ADAM TECHNOLOGY

# 3DM Analyst 2.1*a*

## Release notes

Release 2.1*a* #2060

## Welcome to 3DM Analyst 2.1!

3DM Analyst 2.1 is a minor upgrade to 3DM Analyst 2.0 that is being released free of charge to all current ADAMcare customers. Apart from new features added to 3DM Analyst itself, this upgrade sees a couple of new programs added to the 3DM Analyst distribution.

The first of these is called **DTM Generator**. This is a stand-alone, batch processing application that can load any number of 3DM Analyst projects and generate DTMs for them, allowing this time-consuming process to be performed unattended (e.g. overnight) and freeing you up to do more important things.

The second new program is **3DM Viewer**. This is a freely distributable 3DM Analyst project file viewer that you can supply along with your 3DM Analyst projects so others can see them. It has the same basic interface as 3DM Analyst but with all of the data generation features removed.

As for 3DM Analyst itself, the most significant new features are the ability to digitise polylines in the 3D View, the addition of statistics to polylines (including dip and dip direction information), the ability to export 3D images to Vulcan, and the ability to generate DEMs (Digital Elevation Models). The Change History section starting on page 9 details all of the changes made since the last release.

## What's new in 3DM Analyst 2.1*a*?

### *DTM Generator*

DTM Generator allows you to queue up an unlimited number of projects for DTM generation without user intervention (Figure 1). The user interface is quite simple — simply click on the **Add** button to add projects to the list (multiple projects can be selected at a time by holding down the shift key), click on the **Check All** button to read each project and ensure that the required information for each is available, then click on the **Generate DTMs** button to start the process.

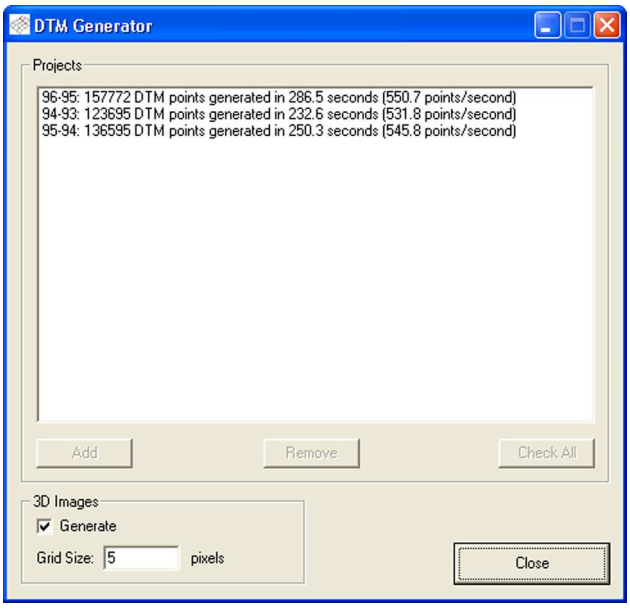


**Figure 1. DTM Generator**

The **Remove** button allows you to remove projects added by mistake, and the **3D Images** section (see "Vulcan Support" below for details) allows you to specify whether or not 3D images should automatically be generated, and, if so, what grid size should be used.

During generation, if you want to pause the process, click on the Pause button. Once the current project is complete the software will pause, allowing you to resume at a later time or simply exit the program.

## *3DM Viewer*

3DM Viewer is a freely distributable 3DM Analyst project viewer program. The interface is a subset of 3DM Analyst's — all data generation-related elements have been removed, allowing viewing only. It is also possible to make manual distance measurements, if desired.

## *Vulcan Support*

3DM Analyst can now export "3D images" for use in Maptek's Vulcan software. The data is actually exported as two separate files — a `TIFF` file containing the actual image data, and a `TXT` file containing the 3D co-ordinate information for the image.

To generate a 3D image, view the epipolar images in the Images View and select the BUILD | 3D IMAGE menu item and the 3D Image Generation dialog (Figure 2) will appear.

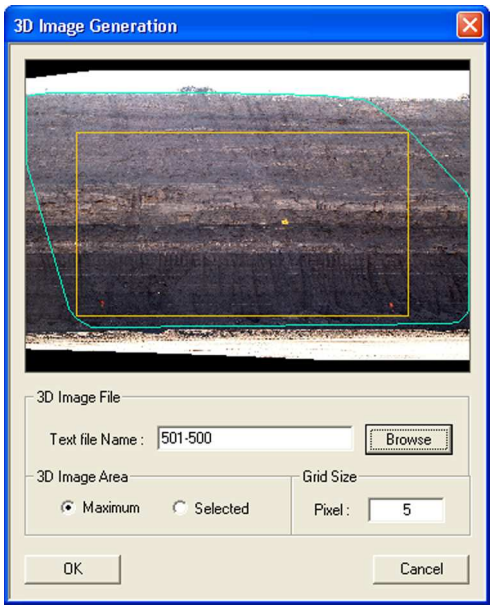


**Figure 2. 3D Image Generation dialog**

By default, the dialog shows an outline of the DTM's area in cyan, with the automatically-generated maximum area shown in orange. (This is the same area that DTM Generator will choose if asked to generate 3D images automatically.) Although the software attempts to maximise the area within the rectangular 3D image, it doesn't necessarily guarantee that it will include the region you are interested in. If it does not include the region of interest, change the **3D Image Area** setting to **Selected** and when you press **OK** the cursor will change and you can manually select the area to export using the right mouse button to digitise the first corner and the left mouse button to digitise the opposite corner.

Click on the **Browse** button to specify the file name you wish to use for the `TIFF` and `TXT` files. The **Grid Size** setting can be used to control the spacing between 3D co-ordinates — by default, a 3D co-ordinate will be output for every fifth pixel in the image. If more detail is required, this can be reduced. On the other hand, if the level of detail is excessive, this can be increased to reduce the size of the resulting `TXT` file.

The steps required to import the data into Vulcan are as follows:

1. If you do not already have it, obtain the program **`tif2ireg.exe`** from Maptek. This is a small file and can be emailed.

2. Copy **`tif2ireg.exe`** into the Vulcan working directory or directories where the 3DM Analyst image needs to be imported.
3. Open a C Shell from Envisage (VULCAN | ENVISAGE | START | C SHELL) and at the prompt type **`tif2ireg.exe filename.txt filename.00t filename.tif filename.ireg`**
4. After approximately one or two minutes, the Vulcan import produces two additional files. One is a Vulcan triangulation (`.00t`) file and the other is a Vulcan image registration (`.ireg`) file.
5. The `txt` file can now be removed from the directory if desired. The `00t`, `tif` and `ireg` files must stay in the directory where the imported 3D images will be used.
6. Load the texture mapped triangulations into Vulcan. When loading the imported texture mapped Vulcan triangulation the first time, use the VULCAN | ENVISAGE | MODEL | TRIANGLE_UTILITY | LOAD option. Select the new triangulation (`00t` file). Click on the **Advanced** tab, tick the **Texture Mapping | Texture resource** box and select the same file name from the pull down menu but with the `ireg` extension. This will load the texture-mapped triangulation into Vulcan. Vulcan will remember this and from the second time triangulations can be loaded using any of the standard ways.

## *Stereo View Digitising*

Continuous line features can now be digitised in the Stereo View. Points are automatically added to the line as the floating marked is moved around without needing to click the mouse button, greatly simplifying the process of digitising complicated polylines. To switch between normal, point-to-point digitising and continuous digitising, press the '_' (underscore) key.

3DM Analyst's Stereo View now also supports the same handwheels, footdisks, and footswitches as ADAM's analytical stereoplotters (Figure 3). These optional accessories dramatically enhance the ease of digitising (especially in the new continuous line feature mode) and are strongly recommended for users spending a great deal of time in the Stereo View.

**Figure 3. Handwheel, footdisk, and footswitch**

The Stereo View now also displays the digitised points on a polyline as an aid to point mode snapping.

## *Bundle Adjustment*

The Indication of Bundle Adjustment Quality section of the Bundle Adjustment Results dialog (Figure 4) now better reflects the correct interpretation of the results.

If the LED is too far to the left, indicating high image residuals, then either the image points' sigmas specified in the Calibration Data dialog (reached via the Orientations button on the Bundle Adjustment dialog) or the Exterior Data dialog (reached via the Orientation Setting button on the Bundle Adjustment dialog when an Absolute Orientation is chosen) are too large (pessimistic), or the control point sigmas are too small (optimistic). Unless you have a good reason to suspect the image co-ordinate observations to be particularly poor, they should be set to values in the range of 0.1–0.3. If they *are* in that range and you are still finding the LED is too far to the left, then the control point sigmas may be too optimistic and may need to be relaxed.

If the LED is too far to the right, indicating high control residuals, then either the image points' sigmas are too small, or the control point sigmas are overly pessimistic. Again, image co-ordinate observations should be in the range of 0.1–0.3 in most cases, with 0.1 pixels being the default.

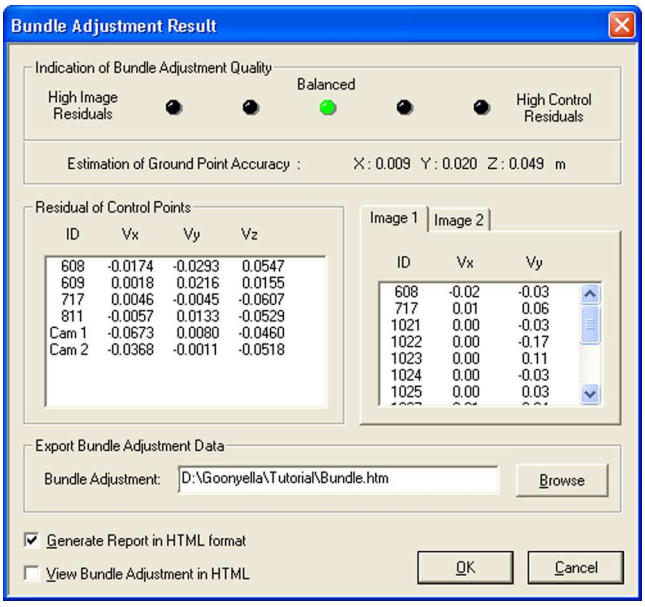


**Figure 4. Bundle Adjustment Results dialog**

Another enhancement to the bundle adjustment is the addition of support for plan-only and height-only control points. These are specified in the control point file by putting a hyphen ("-") in the place of the omitted co-ordinate value. For example, a plan-only point with sigmas of 0.1 would be specified as

```
100 123.45 234.56 - 0.1 0.1 -
```

and a height-only point would look like

```
101 - - 12.4 - - 0.1
```

Another minor improvement is that the interior orientation data now need only be set for the first camera when performing a camera calibration for a single camera. (Generally only the focal point needs to be set in this way, but previously the focal point had to be set for both the left and the right cameras, even if both were the same camera.)

It is also now possible to use a camera calibration that was performed at a different resolution to the current images. This may only be used when the camera and lens are the same but the image size is different, and caution should be exercised when the calibrated size is significantly smaller than the current image size. (Calibrating at a higher resolution than the current one shouldn't cause any problems.)

## *GUI Enhancements*

There have been a few minor enhancements to the user interface in this release. Firstly, control points and relative-only points are now displayed in different colours in the Images View to help distinguish between them. (A control point that has been disabled in the control point list is treated as a relative-only point in the bundle adjustment and so is displayed that way as well.) In addition, 3DM Analyst now automatically scrolls the views when a point ID is changed to ensure the point is visible, and for scanned film images, the software now attempts to predict the fiducial locations to speed up the interior orientation process.

## *GUI Reorganisation*

The layout of the menus and some of the dialogs has been changed to make them more logical—all file-related actions are now located under the File menu, all settings are now under the Settings menu, etc. Most also now have keyboard shortcuts.

## *3D View Digitising*

Digitising in the 3D View is now possible! Like the Stereo View, a 3D "floating mark" is used for digitising. This floating mark is controlled by moving the mouse around while the Control key is held down.

To start digitising, press ‘f’ or click on the New Polyline button in the toolbar ( ). Holding the Control key down while moving the mouse over the DTM will cause a yellow floating mark to follow the mouse’s position. Digitising using the space bar (as in the Stereo View) will cause a new polyline to be digitised.

To select an existing polyline for further editing (or to obtain information about it—see the next section for details), first click on the Select Polyline button in the toolbar ( ), then simply move the mouse to the polyline you wish to select and press the space bar.

All of the normal editing options available in the other views are also available in the 3D View.

## *Feature Information*

Feature information is now stored and can be modified per-feature rather than per-feature type. The settings in the FDF should now be viewed as the default settings for any new feature of that type rather than the current settings for all features of that type. Changes to the FDF only affect new features.

To support this, a new Line Feature Info dialog has been added (Figure 5). This dialog can be accessed for the currently selected feature either by selecting the **FEATURE INFO | FEATURE INFO ON SELECTED LINE** menu item, or by pressing the ‘i’ key. The dialog provides similar settings to the FDF dialog that allow you to changes the behaviour of that feature only, in addition to reporting various statistics and allowing you to enter a meaningful description for that particular feature that will later be reproduced in the Feature Info Report (**FEATURE INFO | FEATURE INFO LIST**).

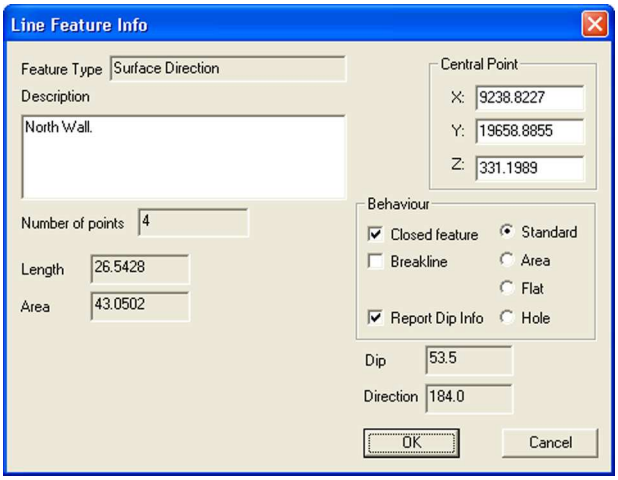


**Figure 5. Line Feature Information dialog**

If you click on the **Report Dip Info** checkbox in the Line Feature Information dialog (or the FDF) then that polyline will be treated as a plane, and the inclination of that plane to the horizontal (“Dip”) and the direction of declination (“Direction”) will be reported. The plane and the normal to the plane will also be shown in the 3D View if it is enabled using the Show Dip Direction button in the toolbar ( ).

The direction the polyline was digitised in determines which of the two possible directions for the dip information are chosen. If the polyline is digitised in a clockwise direction, then the side pointing towards you will be used in the report. If it is digitised in an anticlockwise direction, then the opposite side will be used. If the wrong side is reported, you can reverse the polyline by selecting it, pressing ‘c’ to continue editing, pressing ‘r’ to reverse, and pressing ‘s’ to save. This will force the direction vector to change sides.

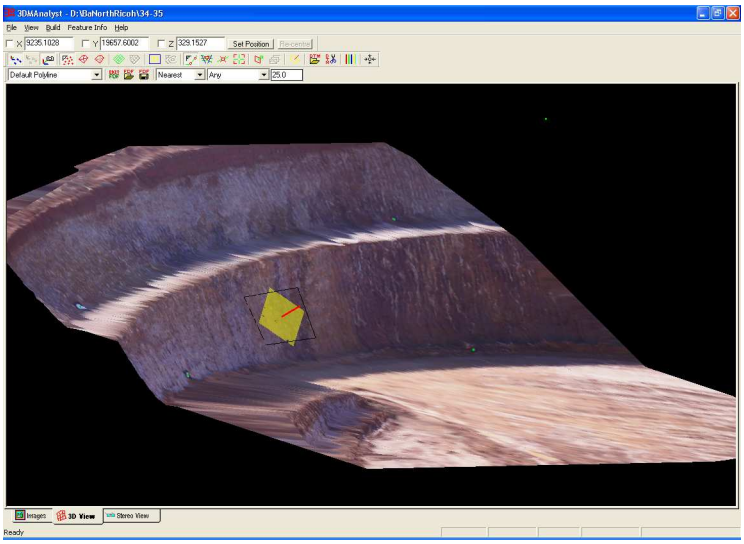

**Figure 6. Dip Information in 3D View**

## *DEM Generation*

3DM Analyst now allows you to generate a Digital Elevation Map (DEM) from the current Digital Terrain Map (DTM). (The difference between the two is that a DEM has points arranged in a regular grid pattern, along the X and Y axes, while a DTM has points arranged arbitrarily.)

To generate the DEM, select the BUILD | DEM menu and the DEM Settings dialog will appear (Figure 7). The Grid Lengths setting determines how far apart each point is in the grid in the X and Y direction; the Origin is the co-ordinate of the first point in the grid; and the Extend Distance is how far the grid should extend in X and Y. The Bearing is the angle the grid should be generated at relative to the X axis.

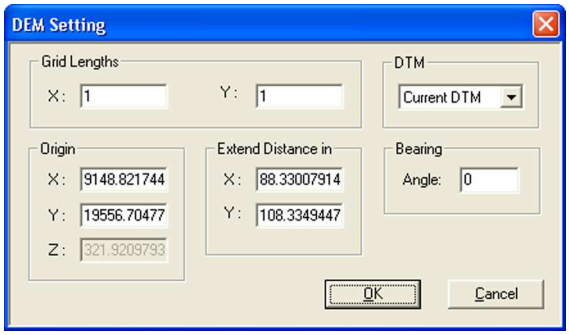


**Figure 7. DEM Settings dialog**

## *Bundle Adjustment Report*

The Bundle Adjustment Result dialog now has a couple of checkboxes at the bottom that allows you to specify that you want a report of the results of the bundle adjustment to be generated and whether you want to view it immediately as well. The report contains the interior orientation and exterior orientation information, as well as the image co-ordinate and ground co-ordinate residuals of the adjustment. The image co-ordinates themselves can be exported in a couple of different formats (for use in Australis and AeroSys) and you can specify whether they should be raw or corrected (i.e. lens distortions removed) using the new Image Coordinates page of the Settings dialog (Figure 8) that can be accessed from the SETTINGS | GLOBALS menu.

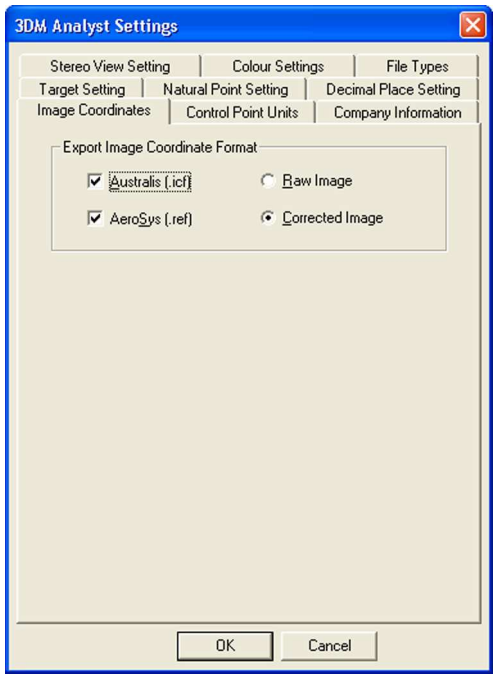


**Figure 8. Image Coordinate Settings**

The Company Information page of the Settings dialog allows you to add your own company information to the bottom of the Bundle Adjustment report as well if you wish.

# What was new in 3DM Analyst 2.0*b*?

## *DTM Improvements*

The DTM generation algorithm in this release has been improved even further, enhancing its ability to find points on surfaces at an acute angle to the camera — for example, the tops of benches in a mine pit. One result of all of these improvements is that DTMs now frequently contain far more points than are needed to represent the surface effectively, so two new features have been added to cut back on the number of points, accessible from the **MEASURE | FILTER DTM POINTS…** menu (Figure 9).

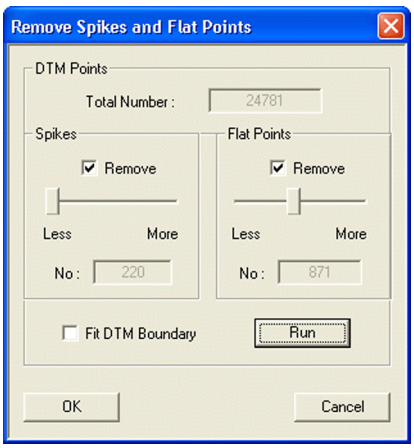


**Figure 9. DTM filtering dialog**

The first DTM filtering feature, “Spikes”, is designed to reduce the number of “bad points” in the DTM. Bad points occur in two ways:

1. Two different points in the real world are incorrectly matched because they look very similar to each other in the images. This is especially troublesome over regular terrain (e.g. a wheat field). Setting Match Similarity in the Epipolar Image Settings window too low can also cause this problem.

2. The point in the real world is correctly matched in both images, but the point has moved during the time it took the two images to be taken (e.g. a point on a moving vehicle). Because the matching was actually successful, the Match Similarity setting doesn't have much effect on this.

Automatically detecting these bad points relies on the fact that they often "stick out" quite a long way from their correctly matched neighbours, forming spikes in the DTM. The slider determines how far points are allowed to stick out before they are to be considered an error — the Less setting is more forgiving, allowing points to stick out quite a long way, while the More setting is very strict and will result in many more points being deleted.

The second DTM filtering feature, "Flat Points", is not designed to remove incorrect points from the DTM but rather to find a simpler way of representing the same surface. Consider a few hundred points lying on a flat plane — if the plane is truly flat, then only the points on the edge of the plane are actually required to represent the surface, and all the points within that boundary aren't actually contributing anything to the overall shape at all, and are therefore redundant.

The slider for this filtering algorithm determines how close the final surface is required to match the original surface. The Less setting will remove fewer points because it requires the final surface to be almost exactly the same. The More setting will remove more points, but the surface will not represent the original surface as accurately.

For both of these features, you select whether you want to run it or not by activating the appropriate Remove checkbox, then click Run. After a short while the number of points that will be removed using the current settings will be shown ("No:"), and you can choose the accept the modified DTM ("OK") or revert back to the original ("Cancel"). Note that clicking Run multiple times will cause the filtering to be applied to the already-modified DTM, not the original.

The final option is the "Fit DTM Boundary" checkbox, which removes triangles formed purely from boundary points.

## *Adding Points to DTMs*

Holding down the control key while digitising a new DTM point in the Images View (using either single cursor or dual cursor mode) will activate a new DTM seeding algorithm that will search in the neighbourhood for additional points to add. This can be used to fill in gaps in the DTM to great effect.

## *Importing DTMs*

Loading a DTM generated in a different model (or in the same model but with different epipolar image settings) to the current one is now possible. The software will detect that the DTM is inconsistent with the current model and offer to reproject it for you. If you choose not to reproject it, you will be able to view the DTM but not change it in any way. If you do reproject it, note that any points that lie outside the current model area will be removed. Make sure you save the DTM with a different name if you don't wish the original DTM to be changed.

Due to this change, 3DM Analyst will sometimes notice if you load a DTM created in an earlier version and offer to reproject it. It will inform you that the DTM appears to be consistent with the current model. It is safe to reproject — no points will be deleted if the epipolar image settings haven't changed.

## *Stereo View*

The Stereo View has had a number of enhancements, the most notable of which is the Set Position toolbar (Figure 10). This toolbar allows you to manually drive the floating mark to a specified position by typing in values and clicking on Set Position; it allows you to restrict movement in certain directions (e.g. to manually digitise contours, set the Z to the desired height and then click on the Z checkbox); and it allows you to automatically re-centre the floating mark if you find yourself lost.


**Figure 10. Set Position toolbar**

Another change is the method for selecting an area of the images to resample. Previously the Resample Images button on the Stereo View toolbar would pop up a dialog box that allowed you to resample the

epipolar images based on the current display settings. This restricted the shape of the images to whatever the current shape of the Stereo View was. Now you can press the F11 button to activate the resample area selection cursor, and select the area to use by clicking the left mouse button. (To cancel the selection, press the Esc key.) Once an area has been selected, press the Resample Images button and the Resample Selected Area dialog will appear, showing the size of the selected area and giving you the option to proceed with the resampling or cancel the operation. If you wish to proceed, it will ask if you wish to retain the 3D data (e.g. DTM, contours, etc.) (press "OK") or not (press "Cancel"). If so, it will reproject the data onto the new images once the operation is complete.

# Installation Instructions

1) To install any hardware supplied with this software, please read the enclosed hardware installation instructions.
2) Install the 3DM Analyst 2.1 software from the 3DM Analyst 2.1 CD-ROM by running Setup.exe in the 3DM Analyst 2.1a subdirectory.

# Change History of 3DM Analyst 2.*x*

The following list documents the changes made to 3DM Analyst 2.*x* since version 2.0*a* in reverse chronological order. You should check here to see if a problem you have previously reported has been addressed.

## *3DM Analyst 2.1a*

Released: 3rd June, 2004.

- Added the ability to use calibrations performed at a different resolution to the current image.
- Improved the performance of the DTM point deletion algorithm. This not only speeds up area deletion of points but also DTM generation where significant numbers of points are removed during generation.
- The control point ID entry box in the toolbar is now wider and also scrolls to accommodate more digits.
- Added support for 3D images to allow draped textures to be imported by Vulcan.
- All toolbar buttons now display as depressed when active.
- Distance measurement now works in the Images View.
- Added support for continuous line features to the Stereo View. The '_' key toggles continuous line mode on and off.
- Added support for handwheels and footdisks to the Stereo View. The software will automatically use them if the user has the necessary hardware.
- The feature rate setting in the Epipolar Image Settings dialog now shows the numbers for both the left and right images together. It was too easy to change the left image setting while forgetting to change the right image setting before.
- Changed the Indication of Bundle Adjustment Quality to better reflect the meaning of the LEDs. Also changed the LED colours to better reflect their meaning.
- Fixed a bug whereby the camera position residuals were reported for Relative Only orientations when camera positions had been specified. They aren't used in Relative Only orientations.
- The Stereo View now displays the digitised points on a polyline as an aid to point mode snapping.
- Control points and relative-only points are now displayed in different colours in the Images View. (A control point that has been disabled in the control point list is treated as a relative-only point in the bundle adjustment and so is displayed that way as well.)
- Increased the size of the fields in the Calibration Data dialog to show more digits.

- 3DM Analyst now notices when a bundle adjustment has been performed and prompts to save the project if the user tries to exit without saving.
- Added the ability to predict fiducial locations to speed up the interior orientation of scanned images.
- 3DM Analyst now automatically scrolls the views when a point ID is changed to ensure the point is visible.
- Added support for plan-only and height-only control points.
- Added support for detecting an inverted orientation.
- Interior orientation data now need only be set for the first camera when performing a camera calibration for a single camera. (Generally only the focal point needs to be set in this way, but previously the focal point had to be set for both the left and the right cameras, even if both were the same camera.)
- Fixed a bug that caused the software to crash on certain machines when company information was saved in the project file.
- Polylines now save their breakline status correctly.
- Removed annoying warning about ignored private TIFF tags in TIFF files.
- The pixel width text box in the camera calibration dialog box is no longer disabled.
- Fixed problem where 3DM Analyst would sometimes crash in terrain following mode if the floating mark was moved outside of the DTM area.
- Added support for larger textures to the 3D View so images appear more detailed.
- Polylines are always open during digitising now to ensure the user doesn't get confused about where the end is.
- Improved the performance of scrolling in the Images View.
- Greatly increased the performance of DTM point deletion.
- Fixed a problem that caused 3DM Analyst to crash occasionally when deleting DTM points in the 3D View.
- Fixed a problem with the 3D View resetting to a very small size after visiting one of the other views and then returning to it.
- Added Dip and Dip Direction support.
- Added support for digitising to the 3D View.
- Added a page to the Settings dialog allowing the user to enter their contact details, to be placed at the bottom of the Bundle Adjustment Report.
- Cross sections now honour area and hole feature boundaries correctly.
- Fixed a problem where an existing point would sometimes move when being transferred to a new image using the dual image cursor.
- Added the option to specify control point units to the New Project Wizard as well as the global settings dialog.
- Set the default units to metres rather than millimetres.
- The camera and lens file names as well as the interior orientation residuals are now remembered for scanned image projects so they don’t need to be entered again when an existing project is opened.
- The Interior/Exterior orientation dialogs now disable fields that should not be modified based on the current project type.
- The interior orientation parameters are now specified as Fixed by default for all non-calibration projects.

- Specifying the camera stations manually (not using a control point) now works correctly, and sigmas can now be specified.
- Re-organised the Bundle Adjustment dialog box to be more logical.
- Moved the option to generate the Bundle Adjustment results in HTML format to the Bundle Adjustment Results dialog, and made viewing it a separate option.
- The distortion settings are now only enabled for scanned image projects.
- 3DM Analyst no longer prompts for a calibration file name when saving a Scanned Image project.
- Commas can now be used as field separators in the control point file.
- Associated .VWR files with 3DM Analyst so that double-clicking on one will launch the software.
- Added keyboard shortcuts to most menu items.
- Re-arranged the menus to make the groupings more logical.
- Added menus to the 3D View so data can be imported and exported without switching between views.
- Added a button to set the global standard deviation flag on all control points simultaneously rather than requiring them all to be set on or off one-by-one.
- Added a button to the 3D View toolbar to re-centre the view.
- Fixed a bug that prevented control points with an ID of 100 from being displayed in the Report of Bundle Adjustment dialog.
- The co-ordinates at the bottom of the Stereo View are now updated when the user presses the Set Position button to move the floating mark.
- Distances entered into the Scale Setting dialog are now saved after pressing OK so the values don't need to be re-entered each time the window is opened.
- The bundle adjustment details can now be written to a user-specified HTML file to serve as a report for QA purposes. Image co-ordinate information can now also be exported to Aerosys and Australis to be used for block adjustments.
- If the calibration information for the model came from .ori files, the Imported Files dialog now reports their file names.
- Added support for DEMs.
- Added support for Index and Intermediate contours.
- Improved the performance of DTM generation.
- Fixed a problem that sometimes caused DTM points to not be connected by the TIN.
- Improved the performance of breakline processing.

## *3DM Analyst 2.0b*

Released: 27th June, 2003.

- Added a new DTM seeding algorithm to the Images View (activated by holding the control key down in either dual cursor or single cursor mode) that searches for additional points in the neighbourhood of the digitised point.
- Pressing the Save button on the toolbar now always behaves like a Save As… if it is the first time the current project has been saved. Previously, creating a new project from within another named project caused the new project to inherit the previous project's name and the Save button wouldn't recognise that the project was new.
- A loaded DTM that was generated using different epipolar image settings or in a different model is now displayed correctly. If the DTM doesn't belong to the current model, it can no longer be edited as this could cause inconsistencies in the triangulation algorithm.

- A Reset DTM Triangulation menu entry has been added to the Stereo View so the effect of new breaklines on the DTM can be checked without switching back to the Images View first.
- 3DM Analyst now detects if an inverted orientation is found (i.e. left and right cameras swapped).
- The camera separation is now used in relative orientations.
- Cancelling a bundle adjustment no longer erases the epipolar images and DTM.
- Pressing the Cancel button in the Control Point View dialog after setting a new global deviation now causes the original global deviation to be reinstated.
- The "Width" setting in the Cross Section Generation toolbar is now disabled so the user cannot change its value. It is only meant to show the difference between the start and the end.
- Contours and cross sections generated over a merged DTM are now clipped in the Stereo View in the same way that polylines are.
- The X, Y, and Z fields of the new Position toolbar in the Stereo View are larger to allow more significant figures to be seen.
- The user can no longer use the same DTM as the Base and the Selected DTM in the DTM Volume dialog box.
- Changing the Base or Selected DTM now causes all values in the DTM Volume dialog box to be cleared.
- Added a new feature that allows DTMs to be simplified by removing points that do not contribute greatly to the shape of the surface (i.e. points in largely flat areas).
- Added a new feature that allows spikes in DTMs to be automatically removed.
- The 3D View can now be switched to much faster when minor changes are made to the data.
- Enhanced the DTM generation algorithm so that it is much better at finding points on surfaces that are at very acute angles to the camera.
- Fixed a problem where triangles would sometimes pass over a hole feature.
- Fixed a problem that sometimes caused large numbers of points to be deleted when DTMs were merged.
- Fixed a problem where polylines would sometimes be deleted when the user performed an epipolar resampling.
- Contours can now be generated over any currently-loaded DTM.
- A new toolbar has been added to the Stereo View that allows the user to enter in new co-ordinates as well as fix movement in one or more axes. Note that attempts to move in a fixed axis can result in rapid movement in the other axes to compensate, so a "Re-centre" button has been added.
- Fixed a problem with the current position display at the bottom of the Stereo View so that it always shows the full co-ordinates.
- Cleaned up the Cross Section Generation toolbar and added the ability to clear existing Cross Sections.
- 3DM Analyst now correctly ignores headers it is not interested in when importing DXF files.
- Added OK and Cancel buttons to all Bundle-Adjustment related dialogs, so the user can choose to undo all the changes they may have manually made, and also to reject the results of running a Bundle Adjustment.
- DTM colour settings have been removed from the Colour Settings dialog as these are now controlled by the FDF.
- Adjusted the default thickness of the DTM Point Style in a new FDF from 2 to 1.5 as it was too large.
- 3DM Analyst no longer prompts the user to save the FDF again when the job is saved if the FDF has already been saved in the job directory.

- If camera stations are specified, their residuals are now displayed in the bundle adjustment dialog along with the control point residuals.
- Fixed a couple of bugs in the fiducial interior bundle adjustment calculation when using a table for the lens distortion values.
- Fixed a problem where pixel sizes were reported as negative for a fiducial interior when the scanned images were rotated 180 degrees.
- Loading images with associated .ori files no longer requires a bundle adjustment to be performed and the orientation data from the .ori files is now used correctly.
- Fixed a DXF file format incompatibility that was preventing DXF files generated by Analyst from working in versions of AutoCAD newer than R14.
- The user can now enter values into the Cross Section Generation toolbar and create cross sections without needing to press the Default button first.
- Changing the Base DTM setting in the Volume Calculation dialog now has an effect.
- The correct height value is now used for the Base DTM Volume Calculation.

## *3DM Analyst 2.0a*

Released: 6th January, 2003.