Presenting regional depth and structure data (C06)

Top

This chapter shows how to synthesise INTREPID products in hard copy compositions. This can enable more effective interpretation of your geophysical data.

The interactive INTREPID Hard Copy Composition tool creates hard copy specifications in text files using our powerful MAPCOMP language.

You can edit or create MAPCOMP hard copy specifications using a text editor if you wish.

A collection of MAPCOMP templates or modules can make composing a new version of a product very simple.

This chapter contains

- General tips for creating hard copy compositions for interpretation.

This section includes instructions for creating hard copy compositions of linear low amplitude high frequency, such as strand line enhancement data.

- A substantial oil exploration case study, creating the Magnetic Interpretation Example poster, a hard copy composition that integrates data from four INTREPID interpretation tools.

Location of sample data for Cookbooks

Where ***install_path*** is the path of your INTREPID installation, the project directory for the *Cookbooks* sample data is ***install_path*****\sample_data\cookbooks**.

For example, if INTREPID is installed in
C:\Program Files\Intrepid\Intrepid4.5,
then you can find the sample data at
C:\Program Files\Intrepid\Intrepid4.5\sample_data\cookbooks

For information about installing or reinstalling the sample data, see "Sample data for the INTREPID Cookbooks" in Using INTREPID Cookbooks (R19).

For a description of INTREPID datasets, see Introduction to the INTREPID database (G20). For more detail, see INTREPID database, file and data structures (R05).

Tips for hard copy composition of INTREPID interpretation products

This section briefly lists the hard copy products available in INTREPID and suggests appropriate combinations for displaying the INTREPID interpretation data.

Basic hard copy products

Here is a basic list of the hard copy products available in INTREPID. The references listed under “Hard copy support” in INTREPID General Reference contains a detailed explanation of all of them. The worked example in Oil exploration interpretation case study in this chapter shows several of them in use. The description includes corresponding MAPCOMP block names (e.g., **SunAngle**).

Displaying grid data

- Pseudocolour and grey scale images (**PseudoColour** and **GreyScale**). You can distribute the available colours or shades evenly using a histogram stretch available in the Legend Editor.

- Sun angle images (**SunAngle**). You can vary the position of the sun as required. The sun angle effect slightly displaces data peaks. You need to be aware of this problem when exact location is important.
- RGB images (**FalseColour**) displaying a different Z field with each colour. These are mainly used with K U Th radiometric channels and Electromagnetic time consistency principal component amplitude data.
- Combination drapes (**Drape** and **TernaryDrape**). You can drape a sun angle or grey scale image with a pseudocolour or RGB image. You can reduce the colour saturation of pseudocolour images in **Drape** combinations.
- Contours (**Contour**). INTREPID has a powerful and versatile contour composition system. You can overlay contours on any of the other grid products.

Displaying line data

- Line plotting (**PathPlot**). INTREPID can plot line datasets with a variety of styles and annotations, coloured according to values in a Z field[1]. The special **bipole** line style shows Z values as coloured line segments perpendicular to the line.
- Line plotting with stack profile (**StackProfilePlot**). Stack profile plots show all data points along the line (as opposed to grids, which are interpolated products) as a continuous profile of the Z field values. Stack profile plots also have the standard line plot features.

Displaying point data

- Point plotting (**PointPlot**) INTREPID can plot point datasets with a variety of symbols and annotations. You can determine point marker colour, size and symbol shape according to Z field values. INTREPID has three special purpose symbol shapes, **dip**, **pointer** and **rectangle**, which we have designed specifically for interpretation work.

Other MAPCOMP features

INTREPID provides a full range of hard copy composition features, sufficient for full professional map composition and publication. See INTREPID Reference Manual volume 4 for details

Recommended hard copy combinations for INTREPID interpretation data

Single grid products

The following products are commonly gridded before use. We recommend that you use the hard copy products indicated.

- Analytic signal: use histogram-stretched grey scale.
- Complex amplitude: use sun angle.
- Instantaneous frequency: use histogram-stretched grey scale or pseudocolour.
- Phillips automatic depth: use contours or histogram-stretched pseudocolour.

1. A Z field contains measured quantities, such as TMI. The purpose of the survey is to acquire Z field values. Non-Z fields locate or calibrate the survey, such as the fiducial field or latitude and longitude.

Combination products

- Instantaneous frequency grid: Compose this grid in a **Drape** with a TMI grid.
- K, U and Th radiometric channel grids: Compose these in a **TernaryDrape** with TMI or Total Count as a sun angle image.
- Complex amplitude grid: Compose this grid in a **Drape** with a TMI image, one as a sun angle image and the other in pseudocolour with low saturation factor (pastel colours)[1]. You can also overlay the grid with depth estimation points such as a Naudy model point dataset.
- Analytic signal grid: Compose this grid as a histogram-stretched grey scale image. You can combine this with a pseudocolour TMI image in a **Drape** object. This data correlates well with a point plot of Euler solutions, since they have a common calculation path.

Illustrating linear low amplitude high frequency data (strand line enhancement)

See "Enhancing very shallow sources (strand line enhancement)" in Other useful interpretation techniques (C05) for instructions on calculating the strand line data.

We recommend that you compose this data as a **PathPlot** (standard line dataset plot) using the **bipole** style.

We supply a legend file for the **bipole** style, called **bipole.leg**, which resides in the **lut** directory (***install_path*\lut**).

Here is an example extract from a MAPCOMP module illustrating the use of the **bipole** style with a field called **strandline** containing the linear low amplitude high frequency data.)

(where ***install_path*** is the location of your INTREPID installation)

```
PathPlot Begin
   ...
   TraverseLine Begin
      ...
      Style = bipole
      Zdata Begin
         z = line_dataset/strandline
         Legend = install_path/lut/bipole.leg
      Zdata End
      ...
   TraverseLine End
   ...
PathPlot End
```

1. Colour saturation control is only available in a **Drape** object.

Oil exploration interpretation case study

The oil exploration dataset provided for the case study we shall call **northsea**. We provide it with the *Cookbook* by courtesy of one of our users. We have modified its location to maintain commercial confidentiality.

This case study explains how we obtained data for interpretation using the INTREPID interpretation tools, then combined it for display in the Magnetic Interpretation Example poster. It gives some tips about performing similar processes with your data. (When you are ready to process your own data for production rather than experimental purposes, we can provide further assistance.)

The worked example

The worked example here explains the structure of **northsea_depth.map**, the MAPCOMP hard copy specification file that generates the Magnetic Interpretation Example poster. It shows how the **.map** file is composed of **Begin – End** blocks, which you can easily and quickly manipulate using a text editor. It also shows how to view the composition using the Hard Copy Composition tool.

After following this worked example, you should be able to

- View the composition using the INTREPID Hard Copy Composition tool.
- Print a copy of the Magnetic Interpretation Example poster. (You require an A1 printer for this.)
- Experiment with obtaining interpretation products from your own data. (Data often requires some conditioning before hard copy composition. Please contact our technical support service for assistance if required.)

Location of sample data for Cookbooks

Where ***install_path*** is the path of your INTREPID installation, the project directory for the *Cookbooks* sample data is ***install_path*\sample_data\cookbooks**.

For example, if INTREPID is installed in
C:\Program Files\Intrepid\Intrepid4.5,
then you can find the sample data at
C:\Program Files\Intrepid\Intrepid4.5\sample_data\cookbooks

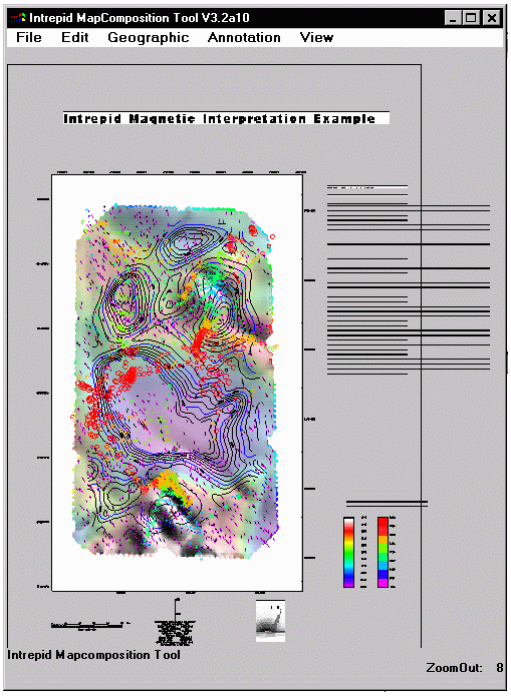
For information about installing or reinstalling the sample data, see "Sample data for the INTREPID Cookbooks" in Using INTREPID Cookbooks (R19).

For a description of INTREPID datasets, see Introduction to the INTREPID database (G20). For more detail, see INTREPID database, file and data structures (R05).

Viewing the poster with Hard Copy Composition tool

1. Go to the directory containing the Oil Interpretation datasets. This is normally ***install_path*\cookbooks\interp_oil**. Start INTREPID Hard Copy Composition, using **Compose Hardcopy** from the **Printing** menu of the INTREPID Project Manager, or the command **mapcomp.exe**.
2. Increase the Hard Copy Composition tool window size.
3. Set the scale (zoom level) to 8:1 using the **Scale** from the **View** menu.

4 Load the poster file **`northsea_depth.map`** using **Load** for the **File** menu.



5 If you have an A1 printer, you can print the composition. Choose **Print** from the **File** menu. See Map composition (G17) for simple instructions about printing, and Map printing (T46) for details.

Interactive Hard Copy Composition and MAPCOMP language

The interactive Hard Copy Composition tool creates and edits **`.map`** files. The **`.map`** files are text files containing MAPCOMP language **`Begin – End`** blocks. The MAPCOMP hard copy language is powerful yet straightforward.

The references listed under "Hard copy support" in INTREPID General Reference contains a full description of both the MAPCOMP language and the interactive Hard Copy Composition and printing system. Alternately refer to Volume 4 if you are still using the bound manuals.

You can create your own hard copy compositions using a combination of the following:

- The powerful interactive INTREPID Hard Copy Composition tool,
- A text editor,
- The sample hard copy specification (**`.map`**) files we have supplied with this worked example in the **`cookbooks/interp_oil`** directory and the further examples in the INTREPID **`examples\maps`** directory (e.g., **`d:\intrepid\examples\maps`**),

Summary of files provided with the Magnetic Interpretation Example poster

The data we have provided with the poster belongs in
***install_path*\cookbooks\interp_oil**
(for example, **d:\intrepid\sample_data\cookbooks\interp_oil**).

It includes

- The master hard copy specification **.map** file **northsea_depth.map**, from which INTREPID can produce the Magnetic Interpretation Example poster.
- A **.map** file for each set of interpretation data, from which INTREPID can produce a version of the poster showing only that product. For example, **euler_ns.map** will produce the poster showing only the Euler solution circle symbols, including the symbol colour legend.
- MAPCOMP modules (**.map** files), each describing a single object from the poster. We include these for use as learning templates and building blocks. You can
  - Combine the modules to make your own subset versions of the poster;
  - Use the modules as templates for including similar data in your own hard copy compositions.
- Legend files, which associate data values with attributes of objects in the composition, such as colour or size.
- The original **northsea** line dataset under investigation in this worked example.
- Grid and point datasets containing interpretation products from INTREPID tools. All of these originate from he TMI field **mag_fin** in the **northsea** dataset.

The following table contains details of the worked example files and datasets, including the components required by each hard copy specification (**.map**) file.

Name	Purpose	Requires
Hard copy composition (.map) files		
northsea_depth.map	full poster specification	Embedded **.map** files **title.map** **description.map** **legend_labels.map** Legend files **tmi_ns_colour.leg** **depth_colour.leg** **naudy_dip_size.leg** **euler_circle_size.leg** **naudy_pointer_size.leg** Grid datasets **tmi_ns** **hilbert_c_amp_ns** **phillips_ns** Point datasets **naudy_ns** **euler_ns**
tmi_ca_ns.map	Poster with TMI and complex amplitude grids only	**title.map** **description_tmi_ca.map** **legend_labels_grid.map** **tmi_ns_colour.leg** Grid datasets **tmi_ns** **hilbert_c_amp_ns**
phillips_ns.map	Poster with Phillips grid contours only	**title.map** **description_phillips.map** **legend_labels_grid.map** **phillips_ns** grid dataset
naudy_ns.map	Poster with Naudy solutions only	**title.map** **description_naudy.map** **legend_labels_pnt.map** **depth_colour.leg** **naudy_dip_size.leg** **naudy_pointer_size.leg** **naudy_ns** point dataset

Name	Purpose	Requires
euler_ns.map	Poster with Euler solutions only	**title.map** **description_euler.map** **legend_labels_pnt.map** **depth_colour.leg** **euler_circle_size.leg** **euler_ns** point dataset
northsea_shell.map **tmi_ca_mod.map** **phillips_mod.map** **naudy_mod.map** **euler_mod.map** **pnt_leg.mod.map** **tmi_ca_leg.mod.map** **colour_symbol_leg_mod.map**	Copies of sections of the poster file **northsea_depth.map** for study and use as building block modules and templates	Corresponding embedded **.map** files, legend files and datasets. Examine the module files to determine the requirements
Legend (.leg) files		
tmi_ns_colour.leg	Legend for TMI grid pseudocolour	
depth_colour.leg	Legend for colours of Naudy and Euler symbols	
naudy_pointer_size.leg	Legend for size of Naudy pointer (coloured rectangle) symbols	
naudy_dip_size.leg	Legend for size of black Naudy dip (T shape) symbols	
euler_circle_size.leg	Legend for size of Euler (coloured circle) symbols	
Datasets		
northsea	Original line dataset under investigation (not directly used in the poster); Contains levelled and corrected TMI field **mag_fin**	
tmi_ns	Grid dataset of TMI created from **mag_fin** field of **northsea** represented in low colour saturation pseudocolour	
hilbert_ca_ns	Grid dataset of Hilbert complex amplitude created from **hilbert_c_amp** field of **northsea** represented using sun angle (**hilbert_c_amp** created from **mag_fin**)	
phillips_ns	Grid dataset of **phillips** field of **northsea** represented using contours (**phillips** created from **mag_fin**).	
naudy_ns	Naudy model point dataset derived from **mag_fin** field of **northsea** and represented using black T-shaped 'dip' symbols superimposed on coloured rectangular 'pointer' symbols	
euler_ns	Euler solutions dataset derived from **mag_fin** field of **northsea** and represented using coloured circle symbols	

Tips for creating your own compositions

MAPCOMP and the interactive Hard Copy Composition tool are powerful and complex tools. The brief tips provided in this section may assist you to readily create simple compositions using your own data.

Reference manual and technical support

The references listed under "Hard copy support" in INTREPID General Reference contains a full description of both the MAPCOMP language and the interactive Hard Copy Composition and printing system. Alternately, refer to Volume 4 if you are still using the bound manuals.

We can assist you with learning advanced techniques and with implementing the process in your production system.

New compositions

We suggest that you use the interactive Hard Copy Composition tool to set up the page size and scale and create the data box by placing the first dataset. See Map composition (G17) for an introductory exercise. This automatically sets the dimensions for the composition, including scale and extent.

Zoom in in the Hard Copy Composition tool

To see more of the composition, select a different scale from the **View** menu or make the Hard Copy Composition window larger

Editing properties of an object

You can edit the properties of an object in the interactive tool by double clicking it. If the object has components, choose the component whose properties you wish to edit from the list displayed. INTREPID will then display the corresponding properties dialog box.

Moving objects in the composition

To move an object, select it using a single click, then hold down CTRL while you drag the object to the new location.

Using the interactive tool vs a text editor

You can use a combination of the interactive tool and a text editor to create the composition. It may often be more convenient for you to insert a MAPCOMP text block into the file and edit it to specify the data you require using a text editor than to specify it interactively. INTREPID offers you the choice of methods.

The `X =` and `Y =` statements

The **`X =`** and **`Y =`** statements in each object=s **`Begin – End`** block specify the position of the lower left corner of the object in millimetres from the lower left corner of the object that contains it.

Using MAPCOMP modules as templates– creating legends

You may find it convenient to use a text editor to create a composition by adapting existing modules.

You may specify a different dataset or field from the one in the module that you are using as a template. In this case it is most important that you remove the existing reference to the legend[1]. It will have cutoff values corresponding to the original data, not the new dataset or field you have specified, and will most likely distribute data values to attribute values wrongly.

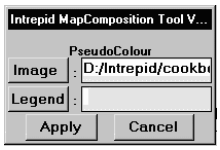
The simplest way to change the legend over to the new data is to remove the **Legend =** statement altogether. This will force INTREPID to create a new default legend for the data.

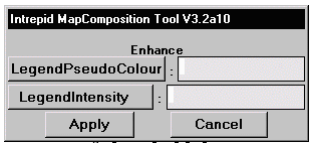
If you wish to create or edit a legend you will find it much easier to use the interactive Hard Copy Composition tool.

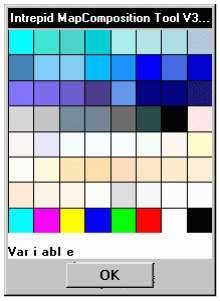
Creating and editing legends using the Hard Copy Composition tool

To create legends for an existing hard copy specification, load the **.map** file into Hard Copy Composition and edit each dataset object.

To create a legend, choose the **Legend** button in the object=s dialog box or the **Variable** option in an attribute value palette.







INTREPID displays the Legend Editor. The Legend Editor will save each legend in its own **.leg** file and automatically include a reference to it in the **.map** file.

SeeMap Legend Editor (T45f) for instructions.

---

1. By **legend** here, we mean the definition of the assignment of data values to attribute values. This definition resides in a **.leg** file. The reference to it in the dataset **Begin – End** block is a simple **Legend =** statement, typically after a **Z =** statement specifying a Z field to be represented by the attribute (e.g., by colour).

You can show a legend in a composition, so that the user can see the values represented by the colours or other attribute values. Use a **Legend Begin – End** block, which specifies the **.leg** file and dimensions, font, etc., of the legend object.

The skeleton of the .map file

This listing shows the skeleton of the hard copy specification file, indicating the place for the data from datasets and for annotations.

The file **northsea_shell.map** in our worked example data contains this skeleton and the tick marks, titles, descriptive text, North arrow, scale bar and INTREPID logo. See Full listing of hard copy specification file northsea_depth.map if you wish to see these objects in location

Important note: We have placed comments at the ends of statements in this listing to assist your understanding of the MAPCOMP language. INTREPID **will not accept comments placed at the ends of statements in this way.** You must place MAPCOMP comments on separate lines beginning with the # symbol.

```
# Demonstration hard copy specification file
#
Call = hpgl2                        #language for print to file operation
#
# Outer margin, border, page object blocks
#
Margin Begin
   X =    0.0000000000              #position of composition on paper
   Y =    0.0000000000              #(in mm from bottom left corner)
   Internal = No                    #default size of Margin is 2 mm
   Border Begin
      X =    0.0000000000           #position of Border within Margin
      Y =    0.0000000000
      Thickness = 1.000000
      Colour = Black
      Style = Solid
      Page Begin
         X =    0.0000000000
         Y =    0.0000000000
         Width = 594.000000         #Page dimensions in mm (A1 size)
         Height = 841.000000
#
# Data box object containing the data
#
         Data Begin
            X = 64.202500  #position of the Data object within the page
            Y = 82.535922
            MapProjection Begin
               Projection = NUTM31
               Datum = WGS84
               XScale = 100000.000000
               YScale = 100000.000000
            MapProjection End
            MapExtent Begin
               Xmin = 540129.158056#geographical region covered by Data object
               Xmax = 576129.158056#using coordinates of the projection
               Ymin = 7245236.000000
               Ymax = 7305236.000000
            MapExtent End
```

```
#
#           Begin - End blocks for datasets and tick marks go here.
#           For best results, place the tick mark blocks last.
#
         Data End
#
#        Begin-End blocks for other objects in the composition go here,
#        For example, legends, titles, North arrows, scale bars.
#
      Page End                    #Ends of outer blocks
   Border End
Margin End
```

The TMI grid (low colour saturation pseudocolour)

How we obtain this data from the northsea..DIR dataset

1. Grid the field **mag_fin** with the following parameters: **Cell size**: 100 m, **Nominal bearing**: 45°, **Minimum Curvature** grid refinement with default values, Other parameters: default values.
2. Save the grid dataset as **tmi_ns**.

The MAPCOMP module for the TMI grid display

The TMI data display is of a grid using low colour saturation[1] pseudocolour.

The display represents values in the **tmi_ns** grid dataset.

The display also requires the legend file **tmi_ns_colour.leg**.

The **Drape** block contains the specifications for both the TMI and the Hilbert complex amplitude data. The sections of the **Drape** block that apply to the TMI data are shown here in bold.

The version of the poster that displays only the TMI and Hilbert complex amplitude data components is called **tmi_ca_ns.map**.

The MAPCOMP module containing only this **Drape** block is called **tmi_ca_mod.map**. If you are creating your own composition and wish to include both TMI and Hilbert complex amplitude data, make sure that you do not include it twice.

This data has a colour legend display outside the data box. The MAPCOMP module containing the legend block is called **tmi_ca_leg_mod.map**.

1. Colour saturation reduced using MAPCOMP statement SaturationFactor = 0.2

TMI (and Hilbert complex amplitude) MAPCOMP module listing

```
#    Pseudocolour image of TMI (tmi_ns grid)
#    Sun angle image of Hilbert Complex Amplitude (hilbert_c_amp grid)
#
Drape Begin
   X =    0.0000000000
   Y =    0.0000000000
   Width = 100.000000
   Height = 100.000000
   ImagePseudoColour = ./sample_data/cookbooks/interp_oil/tmi_ns
   LegendPseudoColour = ./sample_data/cookbooks/interp_oil/tmi_ns_colour
   SaturationFactor =    0.2000000000
   SunAngleOp Begin
      X =    0.0000000000
      Y =    0.0000000000
      Image = ./sample_data/cookbooks/interp_oil/hilbert_c_amp_ns
      Declination = 45.000000
      Inclination = 45.000000
      VerticalEx = 30.000000
   SunAngleOp End
Drape End
```

Colour legend display for TMI grid

The TMI pseudocolour grid display has an accompanying colour legend display outside the data box.

The legend display requires the legend file **tmi_ns_colour.leg**

The MAPCOMP module containing only the legend block is called **tmi_ca_leg_mod.map**.

```
# Legend display showing key to TMI (tmi_ns grid) pseudocolour
display
#
Legend Begin
   X = 483.051514
   Y = 88.545382
   Width = 15.000000
   Height = 100.000000
   Name = ./sample_data/cookbooks/interp_oil/tmi_ns_colour
   ShowHighClip = No
   ShowLowClip = No
   ShowOutOfRange = No
   Horizontal = No
   Length = 100.000000
   Breadth = 15.000000
   Text Begin
      Colour = Black
      Size = 2.000000
      Font = 0
      Angle =    0.0000000000
      Justify = lb
      Gap =    0.0000000000
      VGap =    0.0000000000
      TextThickness =    0.0000000000
   Text End
   Decimals = 0
   Style = 0
Legend End
```

Hilbert Complex Amplitude grid (sun angle)

How we obtain this data from the northsea..DIR dataset

1. Using the Line Filter tool, apply the **Hilbert Complex Amplitude** filter to **mag_fin**, producing a temporary field **hilb_temp**. Use default parameters.
2. Using the Line Filter tool, apply a median filter with a window size of 5 and default values for other parameters to **hilb_temp**. Save the resulting field as **hilbert_c_amp**.
3. Grid **hilbert_c_amp** with: **Cell size**: 150 m, **Nominal bearing**: 45°, **Minimum Curvature** grid refinement with default values, Other parameters: default values.
4. Save the grid dataset as **hilbert_c_amp_ns**.

The MAPCOMP module for the Hilbert complex amplitude grid display

The Hilbert complex amplitude data display is of a grid using the sun angle effect.

The display represents values in the **hilbert_c_amp_ns** grid dataset.

The **Drape** block contains the specifications for both the TMI and the Hilbert complex amplitude data. The sections of the **Drape** block that apply to the Hilbert complex amplitude data are shown here in bold.

The version of the poster that displays only the TMI and Hilbert complex amplitude data components is called **tmi_ca_ns.map**.

The MAPCOMP module containing only this **Drape** block is called **tmi_ca_mod.map**. If you are creating your own composition and wish to include both TMI and Hilbert complex amplitude data, make sure that you do not include it twice.

Hilbert complex amplitude (and TMI) MAPCOMP module listing

```
#
#    Pseudocolour image of TMI (tmi_ns grid)
#    Sun angle image of Hilbert Complex Amplitude (hilbert_c_amp grid)
#
Drape Begin
   X =    0.0000000000
   Y =    0.0000000000
   Width = 100.000000
   Height = 100.000000
   ImagePseudoColour = ./sample_data/cookbooks/interp_oil/tmi_ns
   LegendPseudoColour = ./sample_data/cookbooks/interp_oil/tmi_ns
   SaturationFactor =    0.2000000000
   SunAngleOp Begin
      X =    0.0000000000
      Y =    0.0000000000
      Image = ./sample_data/cookbooks/interp_oil/hilbert_c_amp_ns
      Declination = 45.000000
      Inclination = 45.000000
      VerticalEx = 30.000000
   SunAngleOp End
Drape End
```

Phillips automatic depth grid contours

How we obtain this data from the northsea..DIR dataset

1. Using the Line Filter tool, apply the Phillips automatic depth filter to **mag_fin**, producing a temporary field **phil_temp**. Use default parameters.
2. Using the Spreadsheet Editor, remove spikes by setting to **phil_temp** to null whenever it is greater than 3000.
3. Using the Line Filter tool, apply a median filter with a window size of 5 and default values for other parameters to **phil_temp**. Save the resulting field as **phillips**.
4. Grid **phillips** with: **Cell size**: 150 m, **Nominal bearing**: 45°, **Minimum Curvature** grid refinement with default values, Other parameters: default values.
5. Save the grid dataset as **phillips_ns**.

The MAPCOMP module for the Phillips automatic depth grid display

The Phillips automatic depth dataset display is a set of contours.

The contours represent values in the **phillips_ns** grid dataset.

There are two sets of contours:

- Black contours every 200 m
- Annotated blue contours every 1000 m.

The Phillips automatic depth data display requires the Phillips automatic depth grid **phillips_ns**

The version of the poster that displays only this component is called **phillips_ns.map**.

The MAPCOMP module containing only this block is called **phillips_mod.map**.

Phillips MAPCOMP module listing

```
#
#    Contour plot of Phillips automatic depth estimation
#    (phillips_ns grid)
#       Black every 200 m
#       Blue, annotated, every 1000 m
#
Contour Begin
   X =    0.0000000000
   Y =    0.0000000000
   Detail = Draft
   Grid = ./sample_data/cookbooks/interp_oil/phillips_ns
   LowClip = -5499.729980
   HighClip = -516.524292
   GapBetweenLabels = 100.000000
   DrawIncrement =    0.5000000000
   Tension = 1.000000
   MinIslandSizeFactor = 1.000000
   MinSegmentLengthFactor =    0.5000000000
   ContourWeedFactor = -1.000000
   Cut Begin
      Interval = 200.000000
      Density = 40.000000
      LineColour = Black
      LineThickness =    0.0000000000
   Cut End
   Cut Begin
      Interval = 1000.000000
      Density = 40.000000
      LineColour = blue
      LineThickness =    0.0000000000
      Annotate = Yes
      TextSize = 2.000000
      TextColour = Black
      TextThickness =    0.0000000000
      Decimals =    0.0000000000
      Font = 0
   Cut End
Contour End
```

Colour legend display for Euler and Naudy symbols

The Euler solutions and Naudy mode points display has an accompanying colour legend display outside the data box.

The legend display requires the legend file **depth_colour.leg**

The MAPCOMP module containing only the legend block is called **depth_colour_symbol_leg_mod.map**.

```
#
# Legend display showing key to Pointer (Naudy) and Circle (Euler)
symbol pseudocolour
# representing depth
#
   Legend Begin
      X = 532.051514
      Y = 88.545382
      Width = 15.000000
      Height = 100.000000
      Name = ./sample_data/cookbooks/interp_oil/depth_colour
      ShowHighClip = No
      ShowLowClip = No
      ShowOutOfRange = No
      Horizontal = No
      Length = 100.000000
      Breadth = 15.000000
      Text Begin
         Colour = Black
         Size = 2.000000
         Font = 0
         Angle =    0.0000000000
         Justify = lb
         Gap =    0.0000000000
         VGap =    0.0000000000
         TextThickness =    0.0000000000
      Text End
      Decimals = 0
      Style = 0
   Legend End
```

Naudy Automatic Model point dataset plot

How we obtain this data from the northsea..DIR dataset

1 Using the Naudy Automatic Model tool, calculate a Naudy model point dataset called **naudy_ns** from the **mag_fin** field. Use **Naudy-derived dips**: ON, **Line spacing** 550 m, **Calculate Trends from Line**, Use the default value for all other parameters.

2 Using the Spreadsheet Editor, create a new field called **width_mm** in the **naudy_ns** dataset, which scales the **width** field from kilometres to millimetres (i.e., **width_mm = width / 1000000**).

Use the field **width_mm** as the width field in the hard copy composition.

3 Using the Spreadsheet Editor, create a new field called **depth_rev** in the **naudy_ns** dataset, which is the negative of the **depth** field (i.e., **depth_rev = -depth**).

Use the field **depth_rev** as the depth field in the hard copy composition.

The MAPCOMP module for the Naudy model point dataset display

The Naudy point dataset display consists of two superimposed point plots.

The first plot uses the 'pointer' symbol, a rectangle shape, which displays the data as follows.

Attribute	Attribute Description	Field or value
Colour	colour of symbol	**depth_rev** (depth of inferred structure)
Size	length of symbol	**depth_rev** (depth of inferred structure)
Thickness	width of symbol	**width_mm** (width of inferred structure parallel to line direction)
Angle	orientation of symbol	**strike** (strike of inferred structure)

The second plot uses the 'dip' symbol, a T shape, which displays the data as follows.

Attribute	Attribute Description	Field or value
Colour	colour of symbol	**black** (constant value)
Size	length of T crossbar	**depth_rev** (depth of inferred structure)
Thickness	length of T shaft	**dip** (dip of inferred structure)
Angle	orientation of symbol	**strike** (strike of inferred structure)

The Naudy model display requires

- Naudy model point dataset **naudy_ns**
- Legend files **depth_colour.leg**, **naudy_pointer_size.leg**, **naudy_dip_size.leg**

The version of the poster that displays only this component is called **naudy_ns.map**.

The MAPCOMP module containing only this block is called **naudy_mod.map**.

The MAPCOMP module containing the legend block for symbol colour is called **depth_colour_symbol_leg_mod.map**. It is also used by the Euler data, so don=t include it twice if you are including the Euler data in the composition. See Colour legend display for Euler and Naudy symbols.

Naudy MAPCOMP module listing

```
#
#    Point plots of Naudy model point dataset naudy_ns
#       Pointer symbols (coloured rectangles)
#       colour and size (length of rectangle) associated with depth
#          (depth_rev field)
#       thickness (width of rectangle) associated with body width
#          (width_mm field)
#       angle (orientation) associated with body direction (strike field)
#       Dip symbols (black T shapes superimposed on Pointers)
#          size (length of T cross-bar) associated with depth (depth_rev field)
#          thickness (length of T shaft) associated with body dip (dip field)
#          angle (orientation of T cross-bar) associated with body direction
#             (strike field)
#
PointPlot Begin
   X =    0.0000000000
   Y =    0.0000000000
   Dataset = ./sample_data/cookbooks/interp_oil/naudy_ns
   Marker Begin
      X =    0.0000000000
      Y =    0.0000000000
      Colour Begin
         Z = ./sample_data/cookbooks/interp_oil/naudy_ns/depth_rev
         Legend = ./sample_data/cookbooks/interp_oil/depth_colour
      Colour End
      Size Begin
         Z = ./sample_data/cookbooks/interp_oil/naudy_ns/depth_rev
         Legend = ./sample_data/cookbooks/interp_oil/naudy_pointer_size
      Size End
      Thickness = ./sample_data/cookbooks/interp_oil/naudy_ns/width_mm
      Symbol = Pointer
      Angle = ./sample_data/cookbooks/interp_oil/naudy_ns/Strike
   Marker End
PointPlot End
```

```
PointPlot Begin
   X =    0.0000000000
   Y =    0.0000000000
   Dataset = ./sample_data/cookbook/interp_oil/naudy_ns
   Marker Begin
      X =    0.0000000000
      Y =    0.0000000000
      Colour = Black
      Size Begin
         Z = ./sample_data/cookbook/interp_oil/naudy_ns/depth_rev
         Legend = ./sample_data/cookbook/interp_oil/naudy_dip_size
      Size End
      Thickness = ./sample_data/cookbook/interp_oil/naudy_ns/Dip
      Symbol = Dip
      Angle = ./sample_data/cookbook/interp_oil/naudy_ns/Strike
   Marker End
PointPlot End
```

Euler solutions point dataset plot

How we obtain this data from the `northsea..DIR` dataset

Use the **`tmi_ns`** grid derived from the **`mag_fin`** field.

1. Using the Grid Operations tool resample **`tmi_ns`** to a cell size of 600 m, producing a temporary grid with a name of your choice.
2. Using the Euler Deconvolution tool with the temporary grid, calculate an Euler solutions point dataset called **`euler_ns`**. Set a **maximum depth** of 10000 m and use default values for all other parameters. Use the **Extended Calculate SI** option to get improved depth estimates.
3. Using the Spreadsheet Editor, create a new field called **`depth_rev`** in the **`euler_ns`** dataset, which is the negative of the **`depth`** field (i.e., **`depth_rev = -depth`**).

Use the field **`depth_rev`** as the depth field in the hard copy composition.

The MAPCOMP module for the Euler solutions point dataset display

The Euler solutions dataset display is a point plot.

The plot uses the 'circle' symbol, which displays the data as follows.

Attribute	Attribute Description	Field or value
`Colour`	colour of symbol	**`depth_rev`** (depth of Euler solution)
`Size`	diameter of symbol	**`depth_rev`** (depth of Euler solution)[a1]

a.1 This is a departure from the tradition of displaying the **`reliability`** field using the **`size`** attribute. If you to wish show the **`reliability`** data in the current example, remove the **`Legend =`** statement from the **`Size Begin – End`** block. (It will have incorrect cutoff values for the **`reliablity`** field.) Substitute **`reliability`** for **`depth_rev`** in the **`Z =`** statement. INTREPID will create a default legend when you view or print the composition. If you wish to edit the legend, you can do so using the interactive Hard Copy Composition tool.

The Euler solutions display requires

- Euler solutions point dataset **euler_ns**
- Legend files **depth_colour.leg**, **euler_circle_size.leg**

The version of the poster that displays only this component is called **euler_ns.map**.

The MAPCOMP module containing only this block is called **euler_mod.map**.

The MAPCOMP module containing the legend block for symbol colour is called **colour_symbol_leg_mod.map**. It is also used by the Naudy data, so don=t include it twice if you are including the Naudy data in the composition. See Colour legend display for Euler and Naudy symbols.

Euler MAPCOMP module listing

```
#
#    Point plot of Euler solutions point dataset euler_ns
#       Circle symbols
#          colour and size associated with solution depth (depth_rev field)
#
PointPlot Begin
   X =    0.0000000000
   Y =    0.0000000000
   Dataset = ./sample_data/cookbooks/interp_oil/euler_ns
   Marker Begin
      X =    0.0000000000
      Y =    0.0000000000
      Colour Begin
         Z = ./sample_data/cookbooks/interp_oil/euler_ns/depth_rev
         Legend = ./sample_data/cookbooks/interp_oil/depth_colour
      Colour End
      Size Begin
         Z = ./sample_data/cookbooks/interp_oil/euler_ns/depth_rev
         Legend = ./sample_data/cookbooks/interp_oil/euler_circle_size
      Size End
      Thickness =    0.1000000000
      Symbol = Circle
      Angle = 0.000000
   Marker End
PointPlot End
```

Full listing of hard copy specification file `northsea_depth.map`

Here is a listing of the file supplied with the *Cookbook* worked examples.

```
#
# Demonstration hard copy specification file northsea_depth.map
# As described in the Intrepid Cookbook
#
#
# Specify the output format for printing the composition to a file
#
Call = hpgl2
#
# Outer margin, border, page object blocks
#
Margin Begin
   X =    0.0000000000
   Y =    0.0000000000
   Internal = No
   Border Begin
      X =    0.0000000000
      Y =    0.0000000000
      Thickness = 1.000000
      Colour = Black
      Style = Solid
      Page Begin
         X =    0.0000000000
         Y =    0.0000000000
         Width = 594.000000
         Height = 841.000000
#
# Data box object containing the survey and interpretation data
#
         Data Begin
            X = 64.202500
            Y = 82.535922
            MapProjection Begin
               Projection = NUTM31
               Datum = WGS84
               XScale = 100000.000000
               YScale = 100000.000000
            MapProjection End
            MapExtent Begin
               Xmin = 540129.158056
               Xmax = 576129.158056
               Ymin = 7245236.000000
               Ymax = 7305236.000000
            MapExtent End
```

```
#    Pseudocolour image of TMI (tmi_ns grid)
#    Sun angle image of Hilbert Complex Amplitude (hilbert_c_amp grid)
            Drape Begin
               X =    0.0000000000
               Y =    0.0000000000
               Width = 100.000000
               Height = 100.000000
               ImagePseudoColour = ./sample_data/cookbooks
/interp_oil/tmi_ns
               LegendPseudoColour = ./sample_data/cookbooks
/interp_oil/tmi_ns_colour
               SaturationFactor =    0.2000000000
               SunAngleOp Begin
                  X =    0.0000000000
                  Y =    0.0000000000
                  Image = ./sample_data/cookbooks
/interp_oil/hilbert_c_amp_ns
                  Declination = 45.000000
                  Inclination = 45.000000
                  VerticalEx = 30.000000
               SunAngleOp End
            Drape End
#
#    Contour plot of Phillips automatic depth estimation (phillips_ns grid)
#       Black every 200 m
#       Blue, annotated, every 1000 m
            Contour Begin
               X =    0.0000000000
               Y =    0.0000000000
               Grid = ./sample_data/cookbooks/interp_oil/phillips_ns
               LowClip = -5499.729980
               HighClip = -516.524292
               GapBetweenLabels = 100.000000
               DrawIncrement =    0.5000000000
               Tension = 1.000000
               MinIslandSizeFactor = 1.000000
               MinSegmentLengthFactor =    0.5000000000
               ContourWeedFactor = -1.000000
               Cut Begin
                  Interval = 200.000000
                  Density = 40.000000
                  LineColour = Black
                  LineThickness =    0.0000000000
               Cut End
```

```
               Cut Begin
                  Interval = 1000.000000
                  Density = 40.000000
                  LineColour = blue
                  LineThickness =    0.0000000000
                  Annotate = Yes
                  TextSize = 2.000000
                  TextColour = Black
                  TextThickness =    0.0000000000
                  Decimals =    0.0000000000
                  Font = 0
               Cut End
            Contour End
#
#    Point plots of Naudy model point dataset naudy_ns
#       Pointer symbols (coloured rectangles)
#          colour and size (length of rectangle) associated with depth
 #           (depth_rev field)
#          thickness (width of rectangle) associated with body width
#           (width_mm field)
#          angle (orientation) associated with body direction (strike field)
#       Dip symbols (black T shapes superimposed on Pointers)
#          size (length of T cross-bar) associated with depth (depth_rev field)
#          thickness (length of T shaft) associated with body dip (dip field)
#          angle (orientation of T cross-bar) associated with body direction
#           (strike field)
#
            PointPlot Begin
               X =    0.0000000000
               Y =    0.0000000000
               Dataset = ./sample_data/cookbooks/interp_oil/naudy_ns
               Marker Begin
                  X =    0.0000000000
                  Y =    0.0000000000
                  Colour Begin
                     Z = ./sample_data/cookbooks/interp_oil
/naudy_ns/depth_rev
                     Legend = ./sample_data/cookbooks
/interp_oil/depth_colour
                  Colour End
                  Size Begin
                     Z = ./sample_data/cookbooks/interp_oil
/naudy_ns/depth_rev
                     Legend = ./sample_data/cookbooks
/interp_oil/naudy_pointer_size
                  Size End
                  Thickness = ./sample_data/cookbooks
/interp_oil/naudy_ns/width_mm
                  Symbol = Pointer
                  Angle = ./sample_data/cookbooks/interp_oil
/naudy_ns/Strike
               Marker End
            PointPlot End
```

```
            PointPlot Begin
               X =    0.0000000000
               Y =    0.0000000000
               Dataset = ./sample_data/cookbooks/interp_oil/naudy_ns
               Marker Begin
                  X =    0.0000000000
                  Y =    0.0000000000
                  Colour = Black
                  Size Begin
                     Z = ./sample_data/cookbooks/interp_oil/naudy_ns/depth_rev
                     Legend = ./sample_data/cookbooks/interp_oil/naudy_dip_size
                  Size End
                  Thickness = ./sample_data/cookbooks/interp_oil/naudy_ns/Dip
                  Symbol = Dip
                  Angle = ./sample_data/cookbooks/interp_oil/naudy_ns/Strike
               Marker End
            PointPlot End
#
#    Point plot of Euler solutions point dataset euler_ns
#       Circle symbols
#          colour and size associated with solution depth (depth_rev field)
#
            PointPlot Begin
               X =    0.0000000000
               Y =    0.0000000000
               Dataset = ./sample_data/cookbooks/interp_oil/euler_ns
               Marker Begin
                  X =    0.0000000000
                  Y =    0.0000000000
                  Colour Begin
                     Z = ./sample_data/cookbooks/interp_oil
/euler_ns/depth_rev
                     Legend = ./sample_data/cookbooks/interp_oil/depth_colour
                  Colour End
                  Size Begin
                     Z = ./sample_data/cookbooks/interp_oil
/euler_ns/depth_rev
                     Legend = ./sample_data/cookbooks
/interp_oil/euler_circle_size
                  Size End
                  Thickness =    0.1000000000
                  Symbol = Circle
                  Angle = 0.000000
               Marker End
            PointPlot End #
```

```
#
#    Tick marks for data box object
#       Latitude and Longitude on border
#       Metres on border
#       Metre tick marks within data box
#
            Ticks Begin
               X =    0.0000000000
               Y =    0.0000000000
               MetreGrid = No
               LongInterval = 0:5:0
               LatInterval = 0:5:0
               Format = DMS
               LabelAtTop = Yes
               LabelAtLeft = Yes
               Style = Tick
               Internal = No
               TextSize = 2.000000
               TextFont = 3
               TextThickness =    0.0000000000
               TickSize = 3.000000
               TickThickness =    0.0000000000
               LabelOffset =    0.0000000000
            Ticks End
            Ticks Begin
               X =    0.0000000000
               Y =    0.0000000000
               MetreGrid = No
               LongInterval = 0:5:0
               LatInterval = 0:5:0
               Format = DMS
               Style = Border
               Internal = No
               TextSize = 2.000000
               TextFont = 3
               TextThickness =    0.0000000000
               TickSize = 3.000000
               TickThickness =    0.0000000000
               LabelOffset =    0.0000000000
            Ticks End
```

```
            Ticks Begin
               X =    0.0000000000
               Y =    0.0000000000
               MetreGrid = Yes
               EastInterval =    0.0000000000
               NorthInterval =    0.0000000000
               Format = NESW
               LabelAtBottom = Yes
               LabelAtRight = Yes
               Style = Tick
               Internal = No
               TextSize = 2.000000
               TextFont = 3
               TextThickness =    0.0000000000
               TickSize = 3.000000
               TickThickness =    0.0000000000
               LabelOffset =    0.0000000000
            Ticks End
#
# End of Data box block
#
      Data End
#
# Legend display showing key to TMI (tmi_ns grid) pseudocolour display
#
         Legend Begin
            X = 483.051514
            Y = 88.545382
            Width = 15.000000
            Height = 100.000000
            Name = ./sample_data/cookbooks/interp_oil/tmi_ns_colour
            ShowHighClip = No
            ShowLowClip = No
            ShowOutOfRange = No
            Horizontal = No
            Length = 100.000000
            Breadth = 15.000000
            Text Begin
               Colour = Black
               Size = 2.000000
               Font = 0
               Angle =    0.0000000000
               Justify = lb
               Gap =    0.0000000000
               VGap =    0.0000000000
               TextThickness =    0.0000000000
            Text End
            Decimals = 0
            Style = 0
         Legend End
#
```

```
# Legend display showing key to Pointer (Naudy) and Circle (Euler)
#  symbol pseudocolour representing depth
#
         Legend Begin
            X = 532.051514
            Y = 88.545382
            Width = 15.000000
            Height = 100.000000
            Name = ./sample_data/cookbooks/interp_oil/depth_colour
            ShowHighClip = No
            ShowLowClip = No
            ShowOutOfRange = No
            Horizontal = No
            Length = 100.000000
            Breadth = 15.000000
            Text Begin
               Colour = Black
               Size = 2.000000
               Font = 0
               Angle =    0.0000000000
               Justify = lb
               Gap =    0.0000000000
               VGap =    0.0000000000
               TextThickness =    0.0000000000
            Text End
            Decimals = 0
            Style = 0
         Legend End
#
# Title, Description, Legend Display captions
#    Included for display from separate map files
#
         Include Begin
            X = 80.522672
            Y = 754.292349
            File = ./sample_data/cookbooks/interp_oil/title.map
         Include End
         Include Begin
            X = 459.557042
            Y = 393.939855
            File = ./sample_data/cookbooks/interp_oil/description.map
         Include End
         Include Begin
            X = 486.658250
            Y = 205.605490
            File = ./sample_data/cookbooks/interp_oil/legend_labels.map
         Include End
#
```

```
# Scale bar, North arrow and Intrepid logo display
#
         ScaleBar Begin
            X = 64.202472
            Y = 26.091279
            Length = 100.000000
            Interval = 20.000000
            Unit = Metres
            ShowScale = Yes
            Style = 0
            TextFont = 3
            TextSize = 2.000000
            TextThickness =    0.0000000000
         ScaleBar End
         NorthArrow Begin
            X = 204.595964
            Y = 4.441079
            Length = 30.000000
            GridNorth =    0.0000000000
            TrueNorth =    0.0000000000
            MagneticNorth = 2.000000
            ShowProjection = Yes
            TextFont = 3
            TextSize = 2.500000
            TextThickness =    0.0000000000
         NorthArrow End
         Flexible Begin
            X = 357.034324
            Y = 8.442692
            Width = 64.887769
            Height = 60.830034
            Isotropic = Yes
            Image Begin
               Pixels Begin
                  Format = dfaTIFF
                  File = ./sample_data/cookbooks/interp_oil/intrepid.tif
               Pixels End
            Image End
         Flexible End
#
# End of outer blocks
#
      Page End
   Border End
Margin End
```