and resampling method are user-selectable
  - L2A – Surface reflectance
    - Includes pixel classification, aerosol optical thickness and water vapor map
    - Terrain model and ozone column are user-selectable
- AOI/Collection size and processing level selected affect the processing time.

Scan '063' for Order ' ' acquired at  
09/08/2021, 08:37:36 GMT has been received and being processed according to  
your order

# DESIS Tasking Data Flow (From Order to Delivery)

## ▶ QC Review

- Once processing completes all tiles are delivered to the quality analyst for review.
- Tiles are assessed for:
  - Cloud cover percentage (within a range, clear, 0 – 25%, 25 – 50%, etc)
  - Quality (acceptable, questionable, unacceptable)
  - If either cloud cover is outside of order parameters or quality is questionable the tile(s) are marked for user review.

# DESIS Tasking Data Flow (From Order to Delivery)

## ► Data Delivery

- Once the Quality Review is complete email notification is sent to inform the user of tiles processed and their status (order name and scan ID omitted). Formatting currently being reviewed/updated.
  - Accepted – No issue with data and available for download (DLR users download via EOWEB).
  - Low Quality – Did not meet the quality standards to release.
  - Failed to Meet Order Criteria – Did not meet some portion of the order requested.
  - Failure in order processing – Processing of tile(s) at certain levels failed.
  - User Review – Tiles determined in QC that user review is needed to accept/reject them.

**Earth Sensor Portal**

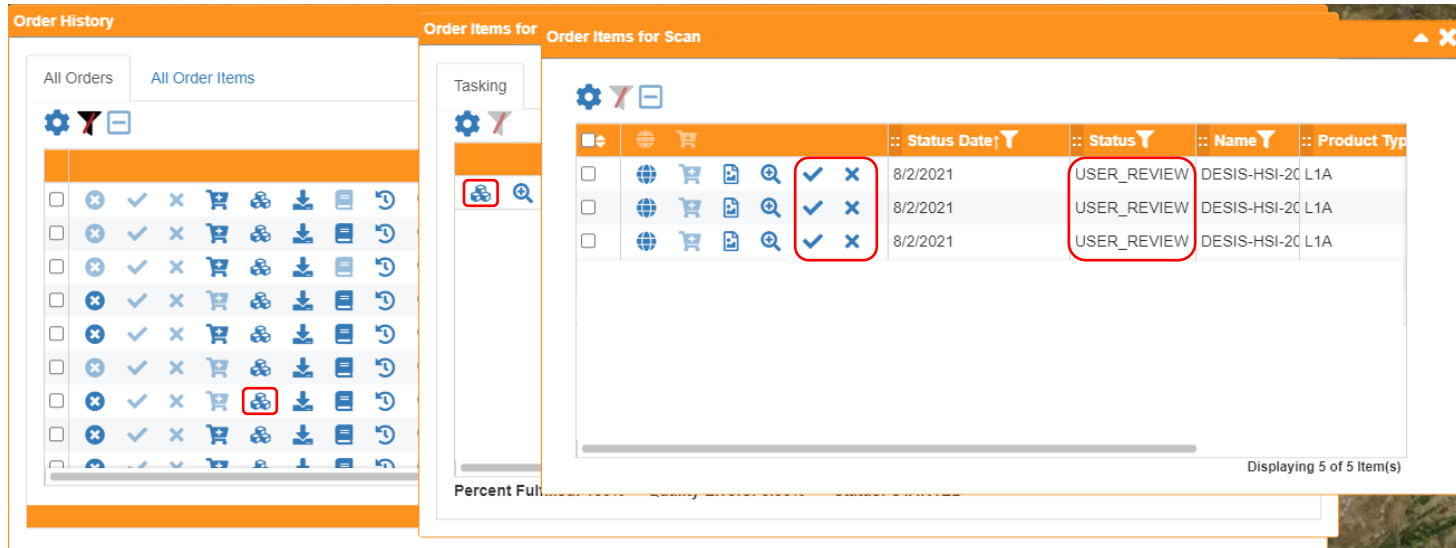
Scan 063 for order: \_\_\_\_\_ has been reviewed.

- 1 tiles were accepted.
- 0 tiles were rejected by the Quality Control Analyst as having low quality.
- 0 tiles failed to meet your Order criteria.
- 1 tiles failed due to a failure in order processing.
- 0 tiles are reserved for User Quality Review

Please login to [TCloudhost](#) for more detail about order.

# DESIS Tasking Data Flow (From Order to Delivery)

- If/when email notification shows you have tiles to review, they can be accessed one of two ways to accept (✓) or reject (✗).
- From the Order History | All Orders | [Order in Question] | Order Details | Scan Details (Scan number omitted)



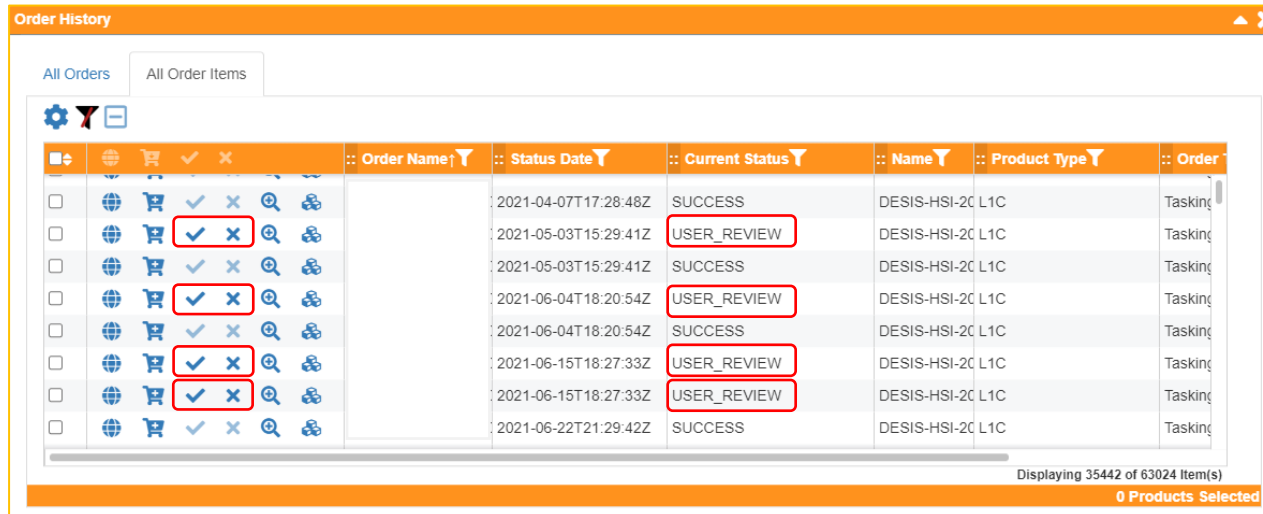
The screenshot displays the DESIS Tasking Data Flow interface. On the left, the 'Order History' panel shows a list of orders with various icons. A red box highlights a specific order icon. On the right, the 'Order Items for Scan' panel shows a table of tasking items. A red box highlights the 'Tasking' section, and another red box highlights the 'Status' column, which contains 'USER\_REVIEW' for three items. The table also shows 'Status Date', 'Name', and 'Product Type' columns.

					Status Date↑	Status	Name	Product Type
<input type="checkbox"/>					8/2/2021	USER_REVIEW	DESIS-HSI-2C	L1A
<input type="checkbox"/>					8/2/2021	USER_REVIEW	DESIS-HSI-2C	L1A
<input type="checkbox"/>					8/2/2021	USER_REVIEW	DESIS-HSI-2C	L1A

Displaying 5 of 5 Item(s)

# DESIS Tasking Data Flow (From Order to Delivery)

- The other method is through Order History | All Order Items (Order Names omitted).
- Every tile from all of your orders can be viewed from this display and can be reviewed then approved (✓) or rejected (✗). Note: Users can only see their own orders. Organization Administrators can see all orders for that organization.



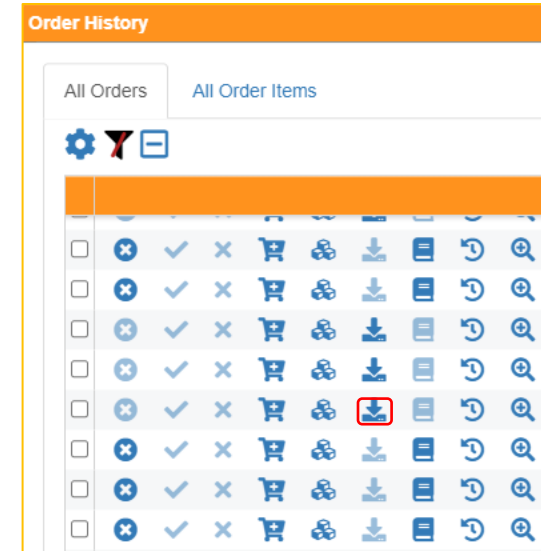
The screenshot shows the 'Order History' window with the 'All Order Items' tab selected. The table displays the following data:

	Order Name	Status Date	Current Status	Name	Product Type	Order
<input type="checkbox"/>		2021-04-07T17:28:48Z	SUCCESS	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-05-03T15:29:41Z	USER_REVIEW	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-05-03T15:29:41Z	SUCCESS	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-06-04T18:20:54Z	USER_REVIEW	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-06-04T18:20:54Z	SUCCESS	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-06-15T18:27:33Z	USER_REVIEW	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-06-15T18:27:33Z	USER_REVIEW	DESIS-HSI-20	L1C	Tasking
<input type="checkbox"/>		2021-06-22T21:29:42Z	SUCCESS	DESIS-HSI-20	L1C	Tasking

At the bottom of the window, it indicates 'Displaying 35442 of 63024 Item(s)' and '0 Products Selected'.

# DESIS Tasking Data Flow (From Order to Delivery)

- Data Download
  - DLR Orders (catalog and tasking) are delivered such that the data will be available to those users on the EOWEB system.
  - All other users download via TCloud Order History. Note: when catalog order processing is complete an email notification is also sent which provides a link to directly download.
  - There is also an option of delivering data directly to an Amazon Web Services (AWS) bucket. This is discussed in a later slide and instructions can be provided for this method.



# **TCloud Ordering Best Practice Recommendations**



## **TCloud Tasking Order Best Practice Recommendations**

- ▶ **Caveat: The following slides include some tasking parameter recommendations that are intended to provide the best practices to help meet data objectives. However, if you feel any of these will restrict or prevent meeting your objectives please do not use or contact us to discuss options.**

# **TCloud Tasking Order Best Practice Recommendations**

## ▶ **Coincidence Collections**

- Contact us as soon as possible with the AOI and tasking parameters to perform an initial overpass assessment for the potential coincidence collection.
- However, the further out it is the less reliable it can be. Re-assessments can be performed closer to the overpass(es).

## ▶ **Collection Window Duration**

- Have observed collection windows as short as 1 and 3 days.
- It is recommended to enter collection windows for as long as your science objectives and schedules will allow.
- An order can be feasible when submitting, but that could be feasible from only one overpass which could be affected by cloud cover and/or by late-breaking ISS dynamic events.

# TCloud Tasking Order Best Practice Recommendations

## ▶ Cloud Cover

- Have observed some orders with 0% cloud cover selected and some with 100% cloud cover selected.
- In some locations/time of day 0% is very unlikely to be achieved and with 100% cloud cover it is unlikely to yield science.
- Two types of philosophy recommendations depending on recurrence parameter setting.
  - If standing recurrence, enter the cloud cover percentage range that will allow you to collect some usable data from your AOI. There will most likely be other opportunities, depending on collection window, that will allow for better cloud cover.
  - If recurrence is none or interval, enter the cloud cover percentage range that will allow sufficient science return.
- While cloud cover forecast is not the overall deciding factor its weight can be determined by order recurrence.

# TCloud Tasking Order Best Practice Recommendations

## ► Recurrence

- Standing
  - Opportunity each time within view through the end of the collection window.
  - Most preferred for operations planning and recommended setting if the user does not have collection amount limitations.
  - Allows for more liberal collection planning relative to cloud cover forecasts.
- Interval
  - Can be used when only periodic collections are needed, but it is important to note that the cyclical revisit pattern of the ISS orbit and cloud cover may not allow us to collect at the exact requested intervals.
  - If possible recommended to allow for a longer collection window and more flexible cloud cover.
- None
  - Can be used when only a one-time collection is needed.
  - Like Interval collections it is recommended to allow for a longer collection window and more flexible cloud cover, if possible.

# TCloud Tasking Order Best Practice Recommendations

## ► Periodically Checking for Order Tile Review

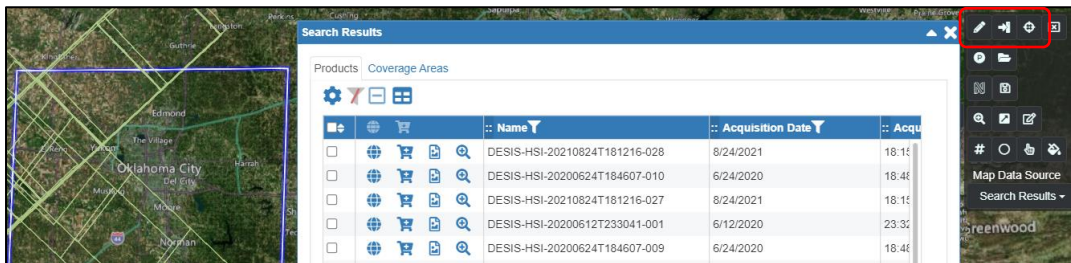
- While notification emails are sent notifying of tile processing and if tiles require user review, periodic review of the Order History | All Order Items will help to ensure no tiles are open for review (Reference [slide 14](#)) and will be delivered or re-planned.
- Assuming you have many orders, using the All Orders display, rather than going into each individual order ([slide 13](#)) provides a more efficient way to check open review tiles.
- This is especially important and time-critical for orders with a recurrence of 'none' as rejecting the tiles will mark the collection failed and allow us to plan the order again.

# **TCloud Features and Enhancements**

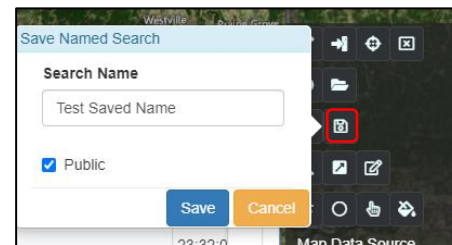
# TCloud Features and Enhancements

- ▶ **While TCloud has many features, this is intended to highlight some that may be lesser known and highlight a recent enhancement.**
  
- ▶ **Saved Searches**
  - Specific AOIs and their filtered criteria can be saved to a profile that can later be quickly run rather than having to manually perform again later.
  - Detailed steps provided on the next slide.

# TCloud Features and Enhancements

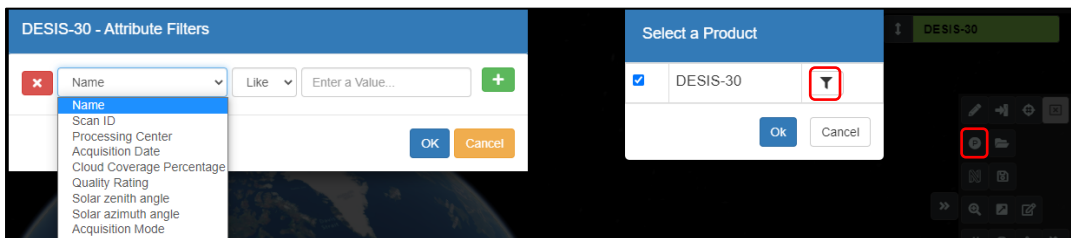


1. AOI drawn or imported

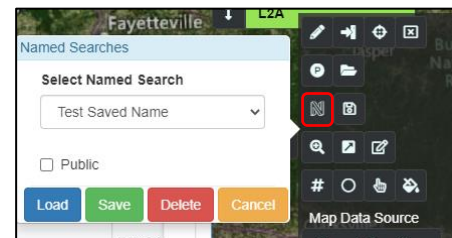


3. Save search criteria

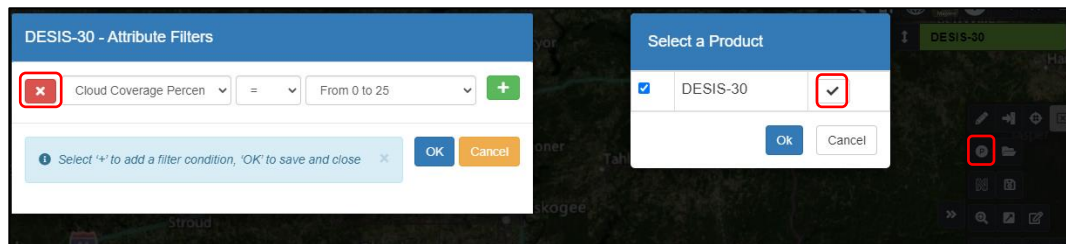
Note: Public is viewable to everyone



2. Product attributes filtered (if necessary)



4. Later; load, update or delete search



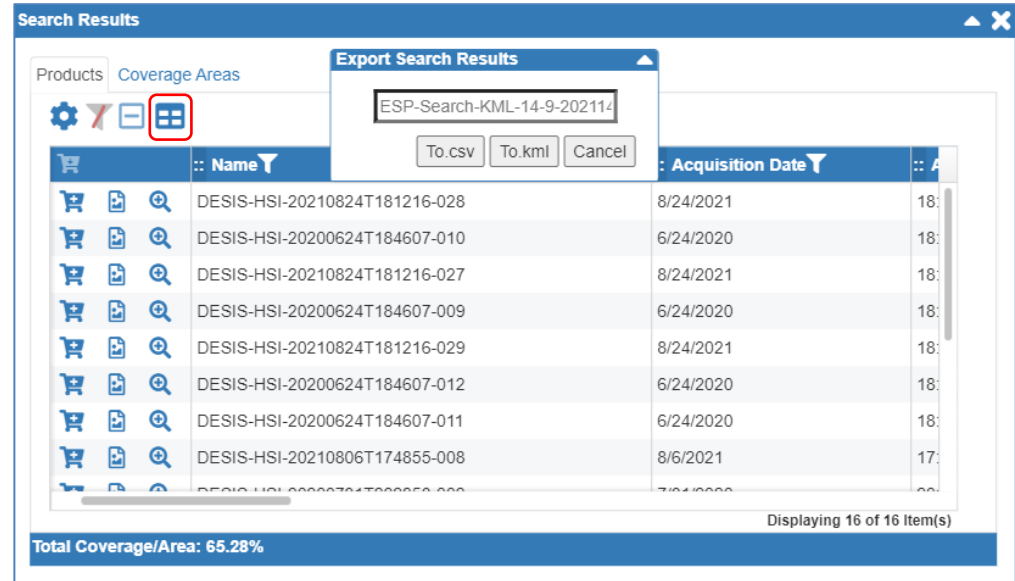
5. Anytime product attributes selected they need to be manually removed if no longer needed.



# TCloud Features and Enhancements

## ► Search Results Export

- Products available from a drawn or imported AOI are provided in a Search Results display.
- These results can be exported in two options:
  - CSV – product list with the same metadata as in the search results.
  - KML – footprint of each tile with tile name from the search results.



Search Results

Products Coverage Areas

Export Search Results

ESP-Search-KML-14-9-202114

To.csv To.kml Cancel

	Name	Acquisition Date	
	DESI-HSI-20210824T181216-028	8/24/2021	18:
	DESI-HSI-20200624T184607-010	6/24/2020	18:
	DESI-HSI-20210824T181216-027	8/24/2021	18:
	DESI-HSI-20200624T184607-009	6/24/2020	18:
	DESI-HSI-20210824T181216-029	8/24/2021	18:
	DESI-HSI-20200624T184607-012	6/24/2020	18:
	DESI-HSI-20200624T184607-011	6/24/2020	18:
	DESI-HSI-20210806T174855-008	8/6/2021	17:

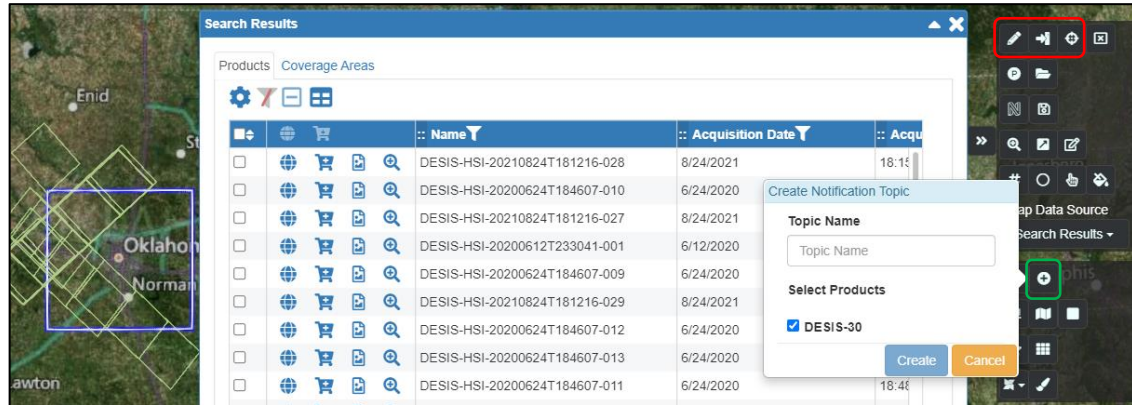
Displaying 16 of 16 Item(s)

Total Coverage/Area: 65.28%

# TCloud Features and Enhancements

## ► New Data Notification

- Notifications can be setup to notify of new data for an AOI.
- Once an AOI is drawn or imported the 'Create Notification Topic' can be selected, named, and then created.



The screenshot displays the TCloud interface with a search results window and a 'Create Notification Topic' dialog box. The search results window shows a table of products with columns for Name, Acquisition Date, and Acquisition Time. The dialog box prompts the user to enter a Topic Name and select products, with 'DESIIS-30' selected.

		Name	Acquisition Date	Acqu
<input type="checkbox"/>		DESIIS-HSI-20210824T181216-028	8/24/2021	18:16
<input type="checkbox"/>		DESIIS-HSI-20200624T184607-010	6/24/2020	
<input type="checkbox"/>		DESIIS-HSI-20210824T181216-027	8/24/2021	
<input type="checkbox"/>		DESIIS-HSI-20200612T233041-001	6/12/2020	
<input type="checkbox"/>		DESIIS-HSI-20200624T184607-009	6/24/2020	
<input type="checkbox"/>		DESIIS-HSI-20210824T181216-029	8/24/2021	
<input type="checkbox"/>		DESIIS-HSI-20200624T184607-012	6/24/2020	
<input type="checkbox"/>		DESIIS-HSI-20200624T184607-013	6/24/2020	
<input type="checkbox"/>		DESIIS-HSI-20200624T184607-011	6/24/2020	18:46

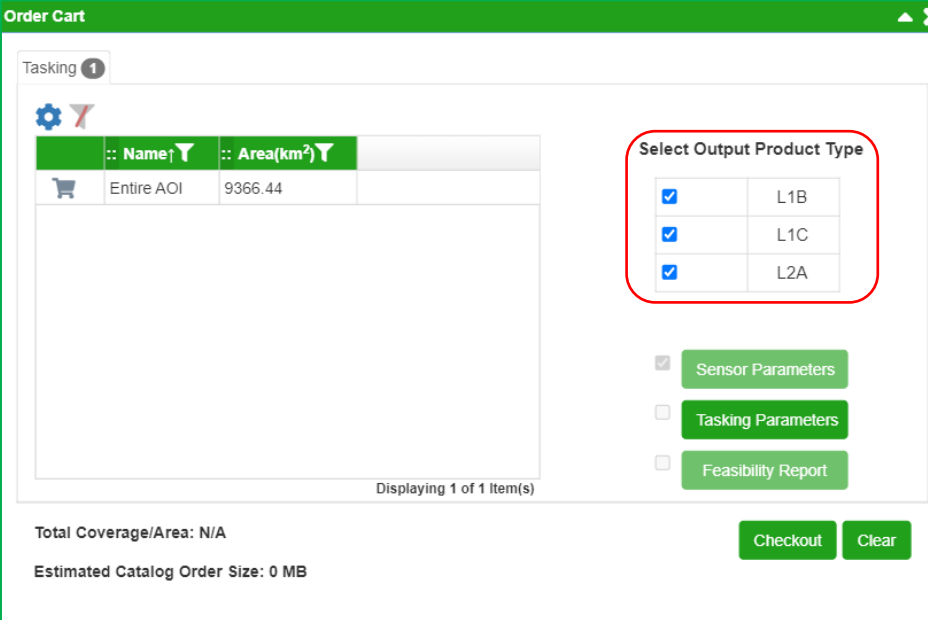
# TCloud Features and Enhancements

## ▶ Delivery of Data to an AWS Bucket

- Users have the option for ordered data be delivered directly to an AWS bucket.
  - Note: this does not apply to DLR users as established processes have all DLR ordered data delivered for access in EOWEB.
- A certain permission policy must be entered for that bucket to allow TCloud access then informing us of the bucket and folder (if applicable) name.
- Important to note that if this process is used the ability to download that data via the TCloud order history will no longer be available.
- Contact us for more information if interested in this process.

# TCloud Features and Enhancements

- ▶ **Multiple Output Product Selection for Tasking Requests**
  - Recent enhancement allows for the selection of multiple processing levels for tasked data delivery.



The screenshot displays the 'Order Cart' window with a 'Tasking' tab. A table lists the tasking item 'Entire AOI' with an area of 9366.44 km². To the right, a 'Select Output Product Type' section is highlighted with a red box, showing three checked options: L1B, L1C, and L2A. Below this, there are checkboxes for 'Sensor Parameters' (checked), 'Tasking Parameters' (unchecked), and 'Feasibility Report' (unchecked). At the bottom, there are 'Checkout' and 'Clear' buttons, and summary text: 'Total Coverage/Area: N/A' and 'Estimated Catalog Order Size: 0 MB'.

Name	Area(km <sup>2</sup> )
Entire AOI	9366.44

Displaying 1 of 1 Item(s)

Total Coverage/Area: N/A  
Estimated Catalog Order Size: 0 MB

## Contacts and Reference Information

- ▶ **TCloud Portal (requires an account but can browse the archive as guest)**
  - <https://teledyne.tcloudhost.com/>
- ▶ **TCloud Help Center (documentation and videos for TCloud use)**
  - <https://teledyne.tcloudhost.com/Help/catalog-tcloud!/ssl!/Catalog/#t=ESPUserDocumentation.htm>
- ▶ **TCloud Questions or Issues**
  - <https://teledyne.tcloudhost.com/help/contact>
- ▶ **TCloud or MUSES/DESIIS Operations Questions:**
  - Heath Lester – TBE Geospatial Payload Operations Manager
  - [Heath.lester@teledyne.com](mailto:Heath.lester@teledyne.com)
- ▶ **Teledyne Brown Engineering Geospatial Website**
  - <https://tbe.com/what-we-do/markets/geospatial-solutions>