

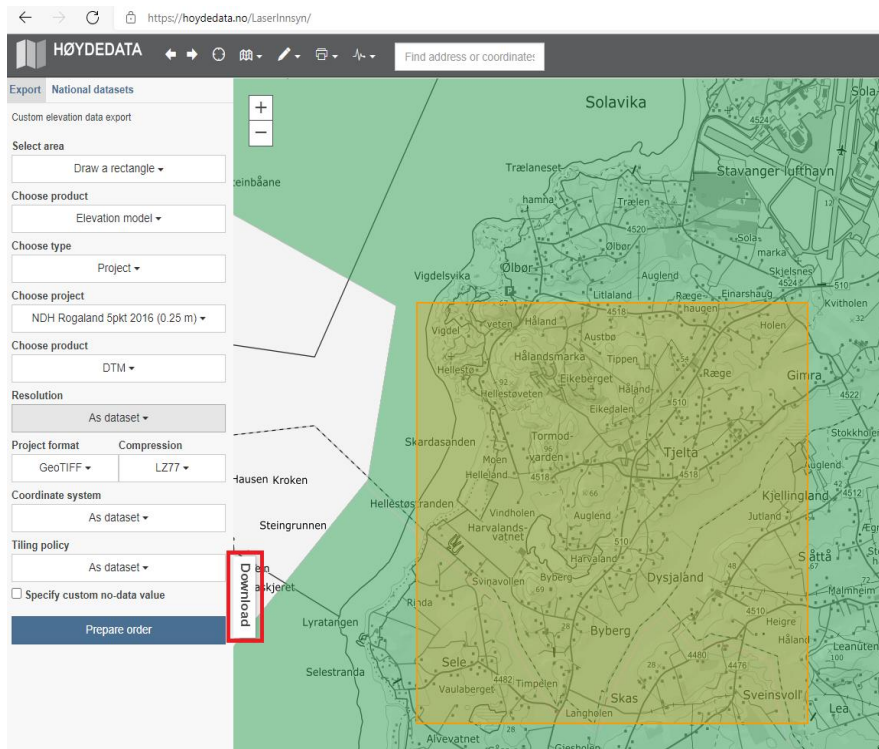
Norwegian LiDAR DTM Data – Acquiring and Setting Up Data in ArcGIS Pro

Step 1: Go to [Høydedata \(hoydedata.no\)](https://hoydedata.no) There is an option for English language.

Step 2: Click the download menu and select an area you want data from. There are several options for defining the area, and you can order either LiDAR point cloud data or DTM GeoTiff data.

By selecting data from a project instead of the standard 1m NHD DTM data, one can find better resolution DTMs available for the area. They vary in resolution. The data from a project might only cover parts of the area you have defined.

Select GeoTIFF for ArcGIS pro. When you place the order, add an e-mail address and reason for request. Once the order is placed, it might take a couple of hours before a mail arrives with a download link for the data.



Alternative Step – Processing LiDAR point cloud data:

If point cloud data has been requested, this data must be processed to create a DTM. This can be done in ArcGIS Pro. See the 15 min video below for a quick introduction for processing LiDAR point cloud data. For a DTM, one should use the last returns or those defined as ground returns. Each LiDAR point cloud dataset has a PDF describing the project data, including a map of the area covered.

The LAZ files that are provided need to be converted/extracted to LAS format first, using the **Convert LAS** toolbox in ArcGIS Pro. (Click the **Tool** button in the **Analysis** menu, and search for the toolbox.)

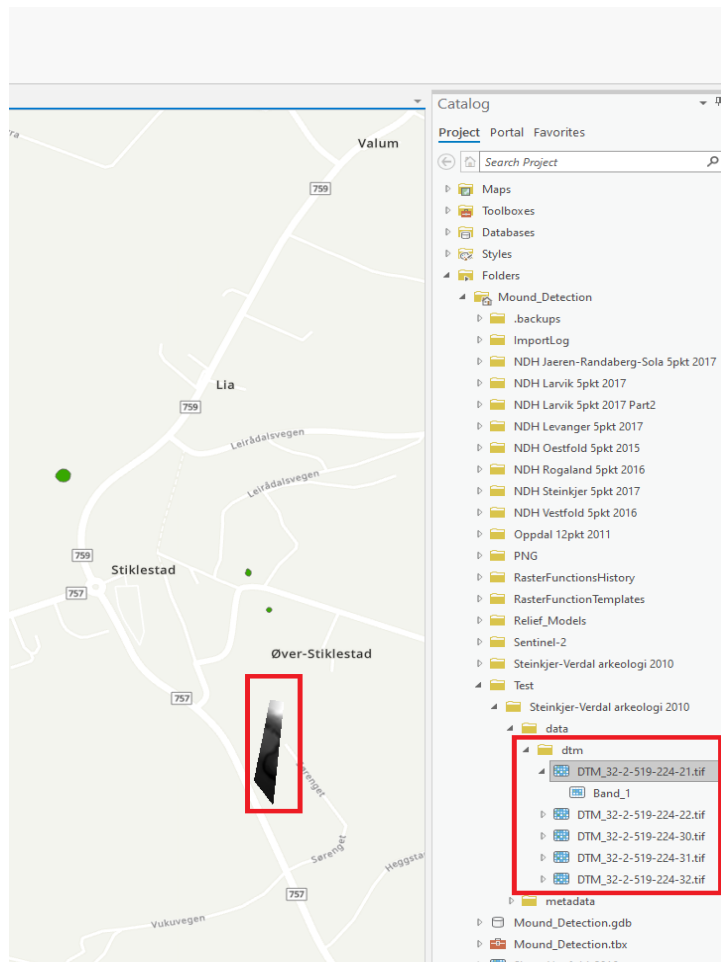
[Making a DEM from LiDAR point-cloud data in ArcMap - YouTube](#)

The screenshot displays a web browser window with the URL `opentopos.sdsu.edu/PointCloud/job?id=pc1492731771033`. The page title is "Point Cloud Job Report". Below the title, there are links: "Modify and resubmit this job" and "Full job metadata report" on the left, and "Download Job Metadata" and "View Job Configuration" on the right. A table lists job details:

Job id	Dataset	Title	Submission	Completion	Duration	Num points	Final Status
pc1492731771033	Sunset_Crater		2017-04-20 16:42:51	2017-04-20 16:43:02	11 secs	11,623,791	Done ✓

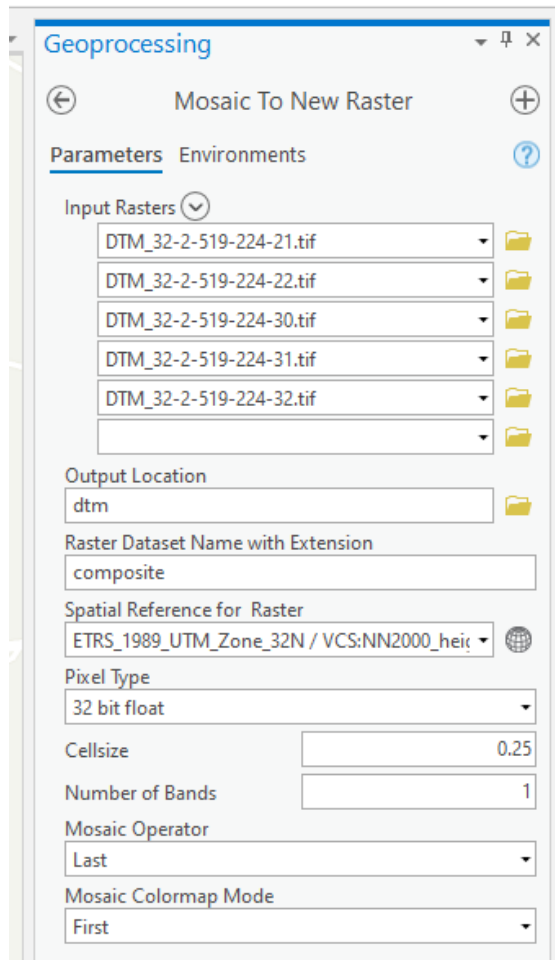
Below the table, the "Download Job Results" section shows a download link: "Download point cloud data in LAS format: points.laz (310.4 MB)". A small thumbnail image of a crater is visible in the center of the page. The browser's taskbar at the bottom shows various application icons and the system clock indicating 7:02 PM on 4/26/2017.

Step 3: Place the received DTM data in your ArcGIS Pro project. The DTM dataset received will likely have multiple pieces/GeoTIFFs. Drag one of the DTM pieces onto the map first, from the **Catalogue** pane. Then click the **Tool** button in the Analysis menu and search for the **Mosaic To New Raster** tool.

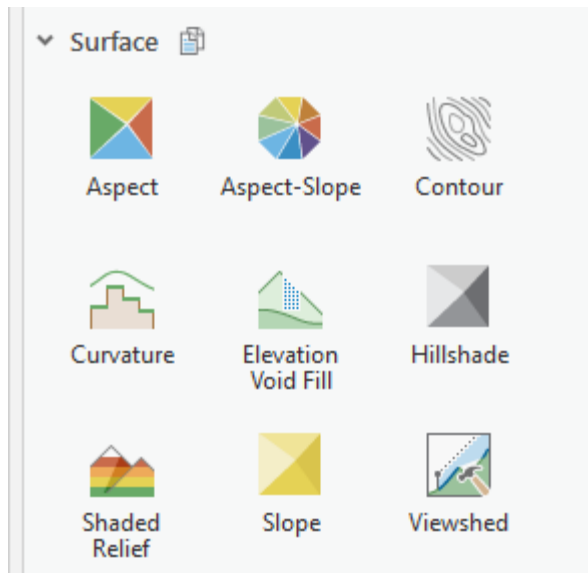


Select all the DTMs to be spliced together and select the spatial reference from the single DTM that was dragged onto the map. (This was done so it is available for selection in the menu. All DTM pieces of a dataset will have the same spatial reference.)

Type in the cell size of the DTM pieces. Look at the properties of a DTM piece to check what the value is for the dataset. The number of bands for the DTM pieces is 1. Click run to generate the new composite raster.



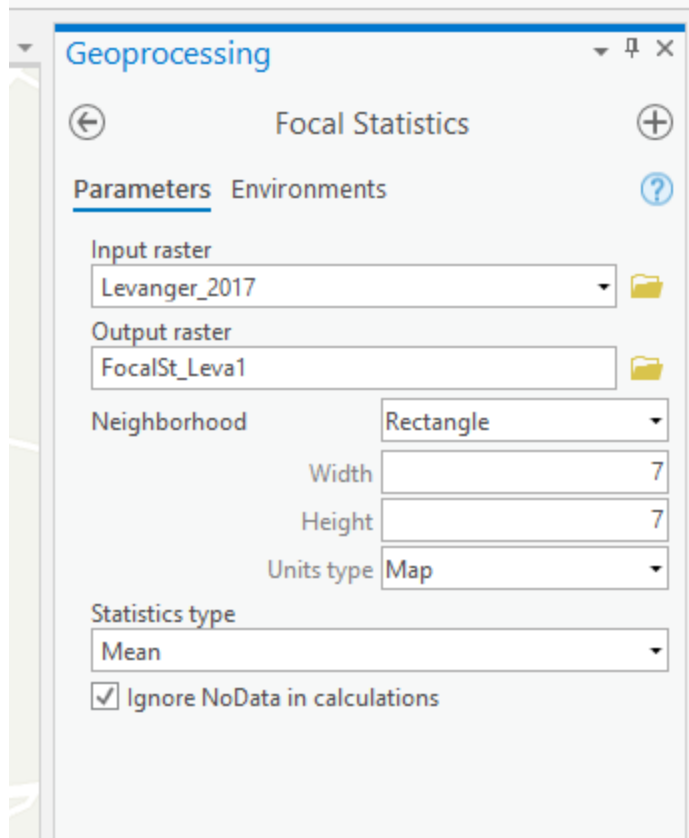
Step 4: The new raster will show up on the map, once generated. To display the raster in a way that is easy to view, click on the Raster Functions button in the **Imagery** menu. Go to the **Surface** options and select one of the functions to create a modified raster. Hillshade is one common way of visualizing the data, and Slope creates a raster which displays the slopes of the DTM data, in degrees for example.



Creating a Simplified Local Relief Model:

A simplified Local Relief model is created by smoothing values over a certain size window for the DTM raster layer, and then subtracting the original raster layer from this new layer.

First, find the **Focal Statistics** toolbox and select the input raster, select the area to average values over. You can select either pixels (Unit type = Cell) or in the units of the map. In the example below it is a 7m rectangular box. Also make sure to set the output coordinate system in the Environments tab. Select the input raster coordinate system.



Once the new raster layer is created go to the **Minus** toolbox, select the newly created smoothed layer as input and subtract the original raster DTM layer from this. The newly created layer will display height differences from the average values.

Askeladden Norwegian Cultural Heritage Database Import:

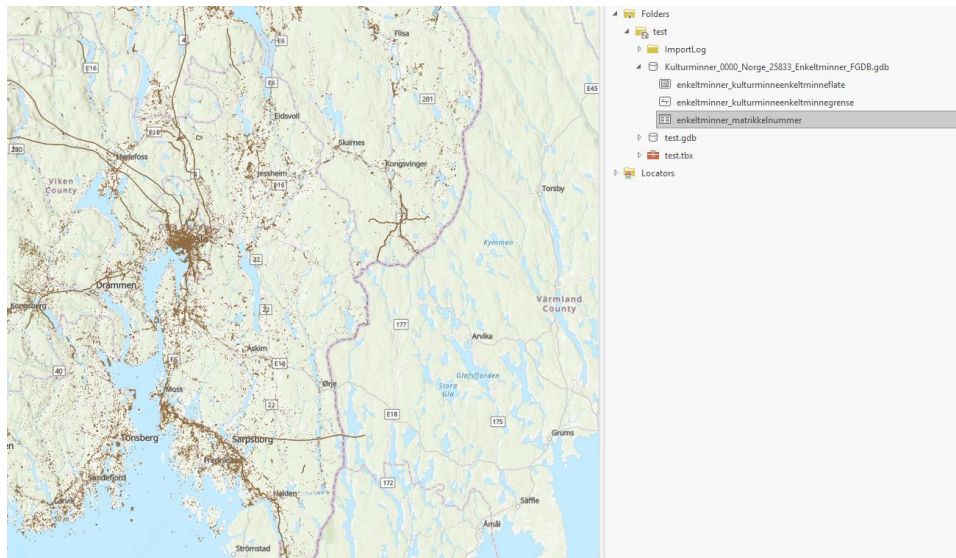
The Askeladden database is run by the Norwegian Directorate of Cultural Heritage (Riksantikvaren). This database is available for download in several formats:

[Kulturminner - Enkeltminner - Kartkatalogen \(geonorge.no\)](https://www.geonorge.no/kulturminner)

Download “Kulturminner - Enkeltminner” in FDBG format (Can try other formats, but FDBG process is shown below).

Place the FDBG folder in the ArcGIS Pro project. Drag the surfaces and boundaries onto the map. The surfaces are labeled “enkeltminner_kulturminnerenkeltminneflate” and the boundaries of these surfaces are labeled “enkeltminner_kulturminnerenkeltminnegrense”.

One should now see these surfaces and boundaries displayed on the map. The surfaces and boundaries contain all the registered cultural heritage.



To filter out the items one wants to view, do the following:

Right-click the surface data layer and go to **Selection**. Select all.

Open the attribute table and click the **Select by Attributes** button. Remove from the current selection everything that is not needed, as shown in the screenshot below. The “kulturminneEnkeltminneArt” attributes 1702 and 1703 are the two types of burial mounds. 1703 are mounds built just from rock (Gravrøys in Norwegian), while 1702 are mounds built from rock, peat and other material (Gravhaug in Norwegian).

Once the selection is filtered, click the **Layer from Selection** button, under the **Feature Layer -> Data** menu. A new layer with the selection will be created.

Information about each individual surface feature can be opened by clicking on that feature. It might contain notes about the mound, the date it was registered and other useful information. All the information is in Norwegian.

A complete list of types of heritage can be found in the database product specification PDF:

[Produktspesifikasjon Kulturminner - Enkeltminner \(geonorge.no\)](https://www.geonorge.no/produktspesifikasjon-kulturminner-enkeltminner)

