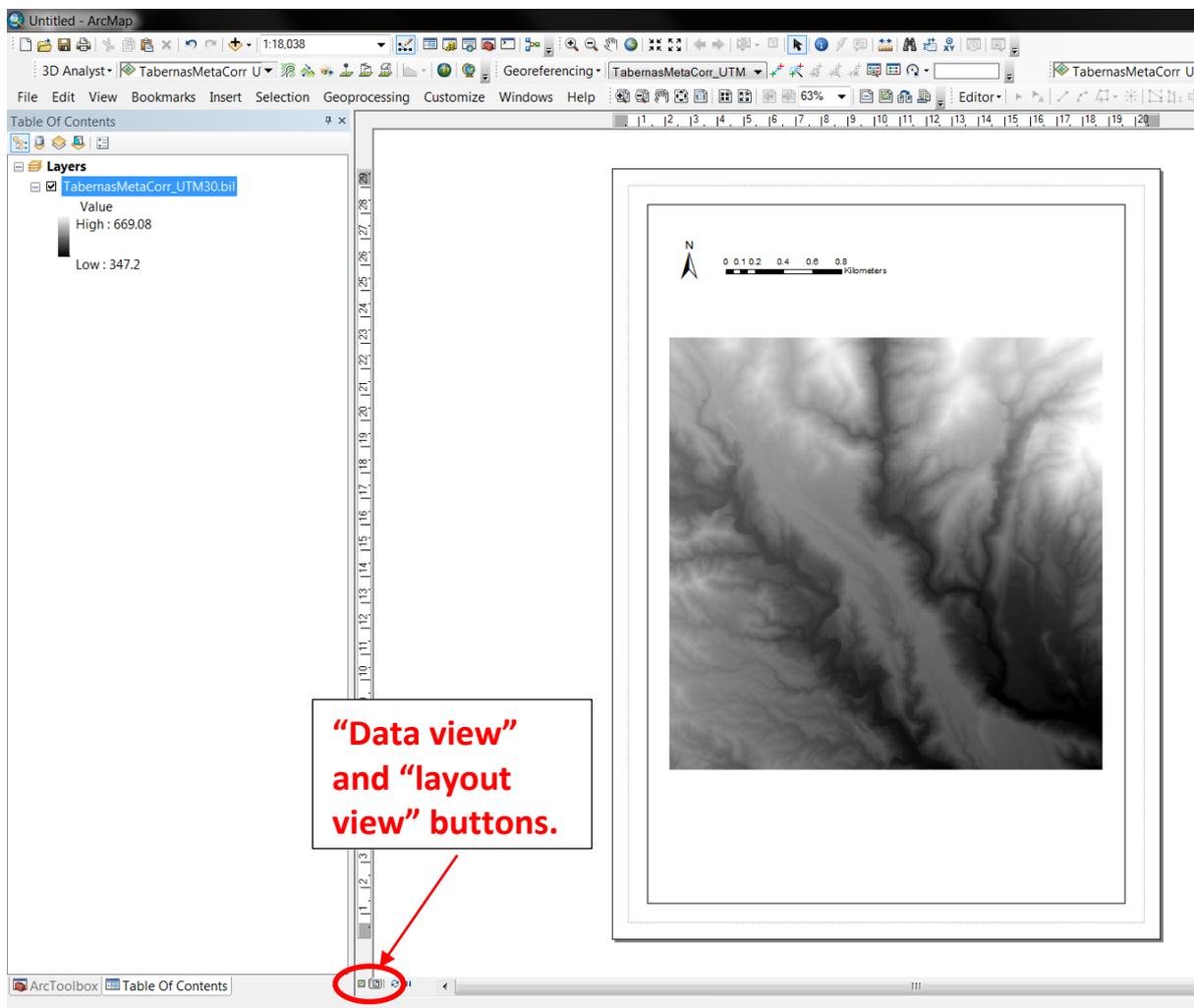


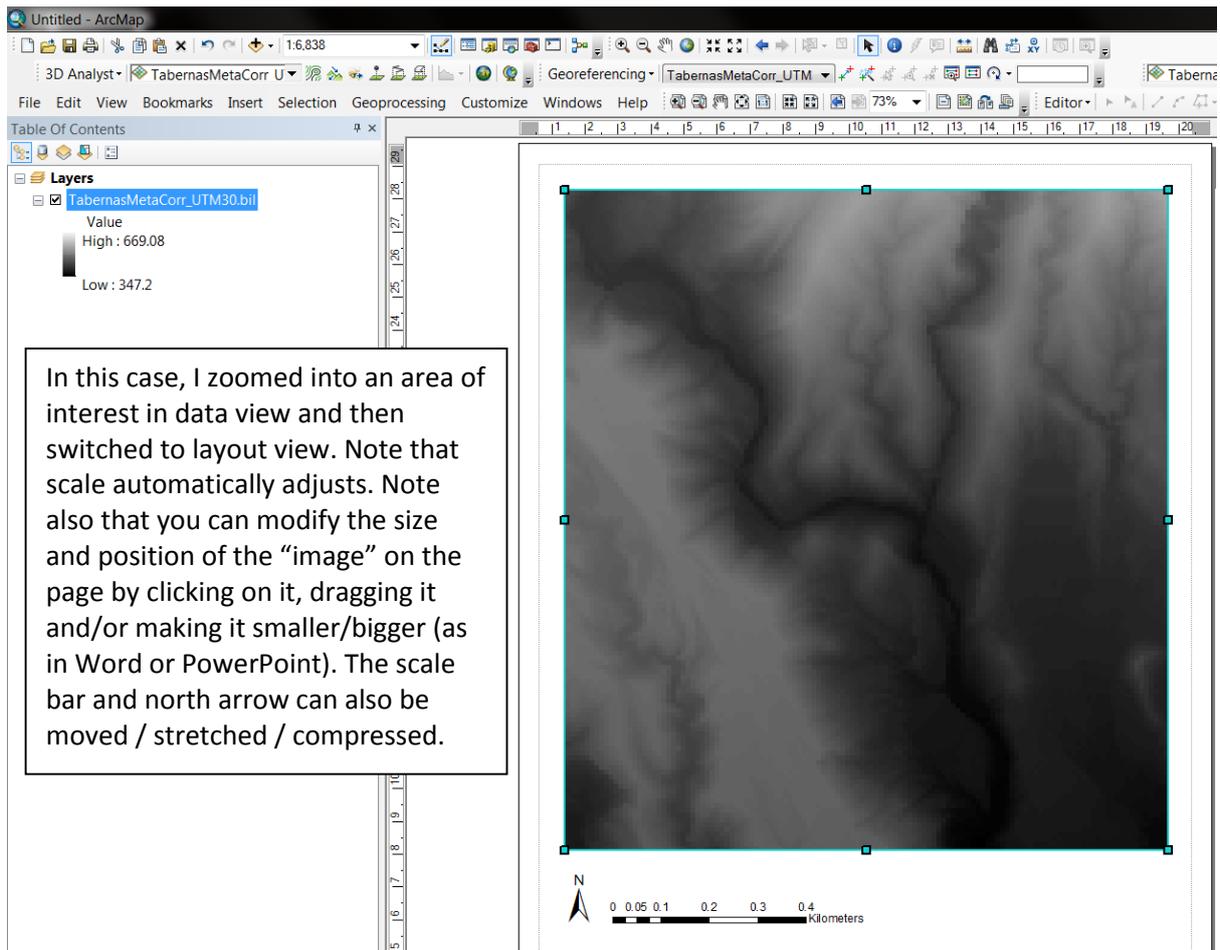
Preparing a base map (e.g., for geological mapping) with ArcMap

This tutorial explains how to create a base map using topographic data. I assume at that stage that you already have a digital elevation model (DEM) of the zone of interest. If not, look at the other handouts explaining how to obtain topographic data from SRTM, ASTER or Digimap. Make sure the coordinate system of your DEM is one that can easily be used with a GPS (because the coordinates that will be displayed on the base map are the ones the DEM is projected in)! I tend to privilege UTM, as I describe in the handouts explaining how to get topographic data.

Step 1: open ArcMap and add your DEM using the “add data” button. I focus your attention here on to two minuscule buttons at the bottom left of the display window (see below): “data view” and “layout view”. The **layout view** is the view of the document that will be printed; it can also be saved as pdf or jpg. In layout view, it is possible to add a scale bar (in miles or meters) and a north arrow, using the “Insert” menu at the top of the window (note that you can insert a scale text, e.g., “1 cm = 50 m”, but this is strongly discouraged as it will be wrong if you blow up your map later!)

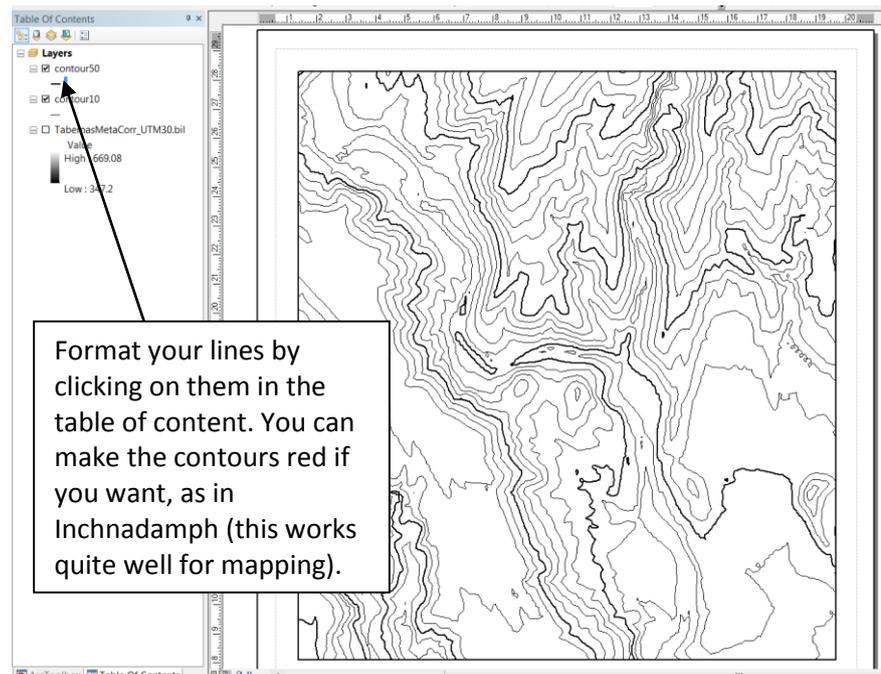


Note: the area fitting in the page in “layout view” is the area displayed in “data view”. If you want to focus on one part of the DEM, switch to data view, zoom to the zone of interest and switch back to layout view (see next page). This offers the opportunity of producing very easily base maps at different scales and/or of different areas within the DEM (the scale bar and labels are automatically updated when you move back to layout view).

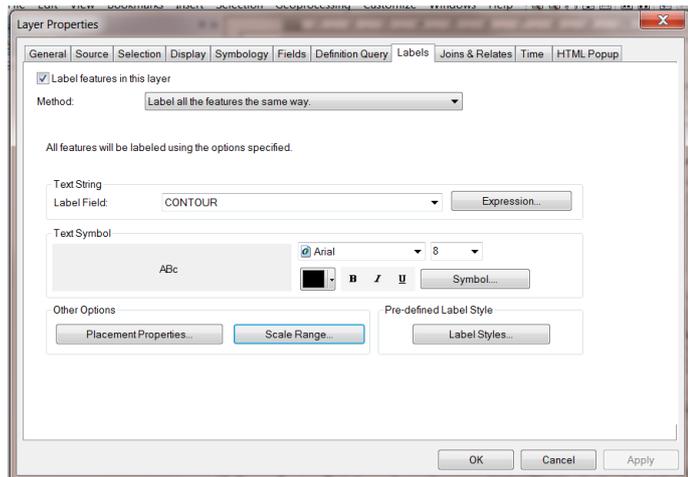


Step 2: creating topographic contours.

In this case, we will do it in two steps: we will create contours every 10 meters but want to have major contours every 50 meters with elevation displayed. In the Arc Toolbox, go to “Spatial Analyst Tools” → Surface → Contour. Use your DEM as the “input raster”, give a name to your output (click on the folder icon → go to your working folder and give a meaningful name, e.g., including “contour10”) and specify the contour interval (here 10 meters). The contours should appear on the map and you can modify the colour and thickness of the line in the table of content (click on the line under your newly created file). Now, repeat the procedure but with a contour interval of 50 meters. To the right, I have made the contours black, with the 50 m contours thicker:

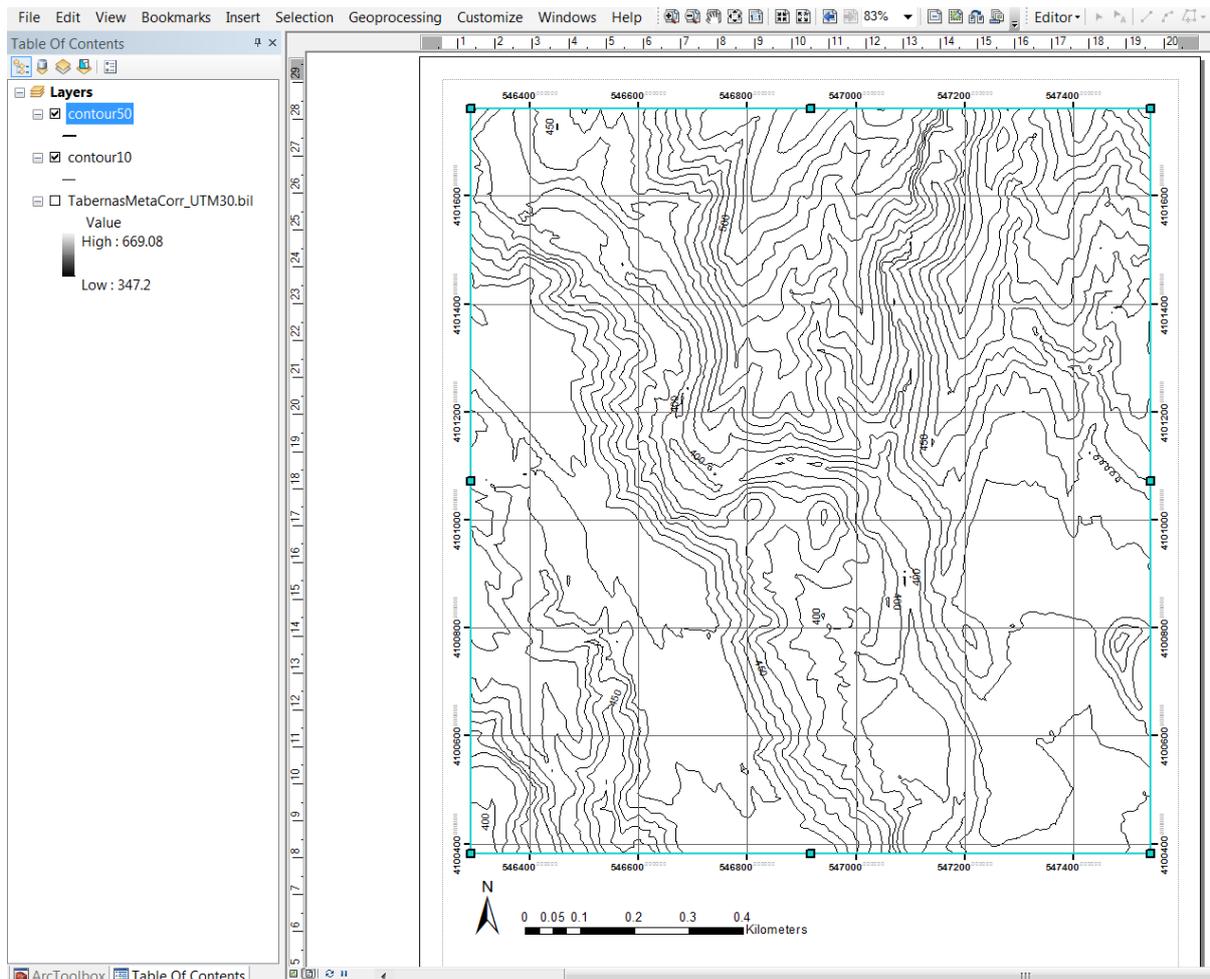


To add the elevation information to the contours, double-click on your “contour50” file in the table of content and go to the “labels” tab (see to the right). Tick “label features in this layer” and use the drop down menu in “text string – label field” to select “CONTOUR”. You can play with “placement properties” if you want to but the default setting is usually quite good. Click ok → the elevation should appear on every 50-m curve.

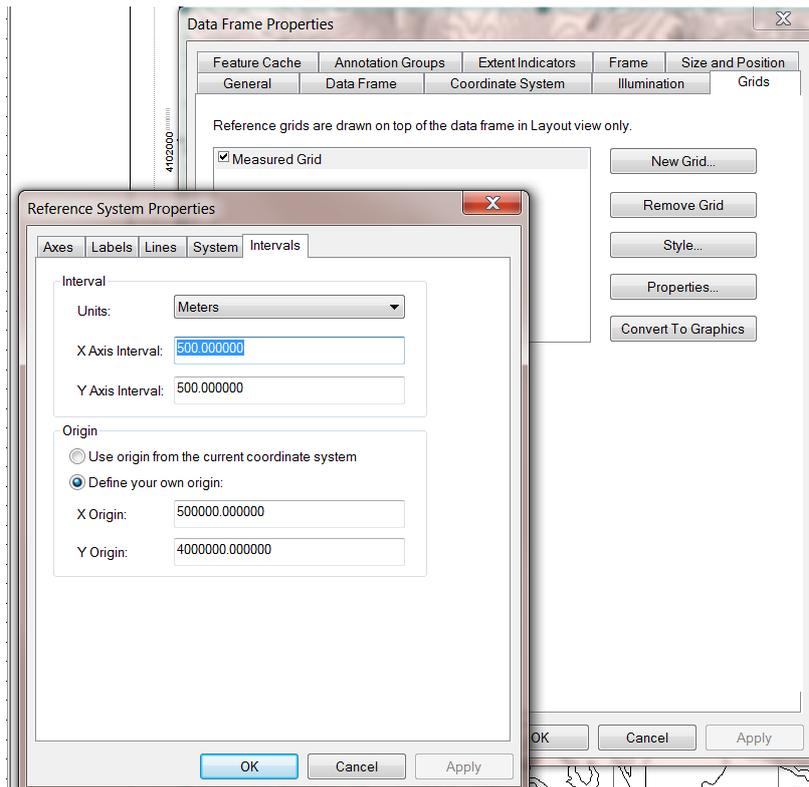


Step 3: adding grid references.

In the “View” menu, go to “Data Frame Properties”, go to the “Grids” tab and select “New Grid”. The Grids and Graticule Wizard will appear. Select “Measured Grid” and click next. On the following window, you can select the distance between the grid lines in “Intervals” (you don’t have to change the other default options), then click next. In the next windows, you can leave the default options which are mostly about display (but make sure the “Grid properties” are kept as “store as a fixed grid that updates with changes...” in the last one). Then click “Finish” and “OK”: your grid lines should appear (see below).

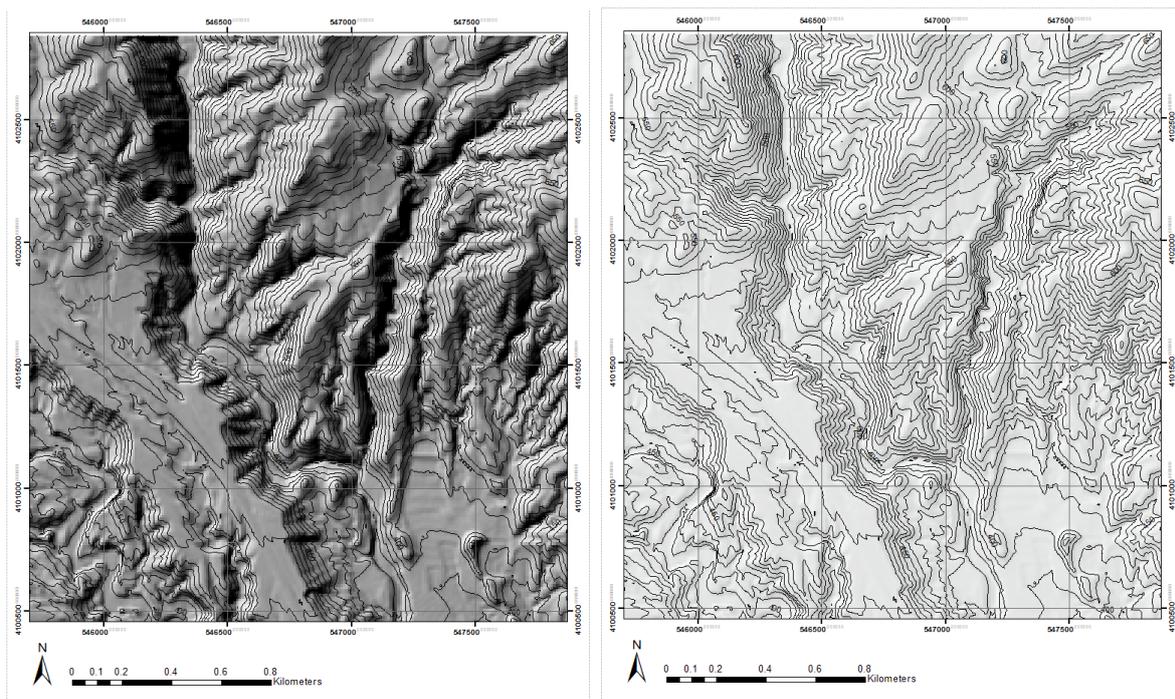


Note: you can go back to data view and move to a different area and/or zoom in and out. When you switch back to layout view, you should see the scale and grid updating automatically! If you want to change the spacing between grid lines, go back to the “View” menu → Data Frame Properties → “Grid” tab. If your grid is selected, you can go directly to “Properties” which will open a new window → go to the “Intervals” tab where you will be able to select a new interval (see to the right); on the same window, the “Lines” tab allows you to format the grid lines as well (click on the “Symbol” appearing and adjust colour, thickness, etc.)



Step 4: adding a background.

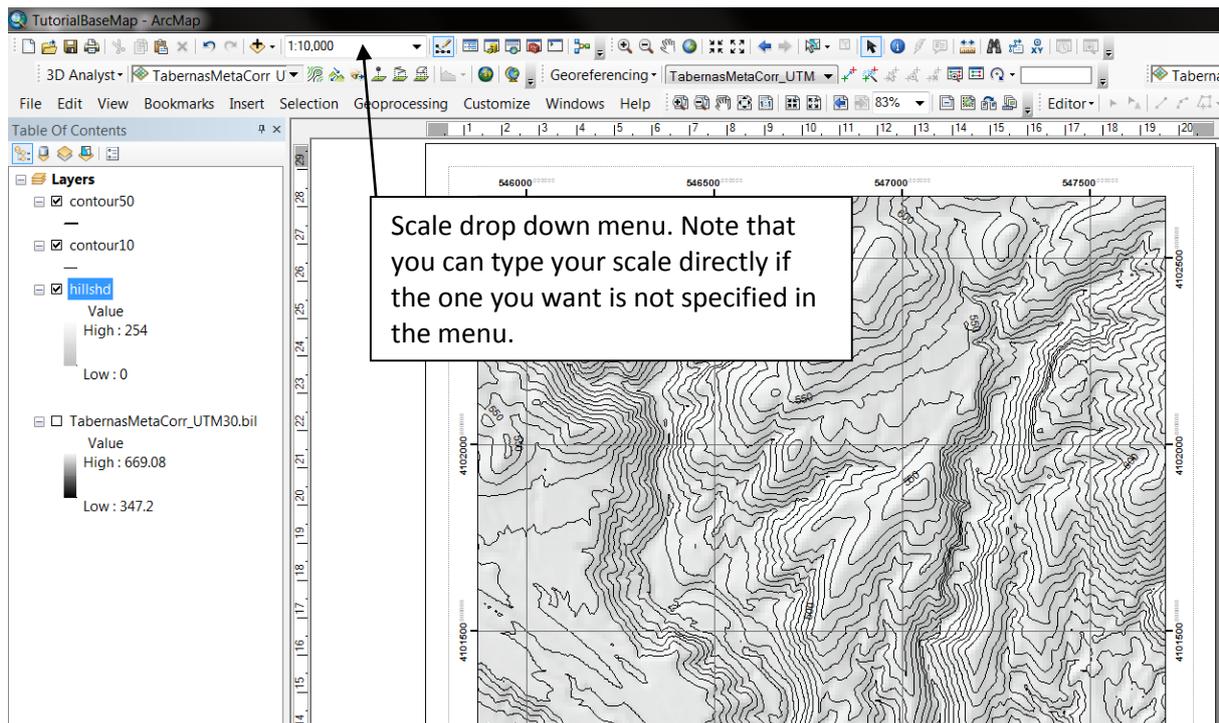
A background may be added to help identify features in the landscape. It could be a satellite or aerial image that you would have georeferenced for example (see georeferencing handout). It could also simply be the hillshade of the map. To produce the hillshade, use the Arc Toolbox → Spatial Analyst Tools → Surface → Hillshade. Use your DEM as your input file → the hillshade should appear (see below left). It would be relatively difficult to map on this hillshade so you can make it fainter: in the Table of Content, double click on the hillshade file, go to the “Display” tab and change the transparency, e.g., to 75 %. The new result is shown below to the right.



What I described here with the hillshade can also be done with aerial photographs or Google map images...

Step 5: Printing.

In theory the page you print should print exactly as it appears in layout view. Obviously, you want your printed map to have a convenient scale, e.g., 1 cm on the map is 100 m in the field (rather than 1 cm on the map is 136.58 m in the field). Note that at the top of the ArcMap window is a drop down menu that allows you to specify the scale (see below): if you specify 1:10,000, then 1 cm on the map should be 100 m in the field. I recommend printing one page as a test and checking before printing all your maps (printing settings are found in the “File” menu → “Page and Print Setup”). Make sure that scale is good, colours, thickness of contours and grid lines appropriate before carrying further!



You can also export your map as a pdf or jpg: go to “File” → “Export map” and specify the type of file and resolution (300 dpi is usually good enough for printing purposes). In theory, scale should be preserved in the pdf map so you can print directly your pdf page. Again, check to make sure it is the case!