Tutorial

VISUALIZATION OF TERRA-i DETECTIONS

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Getting started

Before beginning, an online file of Terra-i detections must be downloaded. The following section explains which alternatives are often used to visualize Terra-i data in ArcGIS based on an example file.

Data: Cumulative Detections

File name: d_h10v08_all_2004-1_2004-353.asc.gz

1. Download the detection file named "d_h10v08_all_2004-1_2004-353.asc.gz" of the web site http://www.terra-i.org/es/terra-i/data.html /
2. Unzip the file ASCII

Terra-i data considerations

- The data are default WGS84 Geographical Projection. So, before conducting an a posteriori analysis (overlay or extract) using secondary data, the ASCII file must be defined in this projection.
- The data contain values that represent detections every 16 days. Values of (0)represent unchanged areas. Values range from 0 (no change) to 23 (last period of the year).

Visualization in ArcGIS v.9.x/10x

1. Add the file in ArcGIS

The visualization in ArcGIS can be done in two ways, either in *ArcMap* or in *ArcCatalog* . The latter allows a quick preview of the file by clicking on the *Preview* tab.

To add the files in *ArcMap* just click on the *AddData* button , and then browse for the folder where the file is stored (Figure 1).
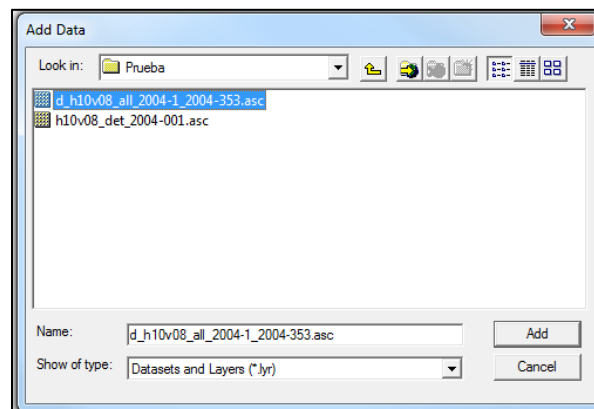

Figure 1. Browse data

2. Classify data

In the ArcMap table of contents, right-click on the file and go to *Properties*. This step displays different tabs with information about the elements. Select the tab *Symbology* (Figure 2). Here the data can be classified to achieve a more detailed analysis of the detections for the period(s) of time downloaded.
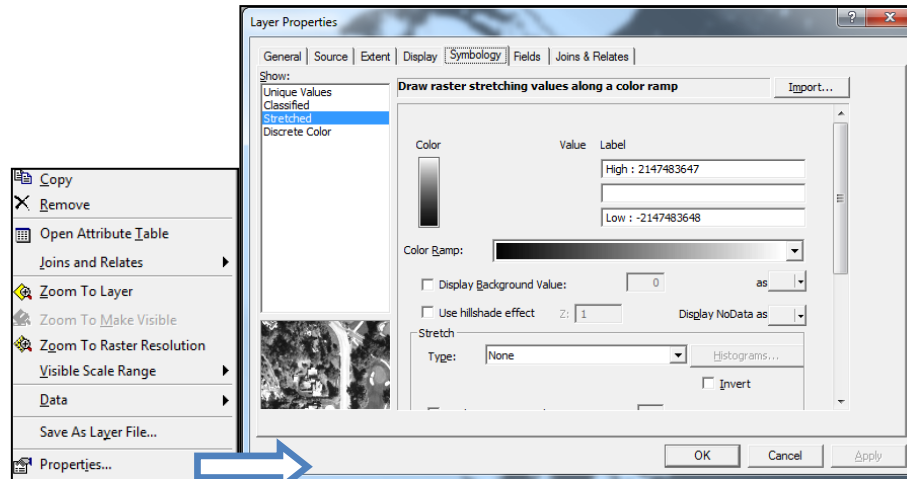
Figure 2. Layer properties

There are a variety of methods available in ArcGIS for classifying data that will be explained in the following section.

2.1 Categories - Unique values: The layer is classified with the values of a selected field. In this case, the field "Value" is selected, which contains the detection values in Julian dates. The complete list of values can be added by selecting the option "*Add All Values*". In addition, a range of colors can be selected using the "*Color Scheme*" button. For the example file (d_h10v08_all_2004-1_2004-353.asc), the values will be classified from Julian day 1 to 353 by periods of 16 days for the year 2004. If desired, NoData values (clouds, bodies of water, among others) can displayed by assigning a color to the "Display NoData as" option on the bottom right.
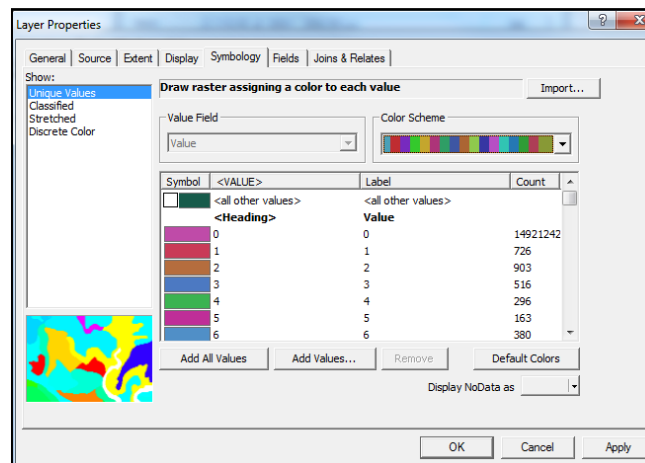

Figure 3. Unique Values

The data represent cumulative annual land cover change detection for the year 2004. A value of 0 means that the pixel remained unchanged while the other values represent the change detected in a pixel over a period of 16 days.
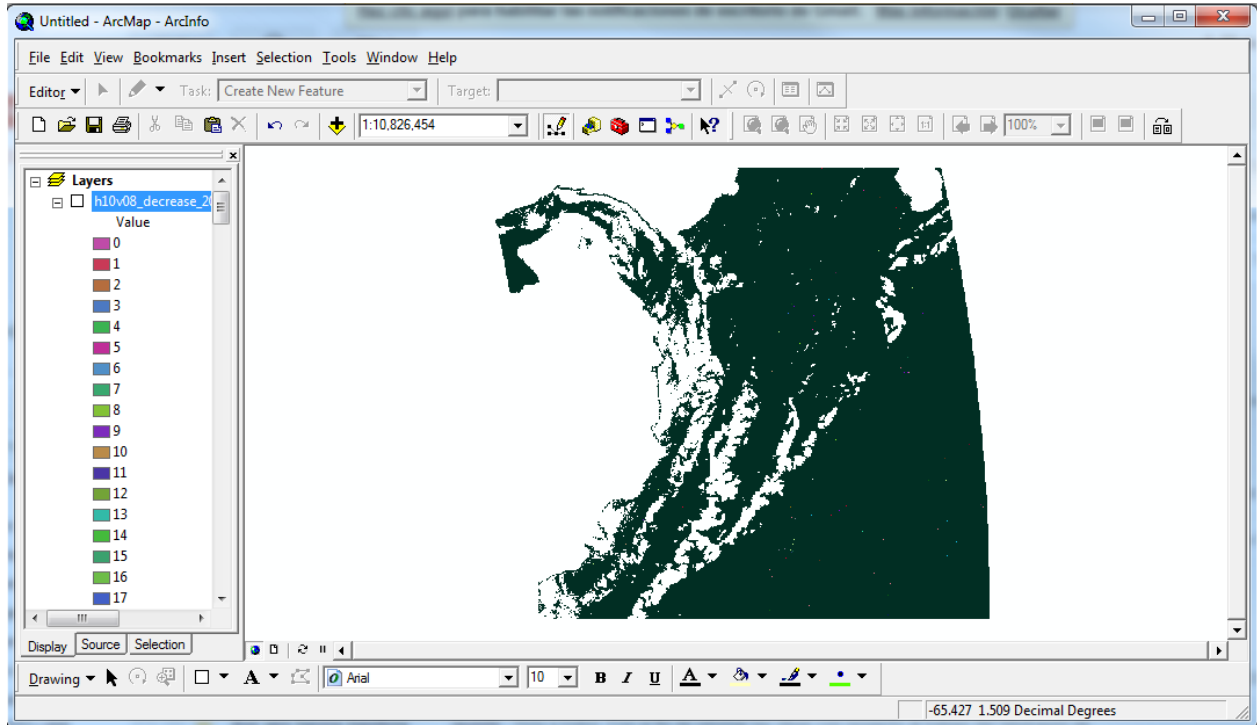
Figure 4. Results Categories - Unique Values

OPTIONAL: To distinguish the detections more clearly, a null value can be assigned to "0" data values. Click on the 0 value, then *Color Selector*. Go to the *Properties* tab and select *Color is null*, then hit *OK* (Figure 5).
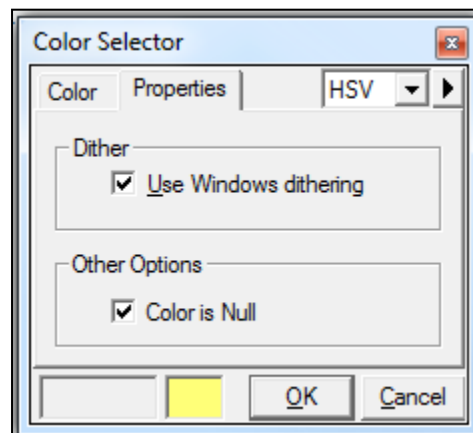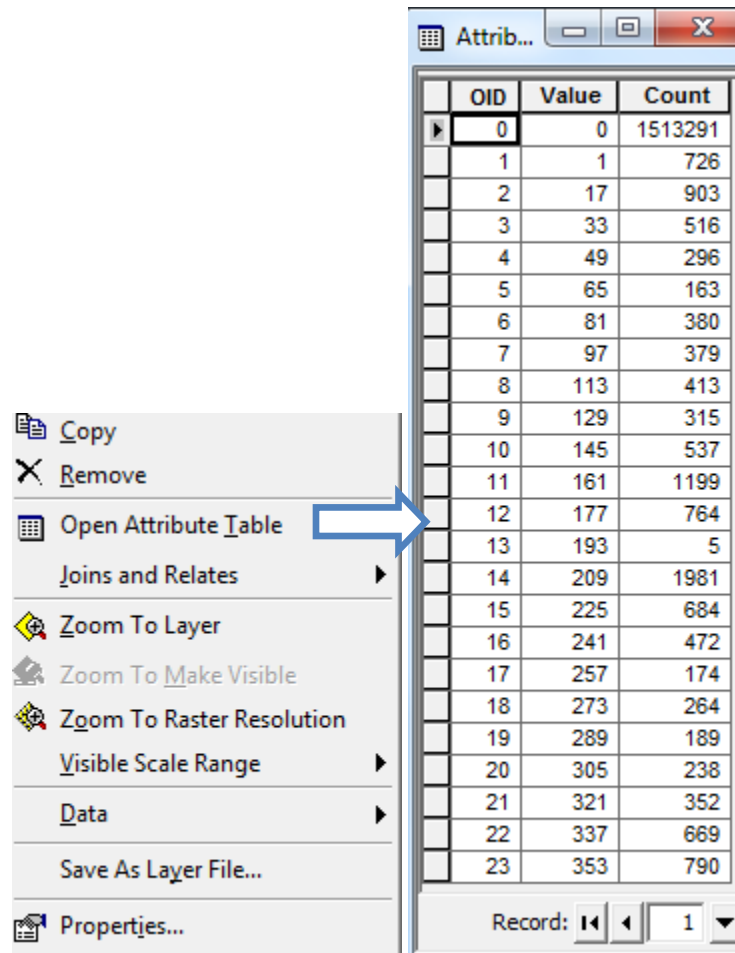

Figure 5. Color Selector

To explore in more detail the detection data, you can open the attribute table of the layer by right clicking on the layer, then clicking *Open Attribute Table* (Figure 6). The field "Value" indicates the Julian day (every 16 days) and "Count" indicates the number of detected pixels to date.

Figure 6. Attribute table

2.2 Quantities - Classified: This section describes how to set **classes** to classify data by different methods. The available classification methods are:

- Natural Breaks - identifies groups of values that are inherent in the data. This is the default method because it is appropriate for the majority of the data.
- Equal Interval - the interval between each class is the same.
- Quantile - each class contains an equal number of values (entities).
- Manual - every class has the range specified by the user. This method is useful to reflect specific data or criteria.

The *Classify* button allows data to be classified using any of these methods. A range of colors can be selected with the *Color Ramp* button.

In the following example (Figure 7 and 8), the data is classified by 4 classes using the Natural Breaks method.
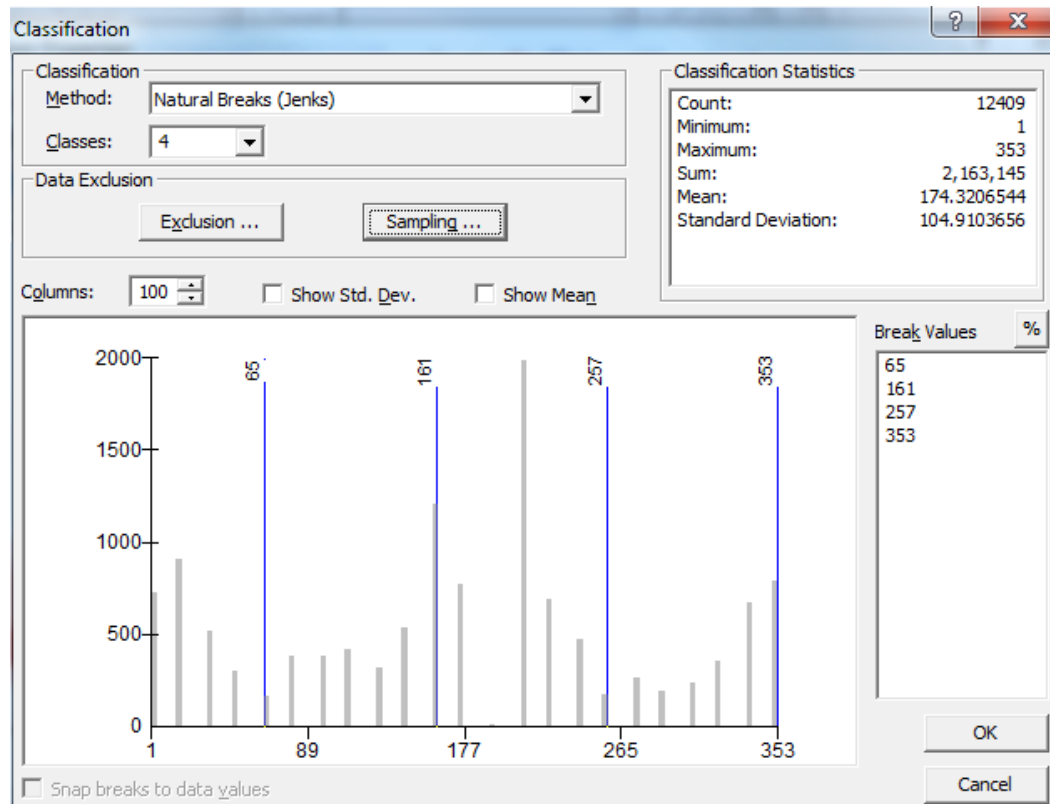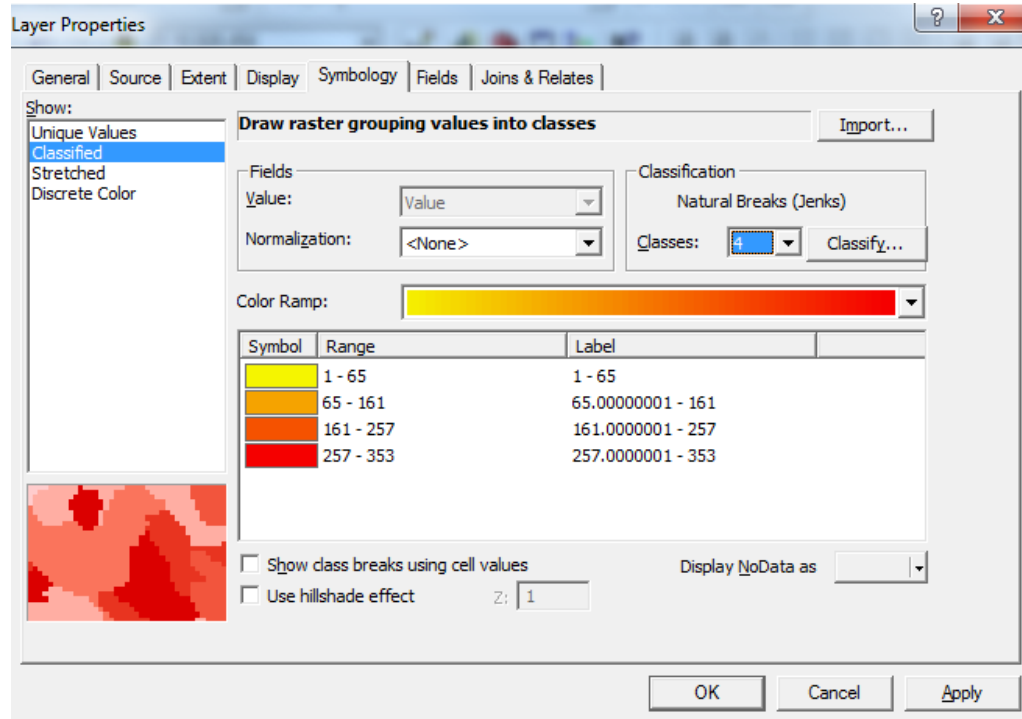
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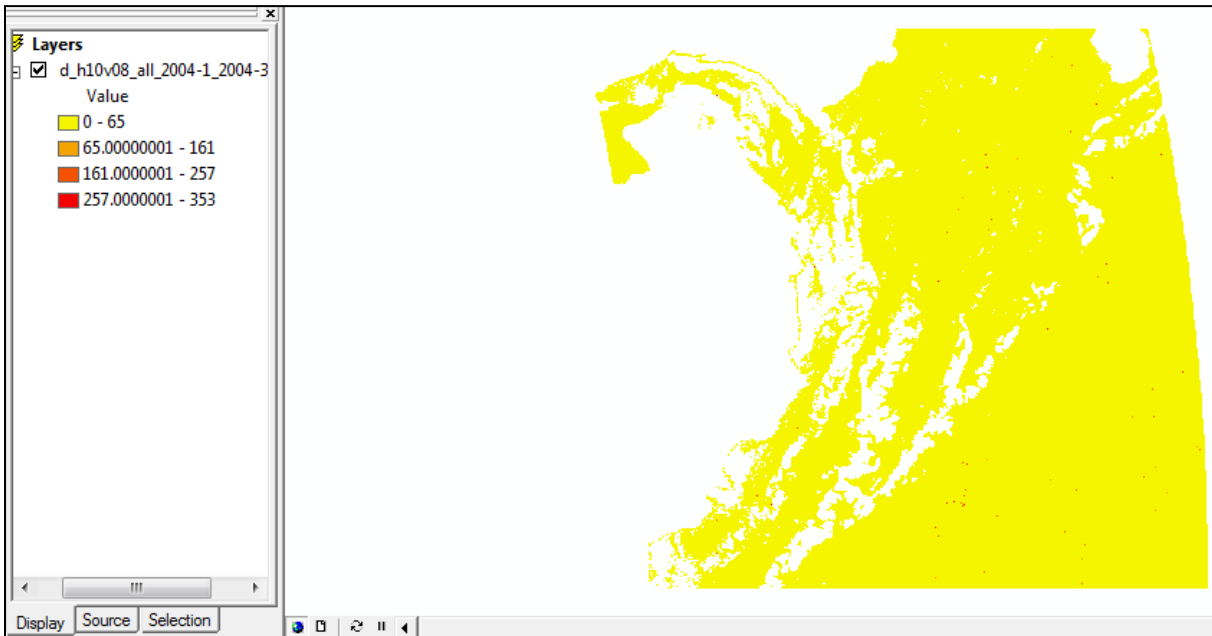**Figure 7.** Example 1: Natural Breaks Method

Figure 8. Result example 1

OPTIONAL: As seen in the results for Example1 (Figure 8), the legend labels contain many decimal places. The number format should be changed to limit the significant digits, thus leaving detection dates as integers. To change the number of decimal places shown, go to *Properties,* then *Symbology*, and click on the tab "*Label*". Choose *Format Labels,* then *Number Format, Numeric, Rounding, Number of significant digits* (Figure 9). In this case, the number of significant figures entered is "2".
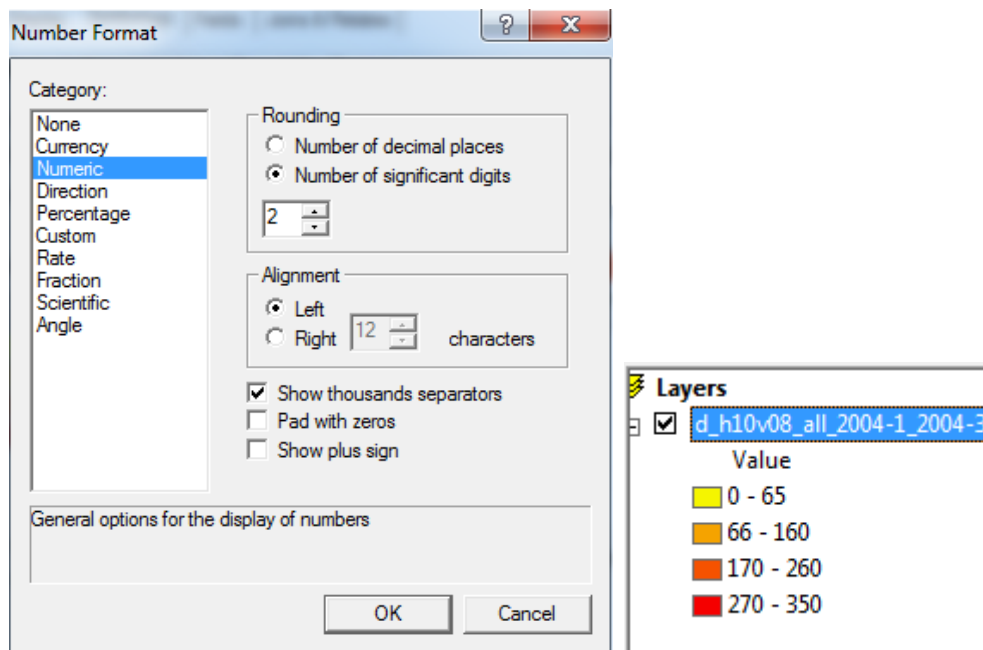

Figure 9. Number formatting and result of changing significant digits

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In the following example (Figure 10), the Manual method is used and the value 0 is excluded for the data classification. In the *Break Values* window, the values are arranged in 4 classes. These classes can be edited by the user according to his/her preference. For example, if only the detections for the last four months of the year (according to the Julian date) are to be displayed, the values 257 (September), 289 (October), 321 (November) and 353 (December) must be chosen manually by typing them in the *Break Values* box.
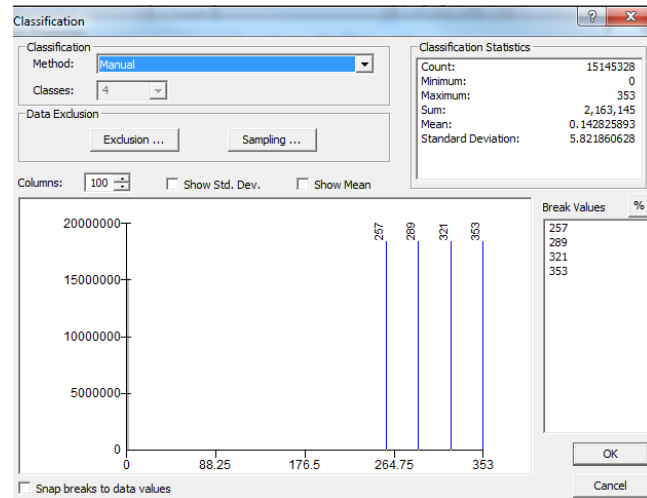

Figure 10. Example 2: Manual method

To define values that are to be excluded from the classification, click on the *Data exclusion* button and select *Exclusion*. For this case, the value "0" (indicating areas where Terra-i detected no change) is excluded (Figure 11). Moreover, the excluded value can be assigned a color to differentiate it from other values (in this case, where changes were detected by Terra-i) (Figure 12). To assign a color to the excluded value, within the same *Data Exclusion Properties* window select the tab *Legend,* then check the *show color for excluded data box* and choose the color.
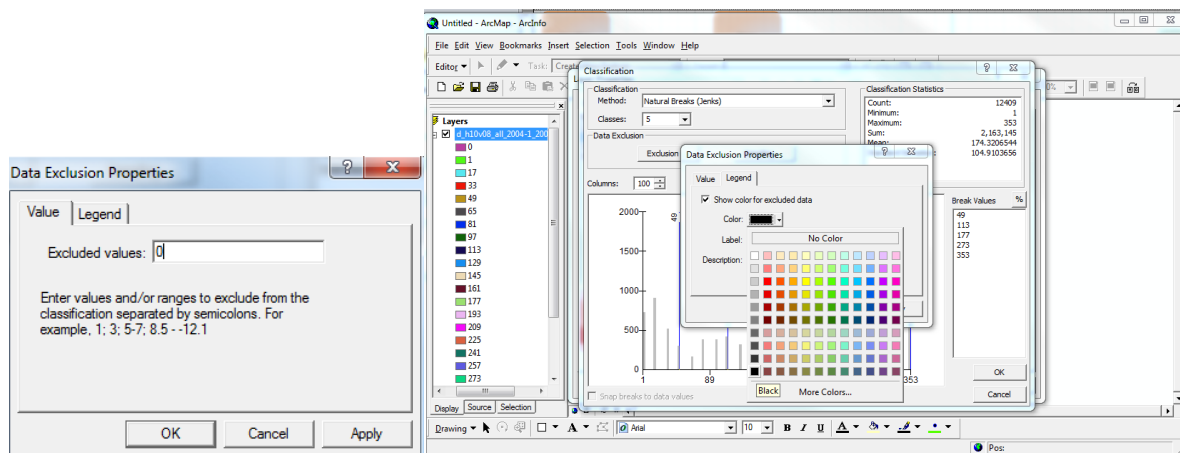

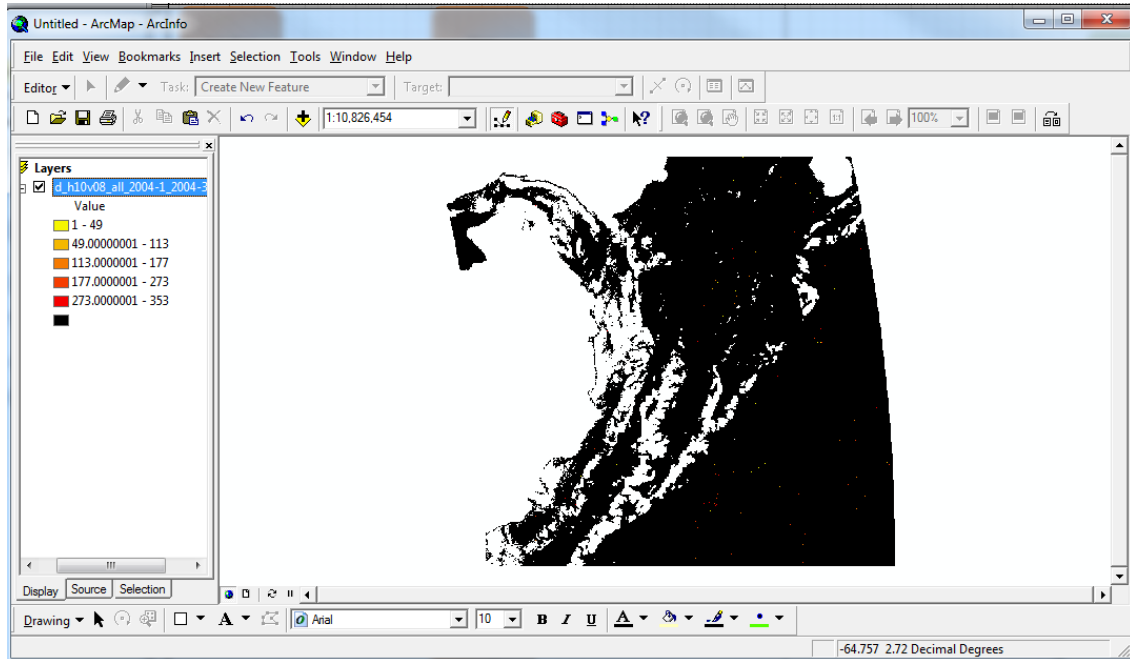**Figure 11.** Value exclusion of areas without change (0) and color assignment.

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Figure 12. Result of exclusion and color assignment of the value 0 (unchanged area).

Assignment of a system of reference (WGS84 by default)

Assigning a system of reference can be performed by two methods. The first method is to use the ArcToolbox. Otherwise, the *Data Frame Properties* of the layer must be edited.

For the first method, go to the ArcToolbox and select *Data Management Tools,* then *Projections and Transformations, Raster,* and *Define Projection* (Figure 12).
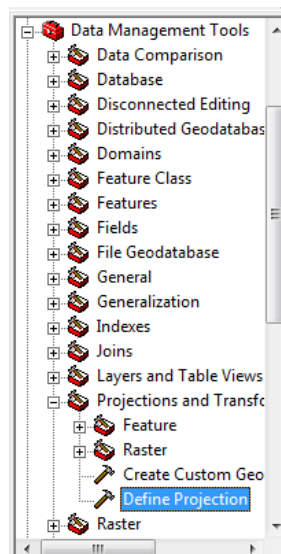

Figure 12. Define Projection Tool

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Define the following parameters:

- Input Dataset or Feature Class: select ASCII file.
- Coordinate System: Select to import or create the reference system.

The two folders (geographic and projected coordinate systems) are the different reference systems used to project regions. The user defines which reference system is to be used.

In this example the WGS84 geographic coordinates system is used, which it is the default projection used by the Terra-i data. Go to *Select* and choose *Geographic Coordinate Systems,* then *World-WGS 1984* (Figure 13).
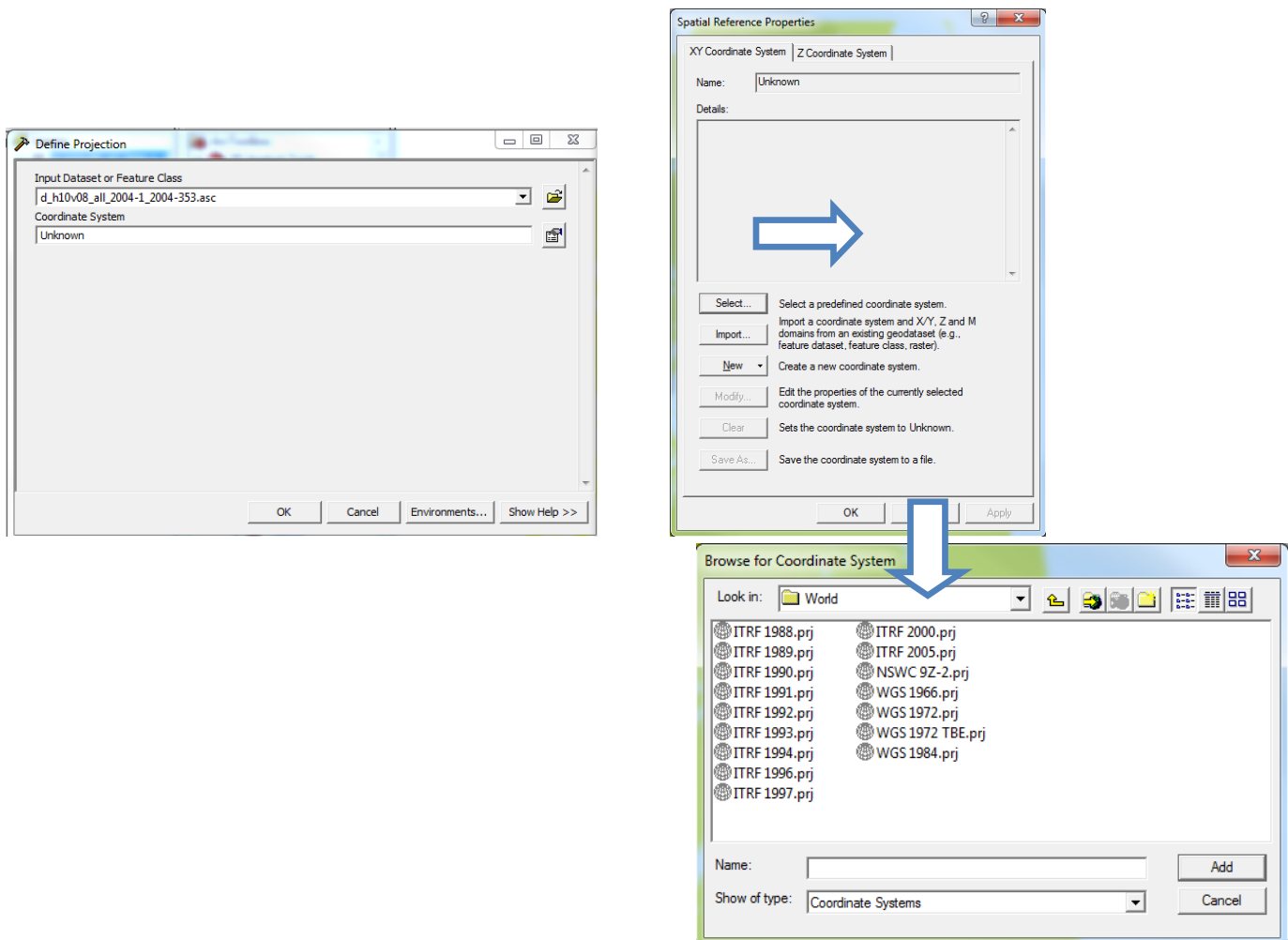

Figure 13. Assignment of a system of reference

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