APS Reader for ArcGIS 10.1/10.2
User's Manual

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ARIS B.V.
http://www.aris.nl/

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1. Introduction

The APS Reader for ArcGIS makes it possible to view files in the APS format in ArcCatalog and ArcMap without having to convert those files.

Spatial models which have been written outside of standard GIS applications (i.e. written in C/C++ or Fortran), sometimes use the APS Grid format for storing intermediate and / or final results. In order to view this data in ArcMap, it is necessary to perform a conversion from APS to a format supported by ArcGIS, such as the ESRI GRID. This ESRI GRID can then be viewed in ArcMap.

Using the APS Reader, it becomes possible to preview APS rasters (output from the OPS model) directly and without conversion in ArcCatalog, and to add them to ArcMap. All the default raster operations in ArcMap (for example the Raster Calculator) can be applied to the APS Grid.

Floating-point and integer type APS Grids are recognized automatically. An important difference between floating-point and integer type rasters is that a Unique Value Classification is available only for integer rasters.

The APS Reader is implemented as a DLL which, once placed in the correct ArcGIS directory, is used to identify files in the APS format.

APS Reader version 1.0 can be used with ArcGIS versions 8.0 to 9.3.

APS Reader version 2.0 can be used with ArcGIS version 10.0.

APS Reader version 2.1 can be used with ArcGIS version 10.1.

APS Reader version 2.2 can be used with ArcGIS version 10.1 and 10.2.

APS Reader version 2.2.1 can be used with ArcGIS version 10.1, 10.2 and 10.2.1

2. Installation

2.1 Basic installation

Installation of the APS Reader is very straightforward:

Run the automatic setup (apsreader.exe) as administrator user. The setup procedure checks whether ArcGIS version 10.1 or 10.2.x is installed and determines the installation folder. Any necessary changes in configuration files for ArcGIS are carried out automatically. After the setup is completed the user can start ArcGIS and files with file extensions ".aps", ."plt" and ".grd" are recognised and shown by ArcGIS as APS raster grids.

2.2 Configuration

For advanced users it is possible to enable or disable one ore more file extensions. Open the menu "ArcCatalog Options" or "ArcMap Options" and tab "Raster". Click the button "File Formats" and check or uncheck the specific file extension (You will need to restart ArcCatalog or ArcMap to make the change effective):

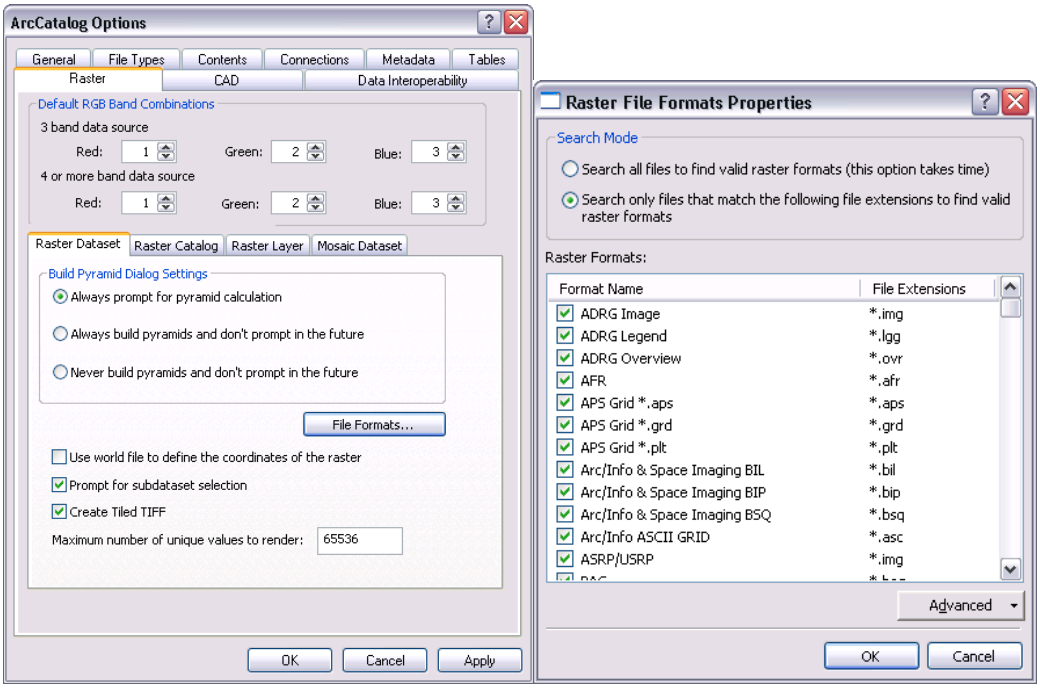


Figure 2-1. Custom settings to enable or disable Raster File Formats and/or File Extensions

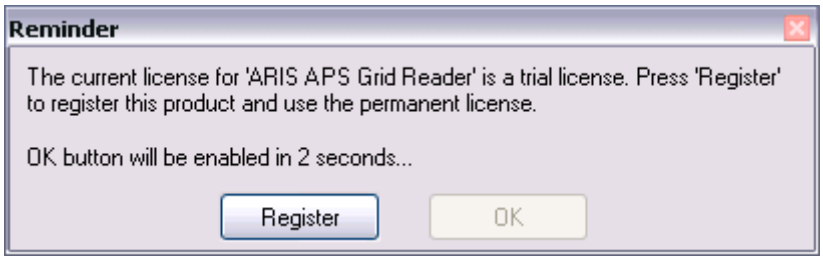
Configuration of the Raster File Formats and/or File Extensions can be useful to disable conflicting file formats.

Note: Due to a bug in ArcGIS 10 a file can still be recognized as an APS grid when the File Extension is also used by another File Format (e.g. *.grd).

3. Registration

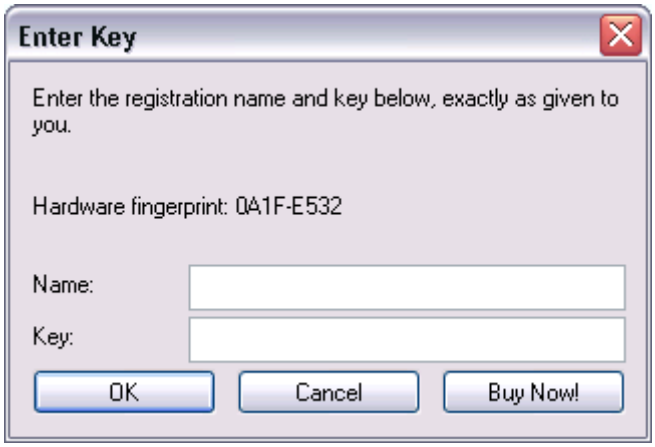
3.1 Trial license

The distributed version of the APS Reader is a fully functional version, except that there is a reminder message shown, almost each time you open an APS Grid file or when ArcGIS is requesting information from the APS Reader. For this reason you might see many reminder screens, especially when browsing a directory with many APS Grids (only in trial license mode).

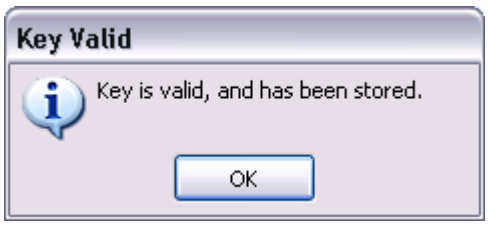


3.2 Register

Pressing the *Buy Now!* button will take you to our online store, where you can order this product. Note that you will need the hardware fingerprint of the computer where you want to install the tool, shown in the dialog below (appears when you press *Enter Key*). After you complete your purchase, a personal registration key will be sent to you by email. Please store this key in a safe place.
Pressing the *Enter Key* button will present you with the following dialog, where you must enter your name and the registration key.



Once you have entered a valid registration key, press *OK*. This key will be stored on your PC.



If you have the ARIS License Checker installed, the registration forms are also accessible through the ARIS License Checker. The ARIS License Checker is available without cost from http://www.aris.nl/download.

The ARIS License Checker is also a better alternative for registration if you still get reminder messages after successful registration.

3.3 Update license

When your license is not valid anymore through changes on your PC, you can obtain a new license (fair use policy) after you unregister the license using the ARIS License Checker. The ARIS License Checker is available without cost from http://www.aris.nl/download.

Send an e-mail to helpdesk@aris.nl with:

- ARIS product name and version
- original hardware fingerprint (active license, if available)
- registration name (active license)
- license key (active license)
- confirmation code (from unregister)
- new hardware fingerprint (from register)

If you are entitled to receive a new license key, a new key will be sent to you by e-mail as soon as possible (same day, but might also take some days as this is not an automated process).

4. Using APS files

After the setup procedure has finished, APS files can be used in ArcMap and ArcCatalog through standard ArcGIS functions (which use the APS reader software).

4.1 ArcMap

APS files can be used in ArcMap: Use the *Add Data* button () or drag from the Catalog Window (ArcGIS 10) to add an APS raster to the map:

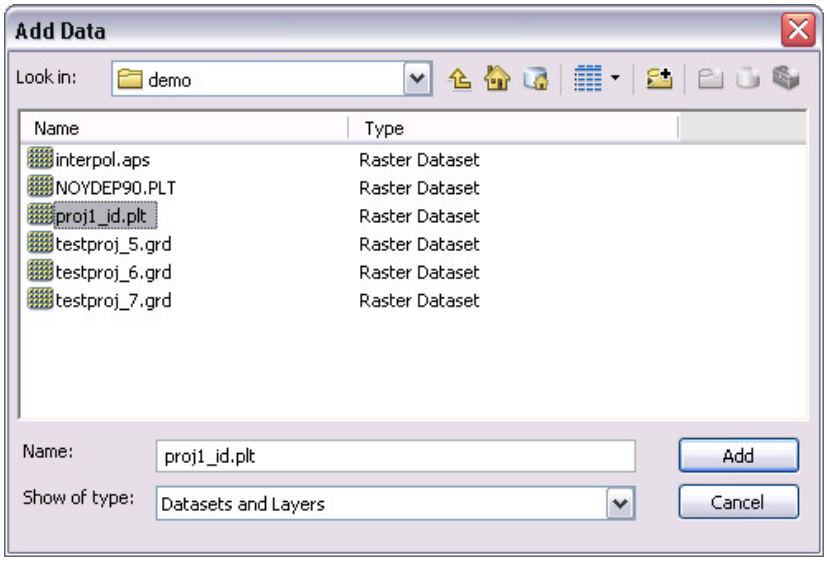


Figure 4-1. Add an APS file (Raster Dataset)

If the APS file (Raster Dataset) contains more than one layer, the first three layers will be added as RGB bands in the ArcMap view (Figure 3.3). If the APS file contains one layer the layer will be added as a grid to ArcMap (Figure 3.4).

To add an individual layer from an APS file, double click on the raster symbol () next to the filename, and after selecting a layer, press *Add*:

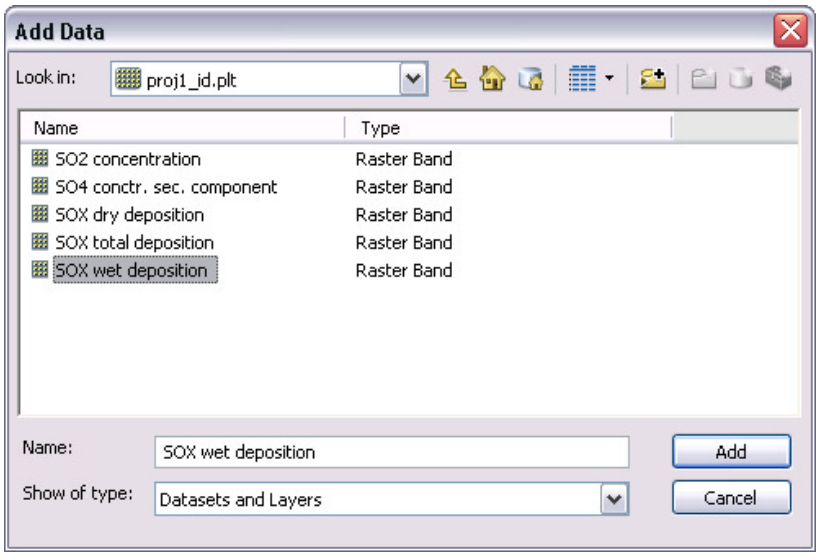


Figure 4-2. Add one layer (Raster Band) from an APS grid

Note: Only APS files that have a file extension *.APS, *.GRD or *.PLT can be used. Other file extensions will be ignored.

Likewise, all standard functions, such as the *Raster Calculator* and other *Spatial Analyst functions* are available.

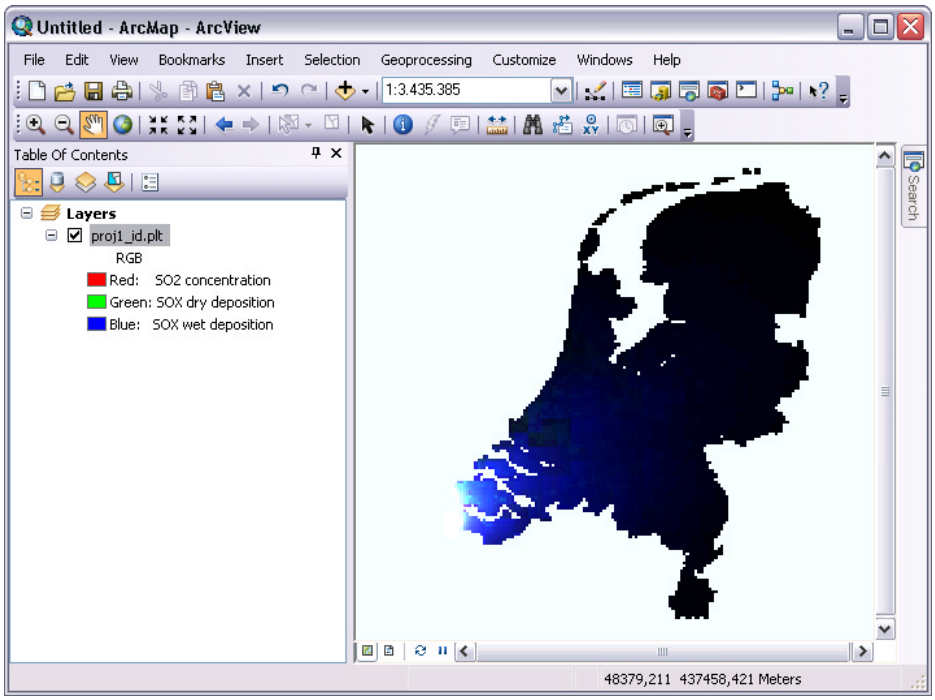


Figure 4-3. APS file with more than one layer in ArcMap shown as RGB bands

The view with RGB bands is not really functional, but is implemented to have result instead of giving an error message. The first three layers in an APS file are returned to be the RGB bands.

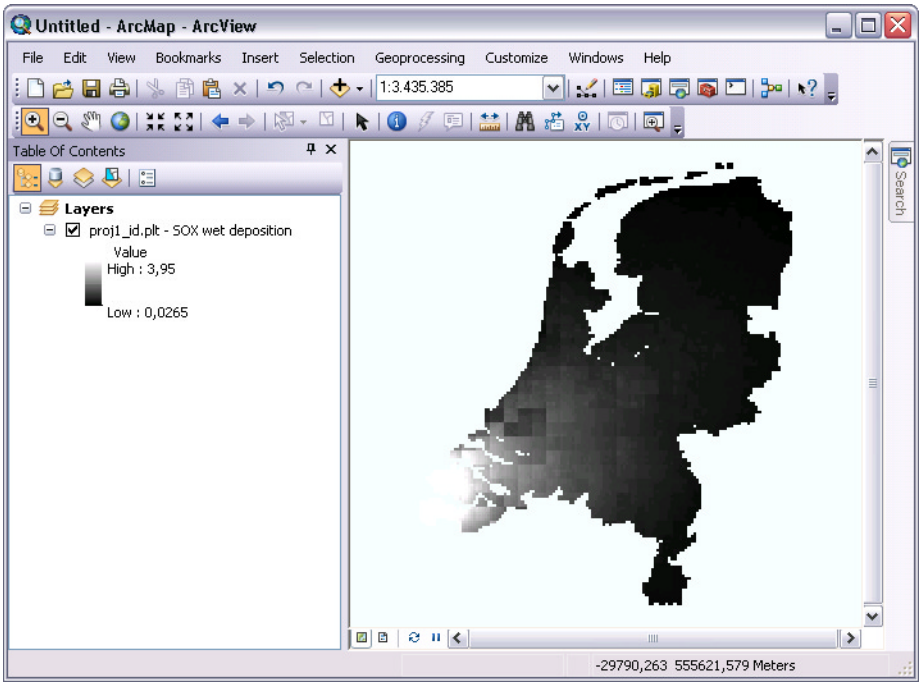


Figure 4-4. One layer from APS file streched between low and high value

4.2 ArcCatalog

In ArcCatolog APS files can be browsed and give the same preview of the file in RGB bands or streched between low and high value as in ArcMap.

Figure 4-5. Preview of APS grid in ArcCatalog

When the appropriate metadata stylesheet is chosen and depending of the setting in the APSReader.ini file (CEN or FGDS), the meta data will be generated automatically and show under e.g. FGDS for Process step and attributes (Figure 3.6).

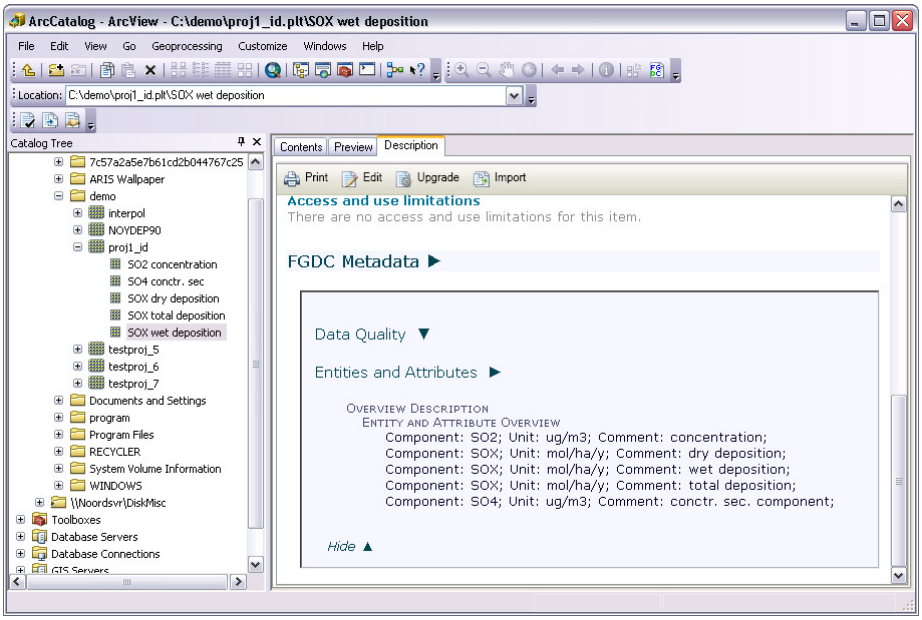


Figure 4-6. Meta data for APS file in ArcCatalog

5. Features:

Supported APS Features:

- Non-square cells.
- Multiple rasters in one file.
- All projections stored in the APS file, except Shifted Pole projections, are supported.
- Cell values for integer rasters are represented as 32-bit Integer values, floating-point rasters as 32-bit Single values.

Extended features:

- Storage of header values in ArcGIS metadata format. The metadata is stored in either CEN or FGDC format (default), depending on the setting in the APS reader configuration file.
- The APS Reader uses the value of the upper-left cell for NODATA, if it is a negative value.

6. FAQ

Q: I installed the APS Reader, but ArcMap and ArcCatalog still don't see APS rasters.
A: There can be several reasons for ArcGIS not to recognize APS rasters, some of which are:
- Something went wrong during the installation. You can try to run ArcMap or ArcCatalog as administrator once, open at least one raster file, then try again from your ordinary user account. Or do a reinstall as administrator. If it still doesn't work, contact us at helpdesk@aris.nl.

Q: Some APS rasters work, others don't, why is that?
A: The APS Reader currently only recognizes files that have a file extension *.aps, *.grd or *.plt. If your files are called, say, myraster.ras, or any other file extension, you have no option other than renaming it.
A: Possibly your APS raster is not in the correct format, see chapter 9 to check if your file complies with the APS Format.

Q: Does the APS Reader work with ArcGIS 9?
A: APS Reader version 2.1 only works with ArcGIS 10.1. You will need APS Reader version 1.0.2a for ArcGIS 9.2 and 9.3.

Q: Does the APS Reader work with ArcGIS 10.0?
A: APS Reader version 2.2 only works with ArcGIS 10.1 and ArcGIS 10.2. You will need APS Reader version 2.0 for ArcGIS 10.0.

Q: Does the APS Reader work with newer versions of ArcGIS?
A: APS Reader version 2.2 only works with ArcGIS 10.1 and ArcGIS 10.2. You will need a newer APS Reader version if available for higher ArcGIS versions.

Q: In ArcCatalog *Data Quality / Lineage / Process Step* is not filled in the meta data under FGDC.
A: This looks like a bug in ArcGIS 10. The FGDC Meta Data Editor for ArcGIS 10 (*fgdc.esriaddin)* shows the process information correctly.

7. Know problems

Registration
After registering the APS Reader for a permanent license it could occur that you have to enter your registration name and code every time you start up ArcGIS. Be sure to register the tool as an administrator. Note: Having administrator-privileges may not be sufficient.

Double click in ArcMap Catalog window
When in trial mode or when the trial period has ended, a double click on an APS Grid in the ArcMap Catalog window may result in unexpected behavior, like an OK button not becoming enabled or ArcMap closing the complete application.
When a valid license of APS Reader is available this problem does not occur.
This problem seems to be solved in APS Reader 2.2

8. History

This is the version history for the ARIS APS grid reader. The version number can be found by locating the file *aps.dll*, in a default ArcGIS installation this file should be in the folder *C:\Program Files\ArcGIS\Desktop10.2\Bin\gdalplugins*. Right click on this file and choose *Properties*. The *Version* tab contains version information.

Version	Features
1.0.1	First release
1.0.2	ArcGIS does not crash anymore when removing APS grids
1.0.2a	Setup has changed to be used for ArcGIS 9.2
2.0.0	Projection parameters in ini-file changed to "Meter" for the EMEP projections to be able to work with ArcGIS 10.0. Program and setup changed for compatibility with ArcGIS 10.0.
2.0.1	Minor bug fix.
2.0.2	Better check on valid ArcGIS versions in setup.
2.1.0	Program and setup changed for compatibility with ArcGIS 10.1
2.1.1	Bug fix for half cell shift to upper left
2.2.0	Program and setup changed for compatibility with ArcGIS 10.2
2.2.1	Program and setup changed for compatibility with ArcGIS 10.2.1

9. The APS Format

The APS raster is a matrix (formatted) representing gridcel values. The raster is preceded by a header which describes spatial attributes and details with respect to the actual content of the file.

The fields in the header have the following meaning:

Format	Column	Fieldname	Meaning
i3	1 - 3	Year	Year for which the matrix is valid
i3	4 - 6	Month	Month for which the matrix is valid (0 if not applicable)
i3	7 - 9	Day	Day for which the matrix is valid (0 if not applicable)
i3,1x	10 - 12	Hour	Hour for which the matrix is valid (0 if not applicable)
a10,1x	14 - 23	Comp	Quantity (for example NH4-deposition)
a10,1x	25 - 34	Unit	Units in which the quantity is represented (i.e. Mol/ha/y)
a10,1x	36 - 45	Data source	Data source (often the name and version of the model is used)
a22,1x	47 - 68	Comment	User comment (optional)
a6,1x	70 - 75	Format	Format of the data in the raster (for example F6.1[1])
i2,1x	77 - 78	Cordsys	Code for projection / coordinate system (codes 1-7; see below)
f8.3,1x	80 - 87	Xorg	X-coordinaat of the upper-left corner of the upper-left cell of the raster (units depend on the used coordinate system)
f8.3	89 - 96	Yorg	Y-coordinaat of the upper-left corner of the upper-left cell of the raster (units depend on the used coordinate system)
i3	97 - 99	Nx	Number of cells in X-direction
i3,1x	100 - 102	Ny	Number of cells in Y-direction
f8.3,1x	104 - 111	Wx	Cellsize in X direction (units depend on the used coordinate system)
f8.3	113 - 120	Wy	Cellsize in Y direction (units depend on the used coordinate system)

Textfields are left aligned.

Projection / Coordinate systems:
The following projections / coordinate systems are supported in the APS format:

1. Amersfoort coordinates (= shifted RDM)
2. Geografical coordinates (= lat/lon)
3. Shifted pole with equator at 50° NB
4. Shifted pole with equator at 60° NB
5. Stereografical projection according to EMEP
6. Stereografical projection according to IE (= EMEP/2)
7. Stereografical projection according to OECD (= EMEP/3)

The following ArcGIS projection strings are used:

Amersfoort:

```
PROJCS["RD_New",GEOGCS["GCS_Amersfoort",DATUM["D_Amersfoort",SPHEROID["Bessel_1841",63
77397.155,299.1528128]],PRIMEM["Greenwich",0],UNIT["Degree",0.0174532925199432955]],PR
OJECTION["Double_Stereographic"],PARAMETER["False_Easting",155000],PARAMETER["False_No
rthing",463000],PARAMETER["Central_Meridian",5.38763888888889],PARAMETER["Scale_Factor
",0.9999079],PARAMETER["Latitude_Of_Origin",52.15616055555555],UNIT["Meter",1.0]]
```

Lat/lon:

```
GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137,298.257223563]],P
RIMEM["Greenwich",0],UNIT["Degree",0.0174532925199433295]]
```

EMEP:

```
PROJCS["EMEP_150_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHERO
ID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199
433]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",450000.0],PARAM
ETER["False_Northing",5550000.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

EMEP/2:

[1] This is a format string as used in the Fortran programming language.

```
PROJCS["EMEP_75_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHEROI
D["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.01745329251994
33]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",412500.0],PARAME
TER["False_Northing",5512500.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

EMEP/3:

```
PROJCS["EMEP_50_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_Sphere_EMEP",SPHEROI
D["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.01745329251994
33]],PROJECTION["Stereographic_North_Pole"],PARAMETER["False_Easting",400000.0],PARAME
TER["False_Northing",5500000.0],PARAMETER["Central_Meridian",-
32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["Meter",1.0]]
```

Implicit values:
Two values of measurement are not explicitly mentioned in the APS header. These are the units of the coordinates for the origin en the units that are used for the cellsize of the raster. Both are kilometers for projections 1, decimal degrees for projections 2, 3 and 4, and EMEP/IE/OECD units for projections 5, 6 and 7.

Missing value:
The APS format does not support a ‘Missing Value’. A workaround that is being used at LLO is to use the value of the upper-left cell as ‘Missing Value’, if it is a negative value.

Metadata format:
The APS reader stores metadata in either CEN or FGDC (default) format, depending on the setting in the configuration file. To change the format, click on *Start* | *Programs* | *ARIS* | *APS Reader* | *Edit Configuration File* to open the configuration file. After the [metadata] section, set the format key to either *CEN* or *FGDC*, for example:

```
[metadata]
format=FGDC
```

10. APS Reader configuration

This is a sample configuration file for the APS Reader, containing a number of projection definitions. Projection definitions should be inserted after the [coordsys] section, the key name should be equal to the APS projection ID, and the key value should be an ArcGIS projection string. The projection string must be on one line.
The configuration file can be opened by clicking on *Start* | *Programs* | *ARIS* | *APS Reader* | *Edit Configuration File*.

```
[coordsys]
1=PROJCS["RD_New",GEOGCS["GCS_Amersfoort",DATUM["D_Amersfoort",SPHERO
     ID["Bessel_1841",6377397.155,299.1528128]],PRIMEM["Greenwich",0]
     ,UNIT["Degree",0.0174532925199432955]],PROJECTION["Double_Stereo
     graphic"],PARAMETER["False_Easting",155000],PARAMETER["False_Nor
     thing",463000],PARAMETER["Central_Meridian",5.38763888888889],PA
     RAMETER["Scale_Factor",0.9999079],PARAMETER["Latitude_Of_Origin"
     ,52.15616055555555],UNIT["Meter",1.0]]
2=GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",637813
     7,298.257223563]],PRIMEM["Greenwich",0],UNIT["Degree",0.01745329
     2519943295]]
5=PROJCS["EMEP_150_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_
     Sphere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Gree
     nwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stere
     ographic_North_Pole"],PARAMETER["False_Easting",450000.0],PARAME
     TER["False_Northing",5550000.0],PARAMETER["Central_Meridian",-
     32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
6=PROJCS["EMEP_75_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_S
     phere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Green
     wich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereo
     graphic_North_Pole"],PARAMETER["False_Easting",412500.0],PARAMET
     ER["False_Northing",5512500.0],PARAMETER["Central_Meridian",-
     32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
7=PROJCS["EMEP_50_Kilometer_Grid",GEOGCS["GCS_Sphere_EMEP",DATUM["D_S
     phere_EMEP",SPHEROID["Sphere_EMEP",6370000.0,0.0]],PRIMEM["Green
     wich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Stereo
     graphic_North_Pole"],PARAMETER["False_Easting",400000.0],PARAMET
     ER["False_Northing",5500000.0],PARAMETER["Central_Meridian",-
     32.0],PARAMETER["Standard_Parallel_1",60.0],UNIT["meter",1.0]]
[metadata]
format=FGDC
```

Appendix A. License Agreement

ARIS Software License Agreement for APS Reader for ArcGIS

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