How to use the *UltraFine+® Next Gen Analytics* Digital Sample Observer (DSO)

What is the Digital Sample Observer?

The Digital Sample Observer (DSO) is an HTML-based prototype dashboard that allows the explorer to easily view and interrogate all available products within the Next Gen Analytics data package. You do not need to be connected to the internet and all analysed data and additional products derived from this data can be viewed at any time on one screen.

Where do I find my DSO?

You will find your DSOs in your *Data Package* under *2 Digital Sample Observer.* In this folder you will find an *overview* DSO which contains all three landscape models that were created for your site. This is important if you would like to pick your landscape model yourself (alternatively you can head to the readme.txt file in your data package to view our recommendation). You will also find a DSO specifically for each landscape model (*kmeans4*, *agg8* or *agg12*).

> **Tip:** The *readme.txt* file within your *Data Package* contains a recommendation on which model (kmeans4, agg8 or agg12) is the most appropriate for your soil survey – this recommendation also applies to your DSO

How do I use the DSO?

The DSO is designed to be intuitive to simply toggle all the data in your data package on and off. You can pan, zoom, and even draw on your viewing boxes. If your screen settings cut off the data toggles at the bottom of your screen, go to the *Settings* in your browser (three dots or press *Alt+F*), go to *Zoom* and reduce the zoom until all toggles display (the last toggle should be *Clusters: 100%*). You cannot alter the data within the DSO or break the DSO. If you get stuck for some reason or you have drawn to many boxes that would be tedious to delete, simply reload the DSO. As the DSO is a single html file containing all site data, it's responsiveness can be affected for very large areas with thousands of samples

How do I use the Navigation Pane?

Zoom – Draw a box over any feature in any viewing box to zoom in

Pan – Left-click your mouse and drag your view, all viewing boxes will move

Draw open freeform – draw on any viewing box, the drawing will remain regardless of the zoom

Erase active shape – click on a shape you wish to delete then click this icon to delete

Zoom in and zoom out

Reset views – this resets the zoom to the original, it does not affect data toggles

How do I use the Data Toggles?

You can use the data toggles on the right-hand side of the screen to turn data on and off. These will display in the landscape model, MrVBF and DEM viewing boxes. Note that the sample properties (PCA, pH, Texture, FTIR, NIR and Exploration Indices) all display in the MrVBF window and should be selected one at a time.

When do I use the Overview DSO?

You only need to use the Overview DSO if you are not sure yet which landscape model to use, or if you would like to see outliers for multiple different landscape models. If you already know which landscape model to use (e.g., from looking at the readme.txt file) you can skip this section.

The Overview DSO is separated into three rows. The first row (from left to right) shows the UMAP (reduced spatial feature layer) data in 2-dimensional space - the pixels are RGB coloured and the more similar the colour of pixels, the more similar the spatial feature properties for these pixels - and the resulting three landscape models with 4, 8 and 12 landscape classes. The middle row (from left to right) shows the UMAP (reduced spatial feature layer) data in 3-dimensional space, followed by surface geology, regolith geology and satellite imagery for comparison to the models. The bottom row (from left to right) shows the spatial feature layers (radiometric data, Sentinel-2 derived regolith band ratios, DEM and MrVBF) used to derive the landscape models. The data toggles are located on the right-hand-side and allow for viewing outliers by or independent of landscape type, as well as all other data products, in landscape context.
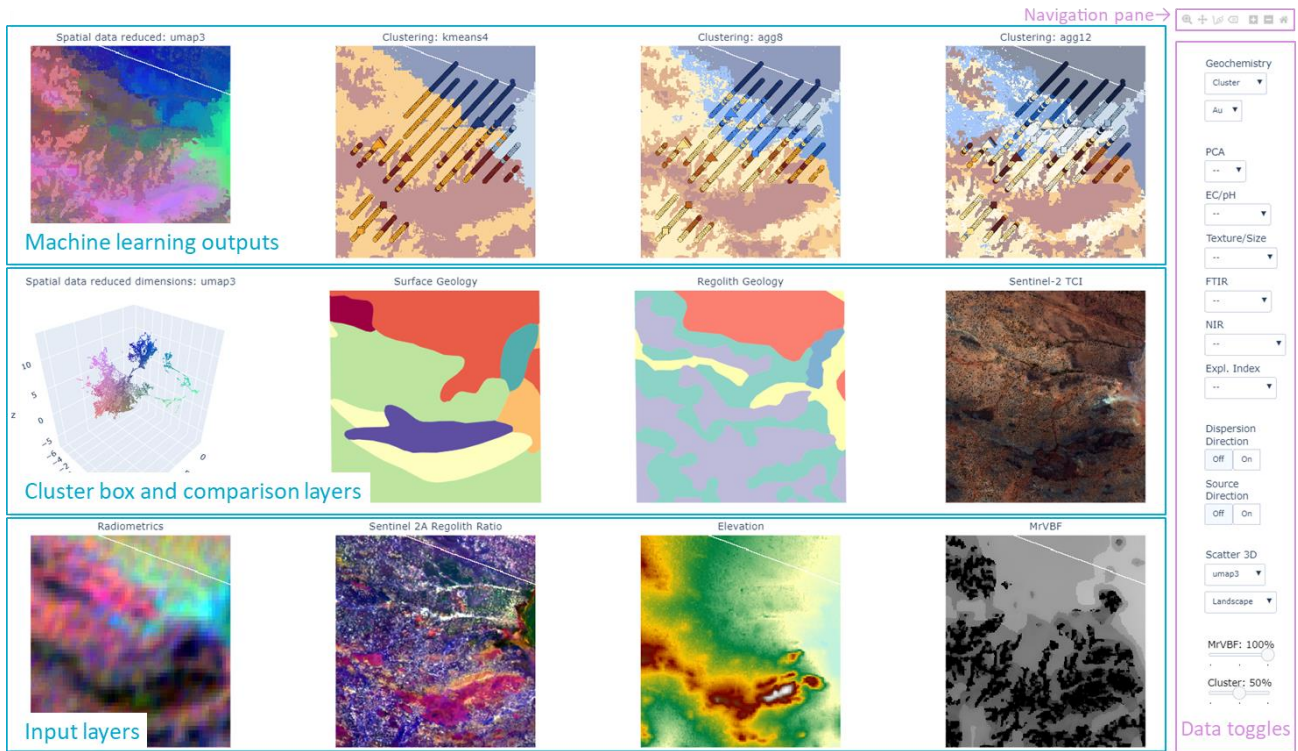
Figure 1: Screenshot of an Overview Digital Sample Observer. Note that coordinates have been removed and the landscape clusters (last three tiles in the top row) are set to 50% transparency and Au outliers by landscape type are displayed for each model.

When do I use the specific landscape model DSOs?

Once you know which landscape model to use for your project site (e.g., from looking at the readme.txt file) you can view all your data in the respective DSO.

Similar to the overview DSO, the specific landscape DSOs are also separated into three rows. The first row (from left to right) shows the UMAP (reduced spatial feature layer) data in 3-dimensional. This is followed by surface geology, regolith geology and the landscape clusters. The middle row (from left to right) shows the spatial feature layers (radiometric data, Sentinel-2 derived regolith band ratios, DEM and MrVBF) used to derive the landscape models. The bottom row shows additional spatial feature layers that may be useful during data interpretation but have not been used to derive the landscape cluster model. From left to right these are: Magnetics, gravity, weathering intensity and satellite imagery. The data toggles are located on the right-hand-side and allow for viewing outliers by or independent of landscape type, as well as all other data products, in landscape context.
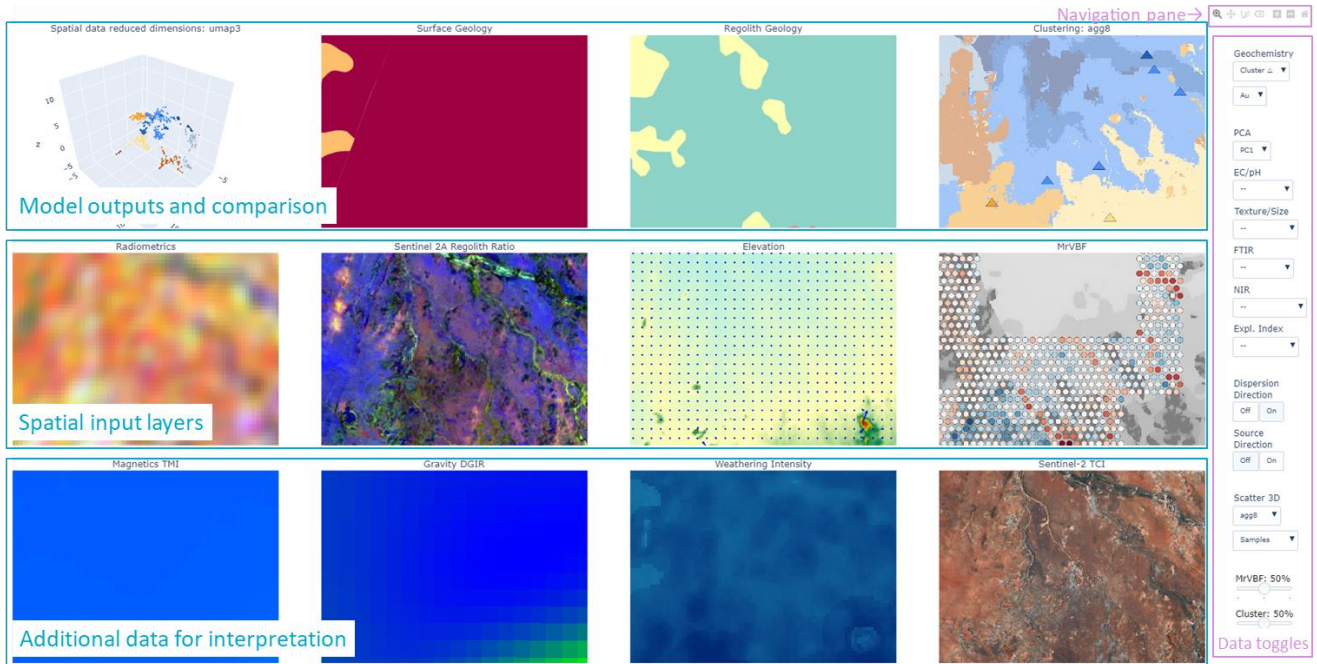
Figure 2: Screenshot of a Digital Sample Observer. Note that coordinates have been removed and the view is zoomed in. The scatter plot in the first tile of the first row is set to displays soil samples by landscape cluster colour, the landscape clusters and MrVBF (last tiles in the top and middle row) are set to 50% transparency, and Au outliers by landscape type are displayed over landscape clusters, principal component 1 is displayed over MrVBF and Dispersion Directions are displayed over the DEM (second last tile in the second row).