

VISION+

Visualisation, Analysis and Animation of Images

Software Reference Manual

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Table 2: Document Change Record

Distribution List

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Table 3: Internal Distribution List

Company/Organisation	Name	No. Copies
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1 INTRODUCTION

2met![®] VISION+ is a windows based graphical user interface designed for forecasters and scientists to display and analyse meteorological and earth observation satellite images as well as level 1 and 2 products in form of overlay or self standing images. **2met!**[®] VISION+ allows the display of a huge range of satellite data provided in different formats. Due to the flexibility of nowadays transmission systems, e.g. EUMETCast, the range of data formats and the availability to the users have been increased enormously. This SW shall support this process. A list of actually supported data is provided in the annex.

1.1 Intended Audience

This software manual is written for users, i.e. forecasters and scientists, of the software with a focus to provide a detailed reference for all functions and items as well as description of the different data formats and data products.

Furthermore the manual shall be used by administrators for the installation of the SW. Some additional system information is provided to get a view on the possible architecture of a typical display workstation. For this purpose we also provide information on data (product) management aspects with respect to data distribution, file and directory naming conventions and disk usage aspects.

All users shall have a basic knowledge and experience in using standard tools of the operating system and standard display applications.

For a basic introduction to the application, please refer to the VISION+ User Guide.

1.2 Deliverables

2met![®] VISION+ is available in two different license versions,

- **2met!**[®] VISION+ and
- **2met!**[®] VISION+ Advanced

The “advanced” license provides option of processing data interactively using **2met!**[®] PROCESSING . The following table shows the list of deliverables for both versions.

Version	Deliverables
2met! [®] VISION+	CDROM including
	- Installation of 2met! [®] VISION+
	- Installation of 2met! [®] LIMIT
	- Installation of 2met! [®] VCSLOG
	- Software Manual
	SW License for VISION+, LIMIT, VCSLOG
2met! [®] VISION+ ADVANCED	CDROM including
	- Installation of 2met! [®] VISION+
	- Installation of 2met! [®] LIMIT
	- Installation of 2met! [®] VCSLOG
	- Installation of 2met! [®] PROCESSING
	- Software Manual
	SW License for VISION+, LIMIT, VCSLOG, PROCESSING interactive

1.3 Document Structure

Chapter	Description
1	Introduction – This chapter provides a brief overview how to use this document.
2	Installation and Configuration – This chapter describes the installation and configuration of the application for various usage.
3	Control Panel – This chapter describes all items, buttons, display fields and functions available on the Control Panel.
4	Menu Bar – This chapter describes all menu items and corresponding functions available in the Menu Bar.
5	Image Area – This chapter describes all windows in the image area, the related menu items and controls.
6	Status Bar – This chapter describes all fields in the Status Bar.
7	SW Architecture and Background Information – This chapter describes the architecture and provides background information about the function of the SW as well as format description and special configuration aspects.
8	Typical Problems and Recovery Procedures – This chapter provides some general recovery strategies.
9 Annex A	User Station Banner – This chapter gives some information about the configuration of the 2met! [®] User station banner.

1.4 Computer System Requirements

The SW typically has to cope with multiple large images e.g. for display of loop sequences. Accordingly the hard disks need to be as fast as possible. As the images need to be kept in the RAM of the computer for fast display and analysis, we also recommend the appropriate size of working memory. Some information is calculated on the fly to allow for optimum presentation, e.g. the overlay. Due to this, CPU performance is also an issue to be taken into account.

If a system is using network file servers for the data storage, the same requirements are valid for the server side. In addition the system administrator has to take the network components into account to allow a fast data access.

Nevertheless the SW has been tested successfully on slower systems, e.g. on Laptops with less RAM, slower disks and lower CPU performance. Due to this the scaling of the Computer is up to the customer and the budget.

A recommended display workstation can be set up using the following components:

- Operating System is Windows XP
- CPU Intel[®] Pentium[®] D 3 GHz (dual core technology),
- RAM 4 GB SDRAM
- Disk min. 2 x 80 GB SATA, 10.000 r/min,
- Network 1 Gigabit Ethernet,
- Monitor/Graphic min. 1280 x 1024 x 32 bpp – 32 MB VRAM

Please note that this is a mid-range PC. Better performance is possible using faster disks or even RAID systems.

1.5 Conventions

All conventions used within this document are referenced in SCISYS' Glossary [VCS/REF/GLOS].

1.6 Reference Documents

Acronym	Title	Reference
VCS/REF/V+RG	<i>2met!® VISION+ Reference Guide</i>	<i>VISION +</i> Reference Guide, SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/REF/GLOS	<i>2met!® System Glossary</i>	Glossary for EOSS Receiving Systems SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/REF/XPIF	<i>2met!® XPIF</i>	Extended Processed Image File Architecture, Reference Manual, SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/SWE/DIS	<i>2met!® DISPATCH</i>	Product Dispatch Software, Software Manual, SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/SWE/LIM	<i>2met!® LIMIT</i>	Product Directory Limitation and Purging Software, Software Manual, SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/SUG/DPS	<i>2met!® PROCESSING</i> User's Guide	Satellite Data Processing Software, Software User's Guide, SCISYS Deutschland GmbH, Release 2.5 or higher
VCS/SRG/DPS	<i>2met!® PROCESSING</i> Reference Guide	Satellite Data Processing Software, Software Reference Guide, SCISYS Deutschland GmbH, Release 2.5 or higher
VCS/SWE/VIS	<i>2met!® VISION</i>	Visualisation, Analysis and Animation of Images, Software Manual, SCISYS Deutschland GmbH, Release 1.0 or higher
VCS/SWE/LOG	<i>2met!® VCSLOG</i>	VCS Logging Facility, Software Manual, SCISYS Deutschland GmbH, Release 1.0 or higher
CGMS/LRIT/HRIT/GSP	Co-ordination Group for Meteorological Satellites - LRIT/HRIT Global Specification	CGMS 02, Issue 2.6, 12 August 1999
EUM/MSI	MSG Ground Segment - HRIT/LRIT Mission Specific Implementation	EUM/MSG/SPE/057, Issue 4.0, 21 September 1999
EUM/SKU	DADF ICD SKU	EUM/MSG/ICD102, MSG Station Key Unit, Interface Control Document, Issue 3.0, 23.08.1999

2 INSTALLATION AND CONFIGURATION

2.1 Prerequisites

In accordance with our product description SCISYS recommends equipment as mentioned in chapter 1.4 for good performance. Smaller systems can also be used for our application but will provide less performance.

2.1.1 Operating System

- Windows XP Professional, Service Pack 3, Windows 2000 Service Pack 4

Other operating systems might be adequate but have not yet been tested.

2.1.2 Disk Partitioning

The disk partitioning highly depends on the usage of the software in relation to the overall system and data management architecture. In the following we assume that the user wants to receive data from a central processing station via network file share copy or FTP.

Other architectures using central file servers or similar means are not covered by this document. SCISYS will support customers in designing their infrastructure for optimised data access on special request or in the framework of bigger projects.

When setting up the computer for our SW the user has to take into account, that the SW is typically dealing with a big amount of large image data files. Accordingly the disks shall provide sufficient storage capacity.

Disk partitions on a typical workstation with two logical or physical disks:

Disk 1: Operating system with executables and installation directories

Disk 2: Data Storage

2.1.3 Java

The software is written in Java[®]. Since Vision+ version 1.7 we recommend the following Java Run Time Environment:

JRE Version 1.7_0_021

In previous versions of Vision+ an older Java runtime environment was recommended. These should be deinstalled prior to an installation of the new version.

The SW is on the installation CD or can be retrieved from www.sun.com. Please install the JRE on your computer before the installation of the application.

After the installation it is recommended to de-activate the Java update option. The **Java Control Panel** exists under **Control Panel** (Start menu -> Settings -> Control Panel).

2.1.4 HDF library

For the display of HDF images the NCSA HDF Java library version 2.5 is used. This is automatically installed, when the Vision+ is installed. Anyhow the HDF library version 2.5 makes use of libraries from the Visual Studio 2005. These should be included in the Windows XP installations. In case Vision+ cannot be started or HDF images cannot be display it might be necessary to install the "Microsoft Visual C++ 2005 Redistributable Package" available from the Microsoft website. (The redistributational package will also be installed by the installation and can be started from the install directory of Vision+ using the setup file vcredist_x86.exe.)

The HDF library is currently only available as 32 bit library. When using HDF images you will have to run Vision+ using a 32 bit JAVA JRE and thus be limited in the amount of memory (about 1400 MB) that can be assigned to Vision+. When you are not using HDF images, you can run Vision+ with a 64 bit JRE with the benefit of access to the full memory of your computer.

2.2 Installation

The installation depends on the license version, the usage and the configuration of the software. The installation and the dependencies are described in the following chapters.

If you are having any problems installing the software, please contact SCISYS under the following address:

SCISYS Deutschland GmbH,
SPACE
Service
Phone: +49 (0234) 9258 – 260
Fax: +49 (0234) 9258-190
E-Mail: service.spacecom@SCISYS.de

2.2.1 General issues before installing VISION+

If a previous version of VISION+ is installed and in use, some manual arrangements are generally necessary before starting the VISION+ installation.



Please note: If you intend to keep the existing "property files" you should backup all property files from the folder ".2met" before doing these steps. If the shortcut buttons configuration from the previous version should be reused then never delete the property files **vision.user.shortcut.properties** and **vision.user.scenarioXY.properties**. As every user has his own property file, the properties should be saved from "C:\Documents and Settings\\.2met".

Afterwards the default steps are as follows:

- 1) Make sure you are logged on with local administrator rights.
- 2) De-installation of VISION+ with "Add/Remove Programs"
- 3) Manual deletion of VISION+ folder under "C:\Program Files\2met"
- 4) Manual deletion of the file "vision.user.properties" under "C:\Documents and Settings\\.2met"
- 5) Reboot of the machine

2.2.2 Dependencies to supporting software modules

Beside the VISION+ application, further 2met!® Software modules are required and recommended. Depending on the system type, the following modules are required:

- **2met!**[®] LIMIT Software is used to limit the number of files in directories as a background service.
- **2met!**[®] VCSLOG Software provides a logging background service to receive and store all log messages from the background services. The VCSLOG user interfaces allow access to log files and real-time monitoring of log messages.
- **2met!**[®] Advanced Processing Software allows processing and calculating products interactively. This is included in VISION+ Advanced.

If a **Processing and Display Computer** is set up, background processing and interactive processing is available anyway. Such a system also includes **2met!**[®] Dispatch for transfer of processed data (products) to other computers in the network.

For the installation the following sequence is recommended.

1. installation: **2met!**[®] VCSLog
2. installation: **2met!**[®] Limit
3. installation: **2met!**[®] Dispatch
4. installation: **2met!**[®] Processing Advanced
5. installation: **2met!**[®] VISION+

The following chapters provide more detailed information about the installation depending on the different system types.

2.2.3 Upgrade VISION+

A display system already installed and in use with all **2met!**[®] Software Modules needs only the upgrade of the VISION+:

For this the following steps are necessary:

1. Log in as the Administrator
2. Backup the folder “.2met” from “C:\Documents and Settings\\”
3. Open “Add/Remove Programs” and de-install VISION+
4. Delete the folder “VisionPlus” under “C:\Program Files\2met\”
5. Delete the file “vision.user.properties” under “C:\Documents and Settings\\.2met”
6. Reboot the machine
7. Insert the delivered installation CD into the computers CD-ROM drive
8. Start “setup.exe” and click on button “Next”
9. Select the target disk for “Program Files” and “Application Data” by accepting the suggested targets C:\ with the button “Next”.
10. Select “Typical” as the type of setup.
11. Click on button “Next” until the installation finishes.
12. Reboot the machine

A set up of different display systems with complete installations are described below.

2.2.4 Standard VISION+ Display Computer (VISION+ and LIMIT)

Such a display system is typically installed for forecasters. The computer will be provided with data from a central processing system on a regular basis. The LIMIT service is used to keep the disk space at a certain level.



For the installation process it is necessary to log on as a user with local administrator access rights. Please make sure that the preparation according to chapter 2.1 and 2.2.1 are performed.

1. Please insert the delivered installation CD into the computers CD-ROM drive.
2. Install **VCSLOG** - To install the **2met!**[®] VCSLog software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks and click on button Next until the installation finishes. Please refer to the corresponding manual for details.
3. Install **LIMIT** - To install the **2met!**[®] Limit software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks. Select "Typical" as the type of setup and click on button Next until the installation finishes. Please refer to the corresponding manual for details.
4. Install **VISION+** - To install the **2met!**[®] VISION+ software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks, select "Typical" as the type of setup and click on button Next until the installation finishes.
5. A set of **sample data** is on the CD, dependent on the version you obtained. The self-extract file **ImageRoot.exe** contains the sample data. The data can be extracted by double-click. The default destination **C** is suggested but if the machine has a more partitions or disks it is recommended to select **D** as destination.
6. Please request the license from SCISYS. Refer to chapter 2.3.

We recommend installing the Sample Data. They can be used to follow the tutorial. This installation is optional. Please refer to chapter 2.2.7.

2.2.5 Advanced VISION+ Display Computer (VISION+, LIMIT, INTERACTIVE PROCESSING)

Such a display system is typically installed for forecasters and/or scientists. The computer will be provided with data from a central processing system on a regular basis. The LIMIT service is used to keep the disk space at a certain level. The interactive processing allows the user to process satellite data interactively in order to develop new products.



For the installation process it is necessary to log on as a user with local administrator access rights. Please make sure that the preparation according to chapter 2.1 and 2.2.1 are performed.

1. Please insert the delivered installation CD into the computers CD-ROM drive.

2. Install **VCSLOG** - To install the **2met!**[®] VCSLog software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks and click on button Next until the installation finishes. Please refer to the corresponding manual for details.
3. Install **LIMIT** - To install the **2met!**[®] Limit software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks, select "Typical" as the type of setup and click on button Next until the installation finishes. Please refer to the corresponding manual for details.
4. Install **Processing** – To install the **2met!**[®] Processing Advanced software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Select D for the image target disk if a second partition or disk is available. Otherwise accept the suggested target drive of C. Select "Typical" as the type of setup and click on button Next until the installation finishes. Please refer to the corresponding manual for details.
5. Install **VISION+** - To install the **2met!**[®] VISION+ software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks. Select "Typical" as the type of setup and click on button Next until the installation finishes.
6. A set of sample data is on the CD. The self-extract file ImageRoot.exe contains the sample data. The data can be extracted by double-click. The default destination C is suggested but if the machine has a more partitions or disks it is recommended to select D as destination.
7. Please request the license from SCISYS. Refer to chapter 2.3.

2.2.6 Processing and Display Computer (VISION+, LIMIT, DISPATCH, PROCESSING)

Such a system is typically designed as a standalone system supporting automatic processing and the corresponding display. On the system itself, products are generated by the background processing. The LIMIT service is used to keep the disk space at a certain level. Besides the automatic processing, interactive processing allows the user to process satellite data interactively in order to develop new products. The DISPATCH is used to transfer product files to different locations in the network.



For the installation process it is necessary to log on as a user with local administrator access rights. Please make sure that the preparation according to chapter 2.1 and 2.2.1 are performed.

1. Please insert the delivered installation CD into the computers CD-ROM drive.
2. Install **VCSLOG** - To install the **2met!**[®] VCSLog software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks and click on button **Next** until the installation finishes. Please refer to the corresponding manual for details.
3. Install **LIMIT** - To install the **2met!**[®] Limit software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters

for the target disks. Select "Typical" as the type of setup and click on button **Next** until the installation finishes. Please refer to the corresponding manual for details.

4. Install **Dispatch** – To install **2met!**[®] Dispatch software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks. Select "Typical" as the type of setup and click on button **Next** until the installation finishes. Please refer to the corresponding manual for details.
5. Install **Processing** – To install the **2met!**[®] Processing Advanced software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Select **D** for the image target disk if a second partition or disk is available. Otherwise accept the suggested target drive of **C**. Select "Typical" as the type of setup and click on button **Next** until the installation finishes. Please refer to the corresponding manual for details.
6. Install **VISION+** - To install the **2met!**[®] VISION+ software on your computer start the file SETUP.EXE on the CD from the Windows Explorer. The instructions on the screen will guide you through the rest of the installation process. Accept the suggested drive letters for the target disks. Select "Typical" as the type of setup and click on button **Next** until the installation finishes.
7. A set of **sample data** is on the CD. The self-extract file **ImageRoot.exe** contains the sample data. The data can be extracted by double-click. The default destination **C** is suggested but if the machine has a more partitions or disks it is recommended to select **D** as destination.
8. Please request the license from SCISYS. Refer to chapter 2.3.

2.2.7 Set up of Data Organisation (Tutorial Data)

The VISION+ installation CD contains also a sample of image data. They can be used to start exploring VISION+ without having another data source. The usage of these data is highly recommended for the tutorial. These samples of image data are compressed in the self-extract file "ImageRoot.exe".

1. Please insert the delivered installation CD into the computers CD-ROM drive.
2. With a double click it can be extract with the whole content.
3. The default destination of the extraction is set to drive C:\.
4. The user can modify it to his wishes like D:\ or E:\ if there are other partitions or disks available.
5. After the extraction the sample data will be stored in "<selected drive>:\ImageRoot".

Please refer to chapter 7.6 for information on the recommended data structures.

2.3 Licensing the Software

Please note that **2met!**[®] VISION+ as well as the other **2met!**[®] programs are licensed. For the other programs a description is provided in the corresponding manuals.

The **2met!**[®] VISION+ software can be licensed using the registration dialog that is started from the Windows-START menu. Select the entry START > Programs > 2met > Vision+ > Vision+ Registration.

The registration dialog will display a hardware depended Registration Code. Please send this code to the SCISYS service (service.spacecom@SCISYS.de) and SCISYS will send you the license key for the activation of your Vision+ application.

Other software modules like LIMIT-, Dispatch- and Processing Software must be licensed and activated in a different way. For activating these modules it is necessary to open the User Station Banner. In the menu **Configuration** the entry **2met! Software Registration** can be selected to open the registration dialog.

The registration dialog is showing the hardware ID. This hardware ID must be sent to SCISYS service (service.spacecom@SCISYS.de). The SCISYS service then will send the licence key for the activation of the software modules.

2.4 Configuration

The Java application allocates a configurable amount of memory at the start. In our installation routine this will be configured automatically to half of the available memory of your system.

Recommendation: If you do not use your computer for real-time and/or operational tasks, you can easily increase the memory allocation. As the system needs certain disk space for other OS functions, one half of the memory to be allocated for the application is a proper figure.

Configuration of memory size for JRE

Depending on your installation, you will find the following command script

```
<program files disk>:\ProgramFiles\2met\VisionPlus\VisionPlus.cmd
```

Here the memory size is set like in the following example:

```
javaw -Xmx523m -classpath
```

The memory size is given in Mega Bytes. By changing the figure of 523, you can increase or decrease the memory allocation.

Please refer to chapter 7.2 for detailed information on memory usage and management.

2.5 Supervision

2met![®] VISION+ is an interactive application. At the moment, no background tasks or services are installed. This is different for the other **2met!**[®] services running under Windows XP. Please refer to the corresponding manuals.

2.6 Uninstalling





The software can be uninstalled from the system by selecting the Add/Remove programs tool from the Windows operating system, which can be found under:

“Start” -> “Settings” -> “Control Panel” -> “Add/Remove Programs”

Here select the **2met!**[®] VISION+ entry (and possibly the other products) and press the “Add/Remove” button. The software will be automatically uninstalled. Directories and files generated after the installation will not be automatically removed and must be deleted manually.

3 CONTROL PANEL

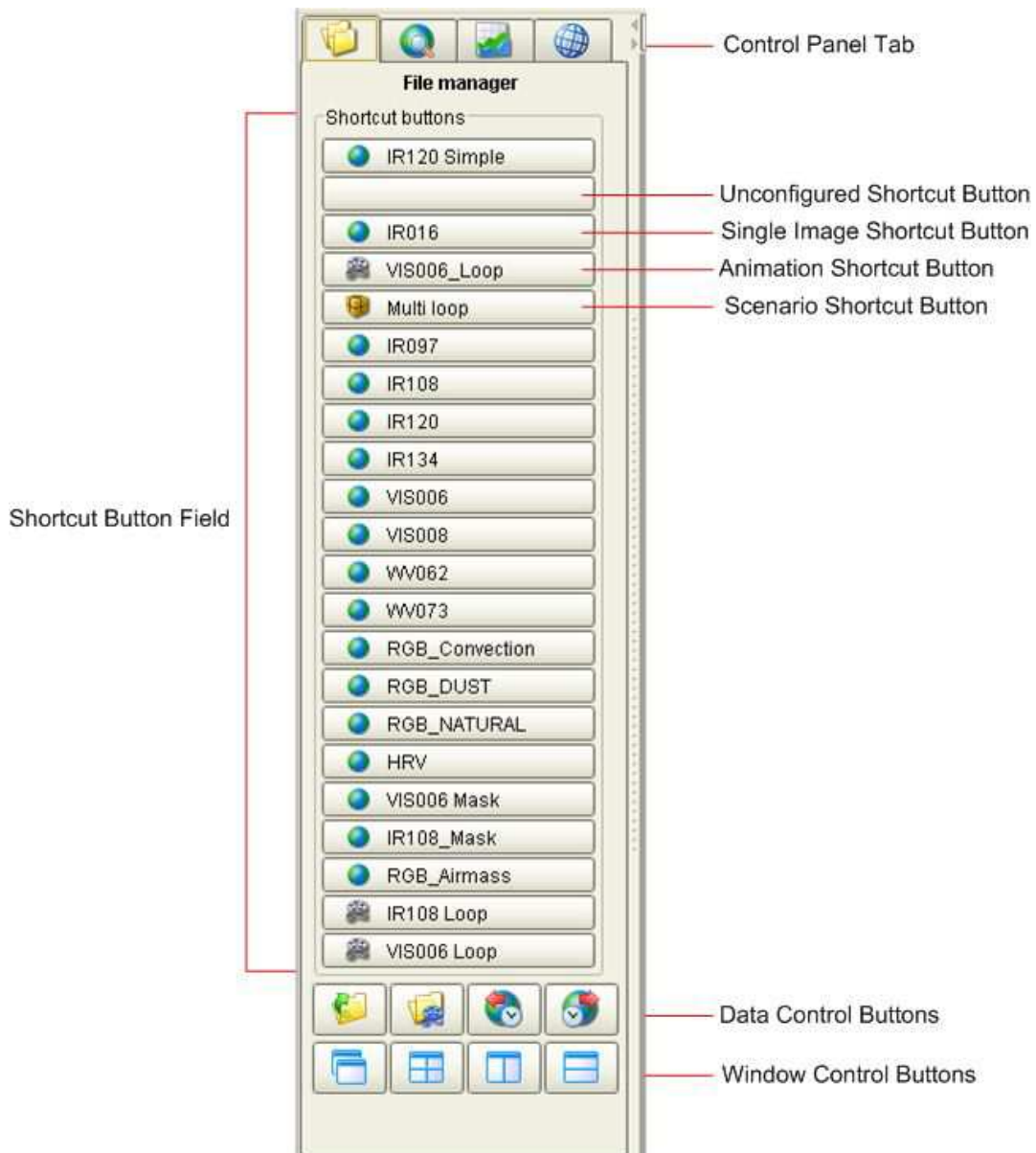
The Control Panel contains four panes,

- The File Management Pane (Tab icon ) – to load image data in form of single images and/or animation sequences and to arrange them within the Image Area
- The Image Control Pane (Tab icon ) – to control the view of the images with respect to the location, zoom factor, colour table or enhancement, synchronisation of images and controlling animations
- The Analysis Pane (Tab icon ) – to display various analysis results
- The Overlay Pane (Tab icon ) – to control the overlays of the images

One of the Control Panes can be activated, i.e. being displayed. By clicking on the Tab Icon, the selected pane will be brought to the front. Per default, the File Management pane will be active at programme start. The Panes can also be accessed by a keyboard shortcut (ALT + 1 ... ALT + 4).

3.1 File Manager Control Pane

A detailed description of all items and functions will be provided in the following issue of this document.



For a description on how to define a shortcut button, please refer to the user’s guide.

Button descriptions:



Open Single Image button. This button starts the Data Manager to open a single image



Open Animation button. This button starts the Data Manager to open a sequence of similar images to display them as an animation.

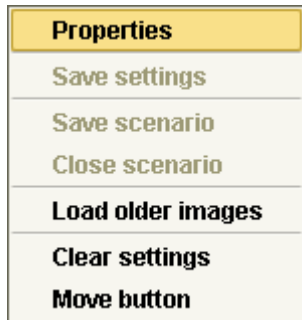


Show “Previous”, Show “Next” Image buttons. If you click to this button VISION+ seeks for an older or newer image in the same folder as the current selected image. If an image was loaded via a short cut button, the correspondent button will no longer be highlighted in grey, because using the short cut button VISION+ shows always the most recent image.



These are the window control buttons with the functions (left to right)

Cascade images, tile images evenly, tile vertically, tile horizontally. Clicking to one of the buttons will arrange all windows shown in the window area of VISION+.



This pop up menu is shown when clicking with the right mouse button to one of the short cut buttons. The items in the menu are greyed out dependent on the actual use of the button, and images loaded.

Using the “Properties” item you review and change the current button definitions. It is also possible to change a single image button into an animation button

The “Save Settings” function will store the information about the current selected image as button definition.

The “Save Scenario” function saves the information about all loaded images. The whole set of images may be loaded by clicking onto a single scenario button. Please not that all other images will be closed if you click to a scenario button.

“Load older Images” opens the data - manager with the folder selected as defined by the shortcut button to select other than the most recent images.

“Clear Settings” clears the button settings.

“Move Button” allows you to move the definitions of the button to another position.

The number of available shortcut buttons can be configured in the Vision+ property file `vision.user.properties` located in the user’s home directory in the subdirectory “.2met”. The entry `vision.shortcutbuttons.number` allows to set the number of shortcut buttons in the range of 20 to 500. Scrollbars will automatically be added to the shortcut button panel, if more buttons are configured.

3.2 Image Control Pane

A detailed description of all items and functions will be provided in the following issue of this document.



Zoom & Pan Functions:

Button functions (from left to right)



- Zoom in
- Zoom 1:1 (which means one pixel of the image is one screen pixel)
- Zoom out
- Zoom All (Shows the whole image)
- Lock area (All images with the same size and area will zoom % pan synchronously).

The frame shown in the thumbnail image marks the area of image which is visible on the screen. You may move the frame by drag & drop and the area of the image visible is moved accordingly. The slider below allows you to select the zoom factor, alternatively you may also type in a value in the box left of the slider. Please note that only zoom factors between (5% and 1600%) are allowed. If you would like to display the thumbnail without shore line overlay, you just need to click the check box left of "Show Overlay"

Colour Map Functions

The drop down box allows selecting one of the existing colour maps. The bar below shows the relation between pixel value (pixel count, or physical meaning, dependent on image loaded) and the correspondent colour. The scale is displayed dependent on image contents. The second bar shows the colours of the masked area if a colour mask is loaded. Please note that VISION+ offers only those colour maps which have been defined for the satellite and the data type of the image loaded. If you want to see all colour maps you may select once "Show All" in the drop down box. But in this case the results may be unpredictable.

Button functions (from left to right)



- Mask Image (Generates a mask if it is not yet available)
- Inverts the image
- Equalises the histogram (Should be used as a first step to generate a new colour map)
- Starts the colour map editor

Animation Controls

Button functions (from left to right)



- Start Animation
- Stop Animation

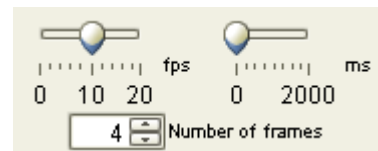
- Lock Animation (i.e. reloading of newer images is not performed)
- Lock all animations in timely manner. This means that the current selected animation becomes the “Master Animation”. All other animations will receive messages with the NIT of the master image currently loaded and will show an image with the same NIT if available. As a result all animations will run synchronously as long as they have image with the same NITs.

Button functions (from left to right)



- Jump to first image
- One image backwards
- One Image forwards
- Jump to last image

The last area allows you to configure speed and end pause as well as the number of frames for the animation. If you have your animation locked in timely manner all animations will be changed accordingly.



All the settings on the Image Control Pan will be saved to the shortcut buttons. (The synchronize functions are only available for Scenario buttons.)

3.3 Image Analysis Pane

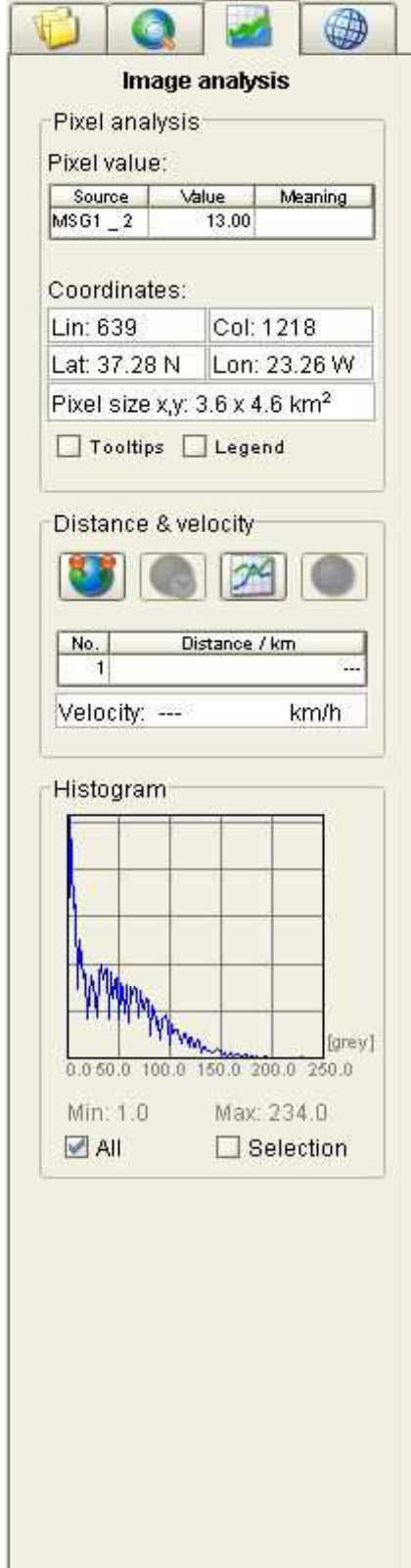


Image analysis

Pixel analysis

Pixel value:

Source	Value	Meaning
MSG1_2	13.00	

Coordinates:

Lin: 639	Col: 1218
Lat: 37.28 N	Lon: 23.26 W
Pixel size x,y: 3.6 x 4.6 km ²	

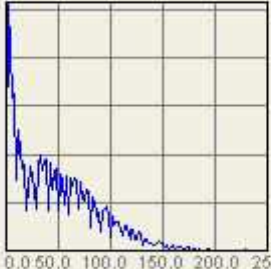
Tooltips Legend

Distance & velocity

No.	Distance / km
1	---

Velocity: --- km/h

Histogram



Min: 1.0 Max: 234.0

All Selection

The image analysis pane offers tools to evaluate the image contents. The Pixel analysis is used to display the values for selected image pixels. It will show the pixel values with their physical meaning instead of pixel counts if available. Pixel values of images containing brightness temperatures will be shown as temperatures. Reflectance images are shown in %, etc.

The coordinate area shows the coordinates of the current cursor position when it is located over the image area in image coordinates (lines & columns) as well as geographical coordinates. The shown pixel size is the east and north distance – centre to centre - of the closest pixel in that direction.

If the Tooltip radio button is checked it will show a tooltip containing the pixel information as mentioned above as long as the cursor is located over an selected image.

The legend button opens an additional window showing the colour map and a scale for the pixel values. In case of images with discrete values like cloud type image in HDF5 format it will also show the type of the cloud if available either in the meta data of the image or in the auxiliary files for the HDF5 SAF data.

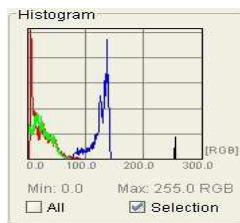
The Distance & Velocity area allows to measure distances in the image. The velocity function is not yet implemented.



The button functions are as follows

- Measure Distance, to perform the measurement click to the image area, keep the left mouse button pressed and release it at the desired endpoint of the distance. The measurement takes into account that the earth is a sphere. Several measurements are possible.
- Not yet implemented.
- Cross Section, to display a cross section proceed as described above. The result is a cross section at the distance line.
- Not yet implemented.

The histogram area shows the histogram either of the whole image loaded or from a selected area. To choose an area first check "Selection". Then select the first corner point of the desired area in the image loaded, keep the left mouse button pressed. Move the cursor the second corner point and release it. The histogram of the rectangular area will be shown in "real time", it means that the histogram contents changes while you choose the area.

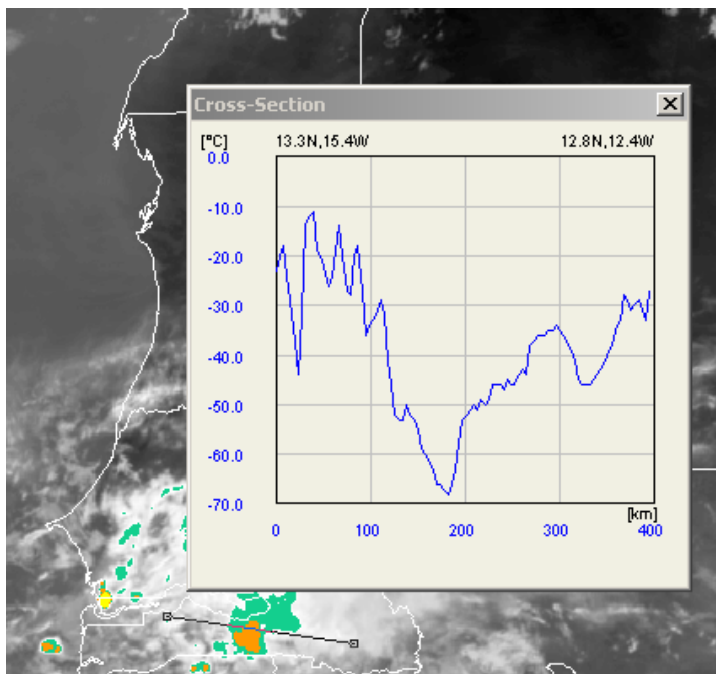


For an RGB image the histogram will show three graphs, one for each of the red, green and blue part of the pixel values. Each graph will be shown in the corresponding colour. For those pixels where the R-, G and B-value is exactly the same, a fourth graph (in black) will be shown.

Histogram data can be exported as comma-separated-value files (CSV). By right-clicking on the histogram it is possible to export the data to a user-specified output file. For RGB images all three graphs will be stored in one CSV file.

Additional information about the currently loaded image can be displayed by pressing ALT + P.

Sample Cross Section Display



The cross section will be shown as a separate window which may be moved freely. The line below the cross section windows marks the pixels from which the values are taken to create the cross section. The cross section will be kept open until to select another image or you switch the function of. So you may perform several measurements one after the other. The cross section window will be updated whenever you mark a new line. The cross section always refers to the last measurement done. The only exception is: When clicking on one of the measurements in the list of distances, the cross section will refer to the selected row.

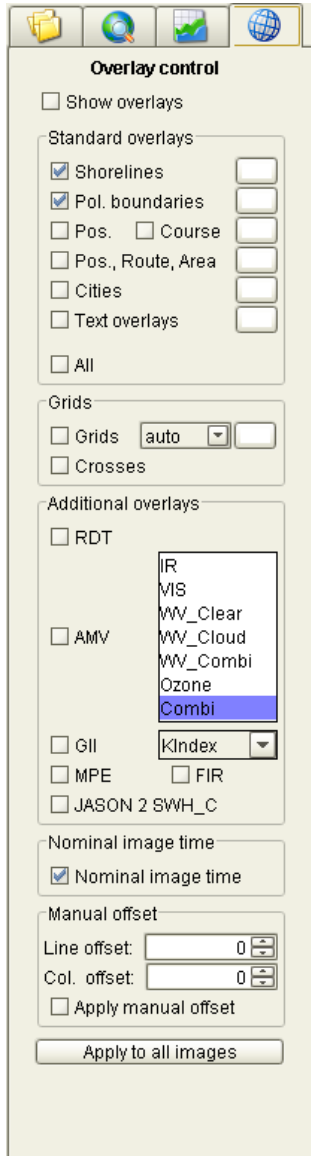
Cross-Section data can be exported as comma separated values list (CSV file) by right-clicking on the diagram area.

When distance measurements are made, the button functions will be modified. The buttons that will allow the following selection:



The second item will allow deleting all current distance measurements in the list.

3.4 Overlay Control Pane



The Overlay Control Pane will allow you to select overlays which are displayed above images. Some of the overlays require that you have access to additional data.

The top most button allows you to switch all overlays on or off at a time. The last button allows applying the overlay settings of the current frame to all other frames currently open.

Standard overlays are generated from a database included in the applications these are the shorelines, political boundaries and cities. The Pos. and Course button are intended for ship based applications where the position of the reception system is recorded in a database and can be displayed as overlay information. A regular grid can also be displayed. The grid distance will be automatically adjusted dependent on the resolution and zoom factor of the image shown, when the distance selection box is set to "auto". Otherwise the grid will have the selected distance: 10, 5, 2, 1 or ½ degree.

Text overlays or the "Position, Route, Area" overlays can be used to display free defined texts, position markers, polygon lines or areas on the list.

The colours of the standard overlays can be chosen by double clicking to the colour field right to the radio button. Double clicking opens the same colour picker dialog as available within the colour map editor. The chosen colour is stored together with the other shortcut settings and may therefore be adjusted for each image loaded. The text font used for these overlays can be selected in the Configuration > Preferences > Overlay dialog.

The additional overlays require extra data. The current supported data are: The rapid developing thunderstorm product produced by the "Now Casting SAF", the Atmospheric Motion Vectors and Global instability index as available from EUMETSAT as MPEF products via EUMETCAST in MSG XRIT format. The folders where the application searches for the data can be configured in the preferences dialog. The AMV and GII data reside in the same folder whereas the RDT data will reside in a different folder. When such overlays are activated the application tries to find data with matching image time. AMV and GII data to be used as overlays may be 1 hour old, RDT data may 15 minutes old. Otherwise no overlay is shown and the status line will show a message saying the no data is available.

For images with the original MSG XRIT resolution (3712 x 3712) in the geostationary projection (center longitude 0°) the MPEF products MPE and FIR can be selected as overlays. The location for these products as well as the used colourmaps for the overlay can be configured in the user properties file. To use these products as overlay currently for the MPE all pixels with a value different from 0 are shown above the selected image, for the FIR product all pixels are shown that are different from 0 and from 3. For single images the Vision+ first tries to find a file that matches the displayed image in time. If no such file can be found a file open dialog is shown that allows the user to select a file. So to display these MPEF products e.g. a blumarble XPIF file can be selected as the background image, too (such a blumarble XPIF is contained in the sample data from the installation). For animation only images are searched that match in time. If no such images are available, no MPEF overlay will be shown.

Following values from the user properties file are used for the MPEF overlays:

```
vision.mpef.searchdirectory=F:\2met\Test\MPEF (specifies the directory that contains the MPE and FIR product files in XPIF format)
```

```
vision.mpef.mpegcolortable=MPEG__MPEG_mmhr_ALL_ALL.rgb (specifies the colourmap for the MPE overlay)
```

```
vision.mpef.fircolortable=FIR__FIR_FIR_ALL_ALL.rgb (specifies the colourmap for the FIR overlay)
```

The colours for the RDT, AMV and GII overlays are configured in the user properties file and will not be stored within a short cut definition. As the GII data are display as imagery data with pixels having a different value a

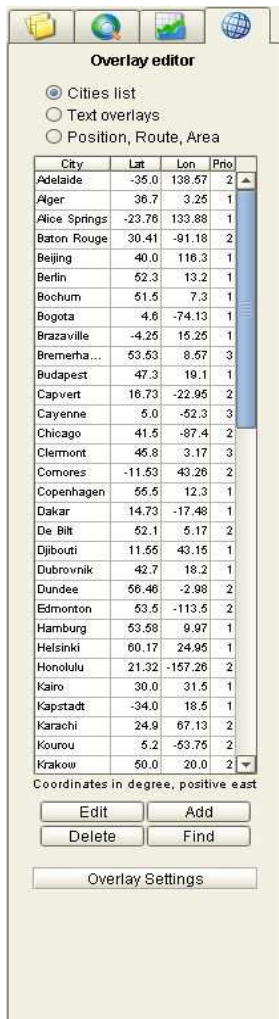
colour map is used to define the display colours. The predefined colour maps are using the same colours as suggested in EUMETSAT examples.

Finally the option "Manual offset" can be used to shift the offset by up to 100 pixel in line and/or column direction. This can be used to fine adjust overlay positions in the image. This option can also be hidden in Configuration > Preferences > Overlay.

KIndex	-8.0 K
KOIndex	-6.0 K
PLIndex	2.0 K
Max. Buoyancy	22.0 K
Precipitable Water	24.0 kg/m**2
Confidence	89.0 %
Latitude / Longitude	34.43 N / 17.31 E

When moving the cursor over an area which shows GII data the tools tip contains information about all layers found in the GII.

Overlay Editors



By selecting the button "Overlay Editors" the Overlay Control Pane can be switched to a list in which some of the overlay content can be edited.

After pressing the "Overlay Editors" button the pane switches to a different content:

It basically consists of a list of items that can be edited.

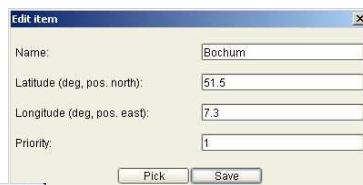
The editor allows editing of:

- City names and positions for the cities overlay
- Text and position of text overlays
- Position markers, polygons and areas for the "Pos., Route, Area" overlay

Entries in the list can be modified by clicking on the list entry or by choosing one of the 4 buttons: Edit, Add, Delete or Find.

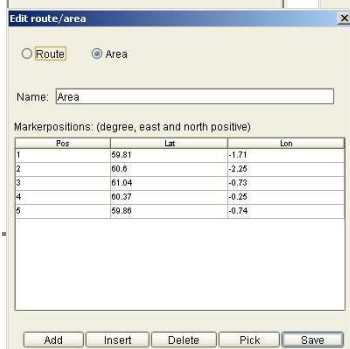
"Edit" allows editing the selected list entry, "Add" allows adding a new entry to the list, "Delete" allows to delete one or more selected items from the list and "Find" allows searching for an item in the list.

When adding or editing items in or to the list, a new dialog is opened depending on the current item list selected. For cities and text overlays the following dialog is displayed:



It allows editing name and position of the current item. The "Pick" buttons allows the selection of the item's position using the mouse pointer.

For "Position, Route, Area" items consisting of more than one point a different dialog is shown, listing all items belonging to a route or area.

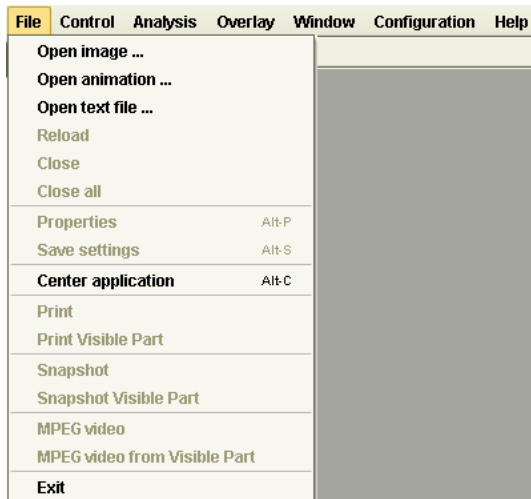


Here points can be added, inserted, deleted or again selected using the mouse ("Pick" button). Here the mouse selection is active until it is deactivated.

Geographic positions can either be specified as decimal number (in degree, e.g. $45.5^{\circ} = 45.5$) or as degrees, minute, second (e.g. $45^{\circ} 30' 0''$).

4 MENU BAR

4.1 File



“Open image ...”	is equivalent to the open image button
“Open animation ...”	is equivalent to the open image button
“Open text file ...”	Can be used to load and display simple ASCII files
“Reload”	The reload function forces a reload of the data from disk into memory. Dependent on the number of images in an
“Close”	Closes the current selected image
“Close All”	Closes all opened images
“Properties”	Shows parts of the image header, may also be start using the keys Alt-P. The content shown is dependent on the type of image opened
“Save settings”	This option allows to save the current image settings (including colour table, overlay settings, zoom factor etc.) to the image directory. All images opened from this directory will than use these settings the next time opened from this directory. These “default” settings will be used unless you load the image using a shortcut button.
“Center application”	Useful for system using more than one display. The application will be centred on the current display.

The functions “Print”, “Snapshot” and “MPEG” video may either be used for only the part of the image windows visible on the screen or for the whole image. If the image loaded does not fill the window completely the “visible part” also contains those parts of the window which do not contain image information. All the functions mentioned below use all information visible on screen like colour maps, mask, BlueMarble underlays, overlays etc. to achieve results which are as close as possible to the screen representation.

“Print” creates printouts of images using the standard java print dialog for Windows.

“Snapshot“ creates a screenshot of the active frame.

“MPEG video” creates MPEG 2 videos from animations only.

For the MPEG videos an aspect ratio can be defined in the preferences dialog:

Use aspect ratio for mpegs Aspect ratio (w/h)

If you want the intermediate tiff images that are created for the MPEG video to have a certain aspect ratio mark the check box “Use aspect ratio for mpegs” and specify the desired aspect ratio (as quotient image width / image height). The Vision+ will then select a centered cutout with the selected aspect ratio that is as large as possible.

Note: the selection of an aspect ratio will only be the first step necessary to generate an mpeg video that has the desired aspect ratio. Currently you will have to adjust the size (width and height) of the resulting video manually in two different files: in the ‘make_mpeg.bat’ file (search for this file in the “MPEG encoder dir” that is set in the Preferences editor) adjust the size for the rescaling and the mpeg encoder in the following lines (to match your desired aspect ratio):

```
REM ----- 1.) Rescale -----
%3 -scale 720x576! "*.tiff*" 1<&2
...
REM ----- 3.) Encode Video -----
%4 %5 %6 "*.ppm" 4 720x576! 1<&2 1<&3
```

The same applies for the file ‘mpegenc.par’ (located in the same folder). Adjust the values in the following lines:

```
720 /* display_horizontal_size */
576 /* display_vertical_size */
```

4.2 Control



The “**Zoom**” functions are equivalent to the buttons in “image control pane”

Mask Image

This function creates a land/sea mask file which is loaded to distinguish between the different areas using a special colour map. If you use a mask file you may split your colour map and use different colours for the different colour maps. The mask file is stored in the same folder as the image you created the mask for.

BlueMarble

This function creates an underlay for the image loaded using BlueMarble files provided by NASA via the web site <http://visibleearth.nasa.gov>. This function is only available for images converted to brightness temperatures as the temperature of an image pixel is used to define its transparency over the underlying BlueMarble image. The pixels will appear more transparent the higher the temperature is. The settings in the preferences dialog define from which temperature on the pixels will become more and more transparent until the temperature reaches the upper limit. From this value on the pixels are fully transparent. Appropriate values for the lower and higher limit may change over the year in the same way as the surface temperatures change.

Additionally a colour map definition is applied to the images. As a result you may change the colour of all clouds. This feature may be used to get better structured clouds for the non-transparent areas.

As the image displayed is no longer an 8 bit indexed image but a true colour image, all colour map manipulations take much more time than usually. A very fast computer with a at least 2GB RAM is

recommended to perform this functions. Using this function on slower computers is possible but may require some patience in using it.

The VISION+ application will automatically reproject the BlueMarble so that the underlay matches the image loaded. The underlay file will be stored in the same directory as image it was created for and receives the extension “.MRB”.

If you want to change the BlueMarble file and use a different one, being more suitable for the current season (A BlueMarble is available for every month of the year!), you need to delete the “.MRB” file and change the used BlueMarble file in the preferences.

The simplest way to get a first BlueMarble underlay is to load an image converted to brightness temperatures, load a suitable colour map or create a new one (us only black & white colours for your first attempt!) and then check the BlueMarble button and wait! (On a 1.6GHz Laptop type computer with 1GB Ram it takes approx. 90sec)

Lock animation

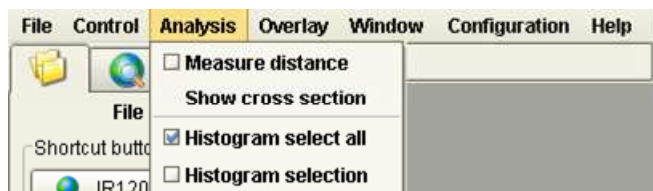
This function prevents VISION+ from loading new images as soon as they arrive.

Add linked animation

This function links animations so that the animate with the same speed and show always images from the same date and time – as long as all animations contain images from the same date and time. The current selected animation is the master animation in such cases. All other animations get a message about the timestamp of the current image of the master animation. If they don't have an image of the same timestamp, they keep showing the last image. This function links images only with respect to the timestamp, it does not care for the area shown.

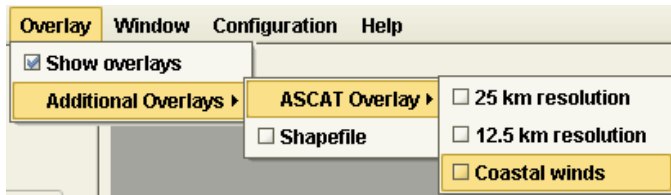
The functions “**Start, Stop, First Image, Next Image Previous Image, Last Image**” are equivalent to the two buttons in the “image control pane”.

4.3 Analysis



The functions of the analysis menu just repeat the functions of the radio buttons in the image analysis pane.

4.4 Overlay



The overlay drop menu only allows switching on or off all overlays completely. This is identical to the radio button in the Overlay Pane.

In the menu for “Additional Overlays” further overlay types can be found which are not accessible through the Overlay tab. These are the following:

ASCAT Overlay ASCAT data shows winds at sea level. Different resolutions are available. ASCAT data must be imported in BUFR format as received via EUMETCAST.

Shapefile displays overlays imported from a shapefile (shp). Only points, lines and polygons are supported (types 1, 3, 5, 8, 11, 15).

4.5 Window



The functions “cascade, Tile evenly, Tile horizontally, Tile vertically” of the drop down menu are identical to the correspondent button functions on the file manager pane. The function “Close” closes the current image and “Close all” closes all opened images.

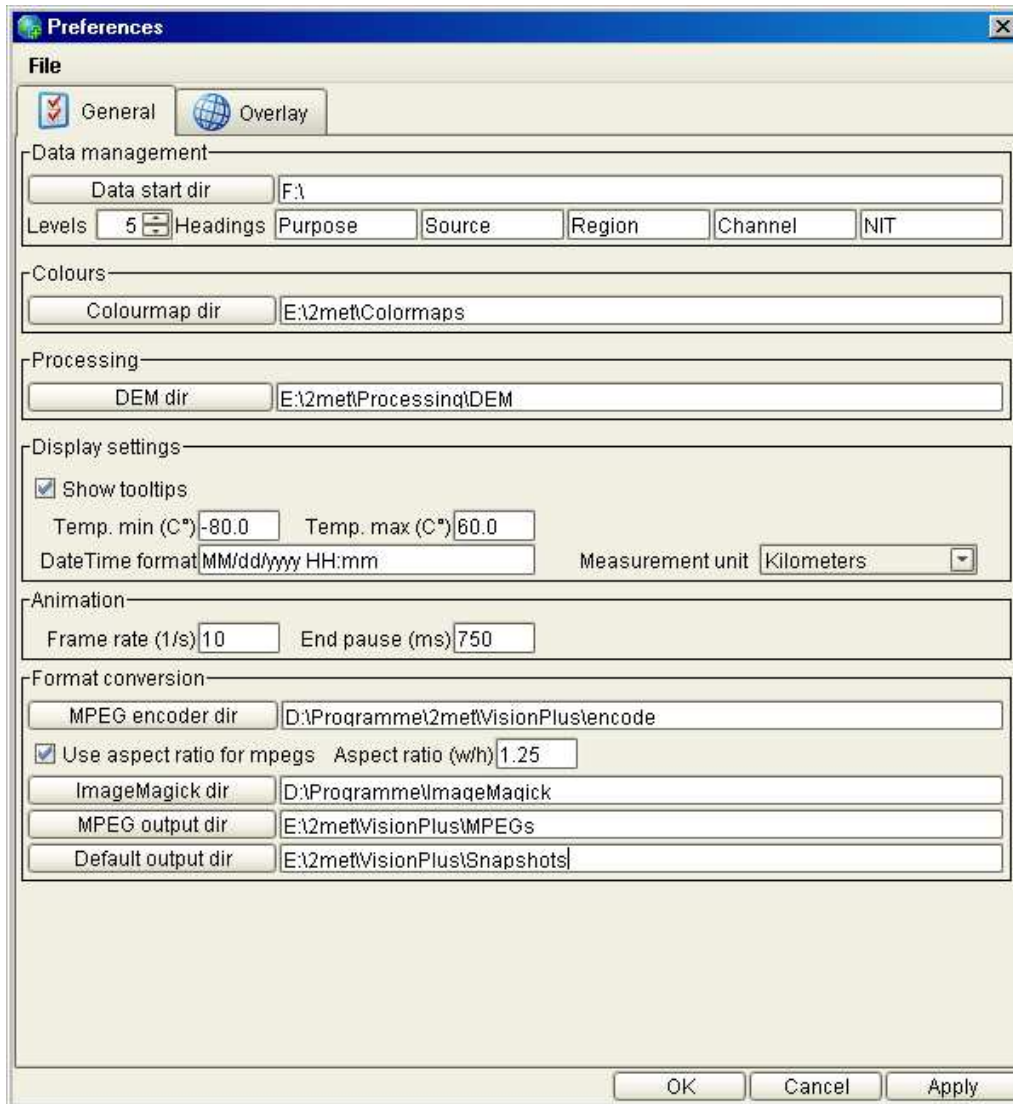
Using the “Full screen” option or the key combination STRG+F the currently active frame will be displayed in a full screen mode. To end the full screen mode, again press STRG+F.

4.6 Configuration

This chapter will guide you through the configuration dialog. All the preferences set will be stored in a “user properties” file located in the user’s home directory. As a result the settings are user dependent. There are no global settings other than those defined during the installation. To make sure that a new user may use the application, an initial set of configurations are stored in the file vision.user.properties which is located in the folder where the main application is installed. If – during application start – no property file is found in the user home directory, this file will be copied to the users home directory. It is an ASCII file following Java rules for property files



The following figure shows the preferences dialog. Its sub-windows are described below:



The general tab shows all settings related to installation directories as well some default settings for data treatment.

Data Management

The data management settings are related to the Data Manager. The default start directory is set-up here as well as the headings used for the columns in the data manager.

Colours

Defines the default folder for the Colour Maps used.

Processing

DEM Dir

Location of Digital Elevation Model used for masking images

Display Settings

Show tooltips	If this button is checked the tool tips will be shown by default
Temp.Min/Temp.max.	For temperature images only temperature between this values will be mapped to a certain colour defined by a colour map. Values above or below will be set either min or max. value for display. See section 7.1 for details
Measurement unit	Unit for distance measurements. Can be kilometres or nautical miles.
Date time format	This defines the format of date and/or when displayed within VISION+. The abbreviation follows Java rules for date and time formats.

This is a list of valid abbreviations:

Letter	Date/Time Component	Presentation	Examples (depend on operating system language)
G	Era designator	Text	AD
y	Year	Year	1996; 96
M	Month in year	Month	July; Jul; 07
w	Week in year	Number	27
W	Week in month	Number	2
D	Day in year	Number	189
d	Day in month	Number	10
F	Day of week in month	Number	2
E	Day in week	Text	Tuesday; Tue
a	Am/pm marker	Text	PM
H	Hour in day (0-23)	Number	0
k	Hour in day (1-24)	Number	24
K	Hour in am/pm (0-11)	Number	0
h	Hour in am/pm (1-12)	Number	12
m	Minute in hour	Number	30
s	Second in minute	Number	55
S	Millisecond	Number	978
z	Time zone	General time zone	Pacific Standard Time; PST; GMT-08:00
Z	Time zone	RFC 822 time zone	-0800

Some examples:

Date and Time Pattern	Result
"yyyy.MM.dd G 'at' HH:mm:ss z"	2001.07.04 AD at 12:08:56 PDT
"EEE, MMM d, 'yy"	Wed, Jul 4, '01
"h:mm a"	12:08 PM
"hh 'o'clock' a, zzzz"	12 o'clock PM, Pacific Daylight Time

Date and Time Pattern	Result
"K:mm a, z"	0:08 PM, PDT
"yyyy.MMMMM.dd GGG hh:mm aaa"	02001.July.04 AD 12:08 PM
"EEE, d MMM yyyy HH:mm:ss Z"	Wed, 4 Jul 2001 12:08:56 -0700
"yyMMddHHmmssZ"	010704120856-0700

The shown text differs dependent on operating system language!

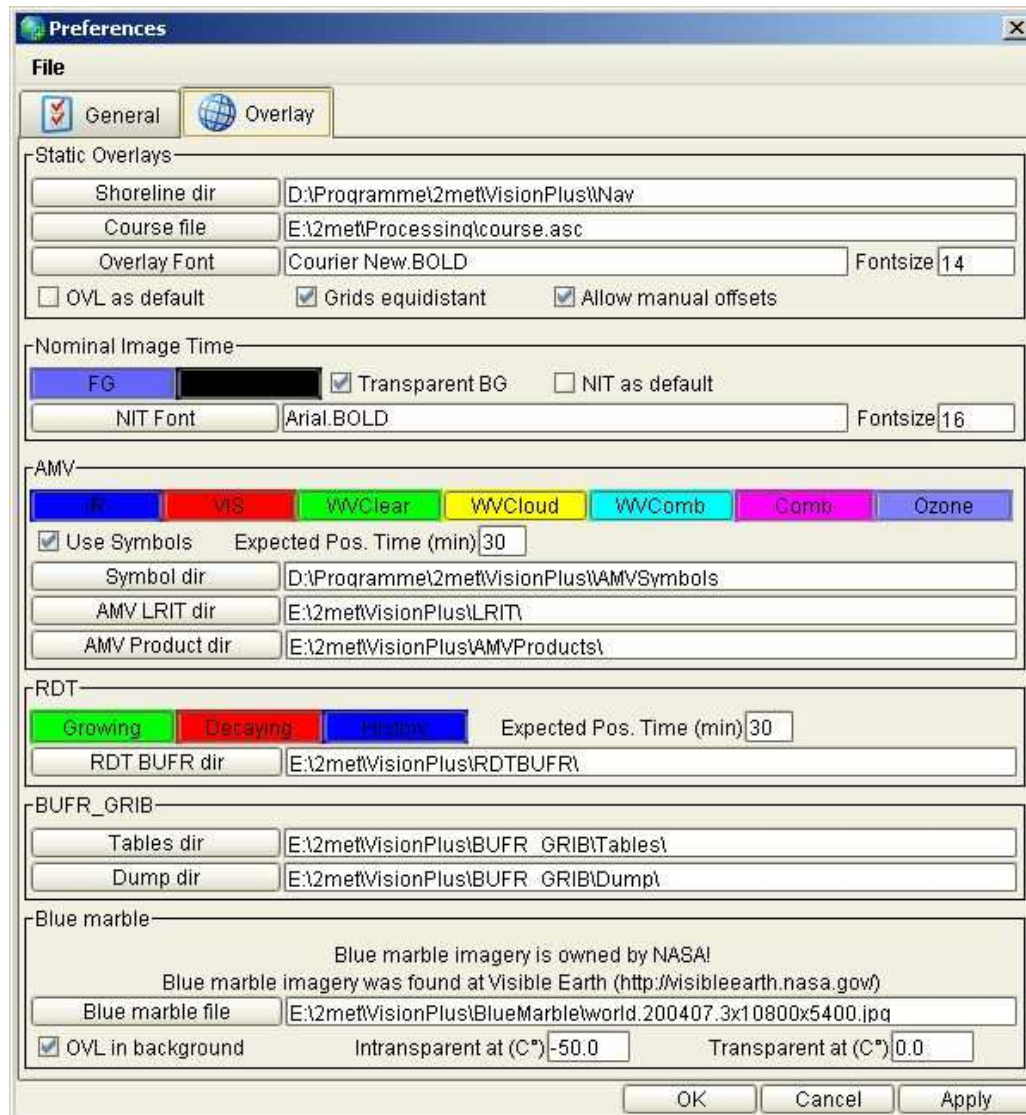
Animation

Defines the default settings for animation speed (1-20 frames /sec) and the default pause at the end of an animation (0-2000msec.).

Format Conversion

MPEG Encoder dir	This defines the location for the external MPEG2 encoder.
ImageMagick dir	This defines the location of the ImageMagick software package
MPEG output dir	This defines the default location for created MPEG animations. All temporary files created during the MPEG animation process are also kept here. They will be deleted once the animation is ready. See section 7.5 for details.
Use aspect ratio for mpegs	Mark this check box if you want the intermediate tiff images created for the MPEG videos to have a certain aspect ratio.
Aspect ratio (w/h)	Specify the desired aspect ratio (as quotient image width / image height) to be used for the intermediate tiff images. This ratio will be used if the "Use aspect ratio for mpegs" check box is marked as selected.
Default Output dir	This defines the default location for created snapshot files.

The figure below shows the preferences for overlay and underlay functions.



Static Overlays

Shoreline dir
ship course.

defines the path static overlay files like shorelines, political boundaries, cities,

Course file

defines the path to the course file generated by the HRPT Acquisition software package in case of ship based installations. The package records the ship positions and stores this information into a file.

Overlay Font

Text font that should be used for text overlays, cities and grid line inscriptions

Fontsize

Size of the overlay font

OVL as default

If this button is checked, all overlays will be displayed automatically when loading images via the data manager

Grids equidistant

When the grid distance for gridlines is set to automatic, it is automatically adjusted to the current zoom factor. When this option is selected, the calculated distance will be identical for latitude and longitude. Then it is deselected, the grid distance may be different for latitude and longitude lines.

Allow manual offsets

When this option is selected, the overlay control tab offers additional controls to manually shift the overlay in line and column direction. This can be used to adjust overlay positions for inaccurate navigated data. (This can occur especially for data from polar orbiters, e.g. when the orbital element data is not up to date.)

Nominal Image Time

FG	defines the foreground colour
BG	defines the foreground colour
Transparent BG	if checked the background will be displayed transparent
NIT as default	If this button is checked, the Nominal Image Time will be displayed automatically when loading images via the data manager
NIT Font	here the font for the Nominal Image Time can be selected from the available system fonts
Fontsize	defines the size of the font for the Nominal Image Time

AMV

Defines the settings for display of Atmospheric Motion Vector overlays

IR, VIS, etc.	defines the colour for the different kinds of AMV overlays
Use Symbols	switches between display of wind speed symbols and arrows
Expected Pos. Time (min)	

specifies the time for which the expected position should be calculated (only for wind arrows). Current wind speed will be used to draw an arrow to the expected position of each point

RDT

Defines the settings for display of the NWCSAF RDT product

Growing	Colour used to show the outline of growing cells
Decaying	Colour used to show the outline of decaying cells
History	Colour used to show the history of the path of the cells center.
Expected Pos. Time (min)	

specifies the time for which the expected position of the storm centre should be calculated

RDT BUFR	defines the path to the RDT buffer files
----------	--

BUFR_GRIB

Tables Dir	defines the path to the BUFR table used. Standard WMO tables may be used
Dump dir	defines the path to dump files created during the BUFR read process

Blue Marble

BlueMarble defines path and the name of the BlueMarble file used. The BlueMarble file may be a sub sample version of the original BlueMarble files (2km resolution) found at <http://visibleearth.nasa.gov>. The maximum file size should not exceed 10800x5400 pixels. If the file is larger, VISION+ may not be able to open and process it.

OVL in background

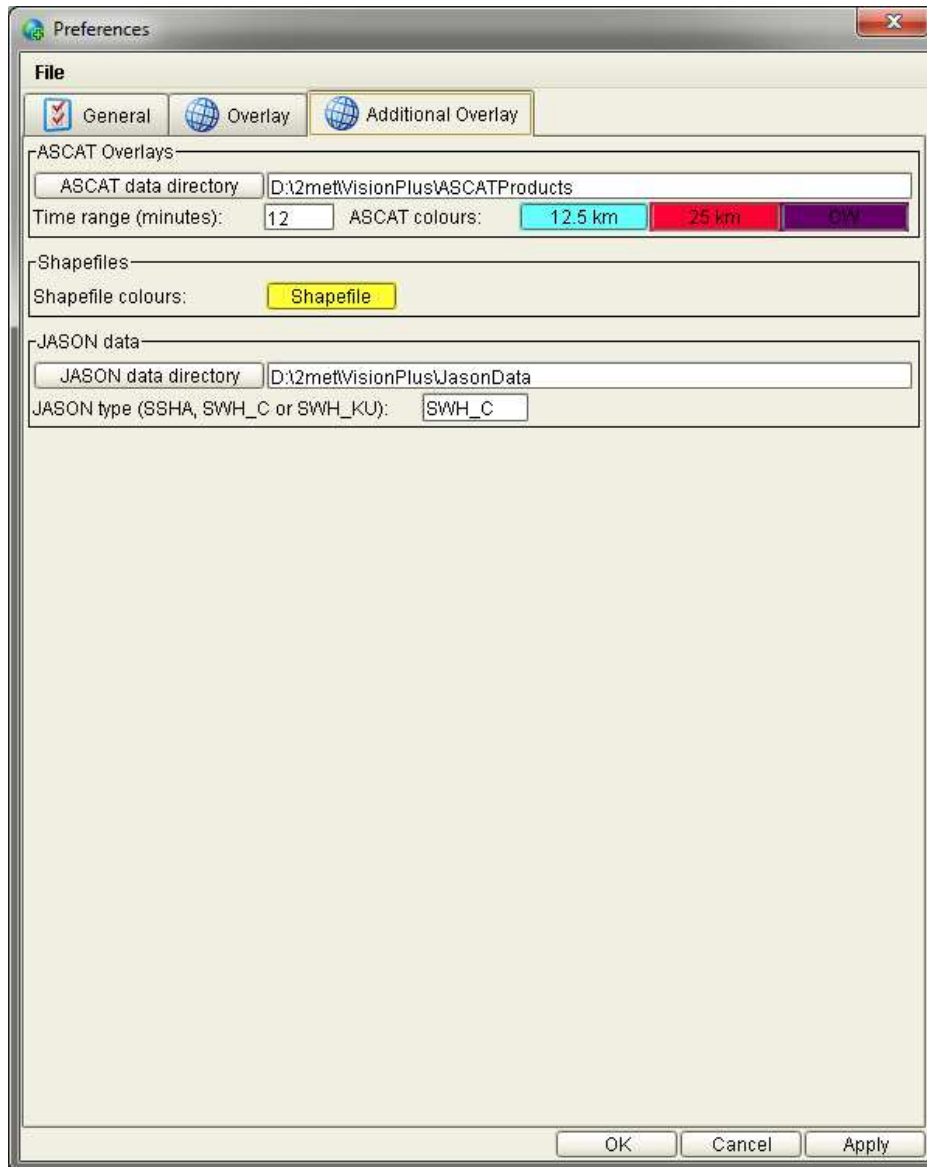
If this button is checked, the overlays will be shown below the clouds

Intransparent at solid All pixels of the image having a temperature below this value will be shown solid

Transparent at fully transparent. All pixels of the image having a temperature above this value will be shown fully transparent.

All pixels between these values will appear more transparent as closer their values are to the "Transparent at" value.

Note: Appropriate values for the above mentioned items may change over the year in the same way as the surface temperatures change.



ASCAT Overlays

ASCAT data directory

Directory in which the ASCAT BUFR files should be stored.

Time range (minutes)

For a given MSG image, ASCAT data in the time range

$NIT - \text{time range} < NIT < NIT + \text{time range}$

will be loaded and displayed as overlay. Whether wind vectors or symbols are used, will be according to the settings of the AMV overlays on the previous tab.

ASCAT colours

configures the colours for the three types of ASCAT data

Shapesfiles

Shapefile colours

configures the colour used for shapefile overlays.

JASON data

JASON data directory directory in which JASON data files have to be places

JASON type overlay three types of JASON data is possible:

SSHA, SWH_C, SWH_KU

4.7 Channel

Some data file may contain the information of several spectral channels at a time. Examples of these are HRPT raw data files of the NOAA and FengYun satellites.

When a raw data file is loaded into the Vision+ it will always be opened showing the first of the available spectral channels. In the menu bar a "Channel" menu is added when these images are displayed. In the channel menu the available spectral channels can be selected. The image in the frame will then switch to the selected channel.

4.8 Help

Not yet implemented.

Only an About dialog exists. For demo version the about dialog will show the expiration date of the demo license.

5 IMAGE AREA

Within the image area tool tips are displayed (if activated) which will give you additional information about the pixel where the cursor is currently located. Dependent on the data and overlays loaded the shown tool tip may differ. In the following you will find some examples of tool tips shown:

1.) Standard Tool tip showing Brightness temperature, geographical location, and pixel count

```
Temperature: 45.38 °C | 318.53 °K
Location: 16.26 N, 14.37 W
Pixelvalue: 31853.0
```

2.) AMV Tool tip

Direction	36.0 °
Speed	9.4 m/s
Pressure	0.00 hPa
Temperature	16.50 °C
Latitude / Longitude	35.13 N / 15.08 W

3.) GII ToolTip

KIndex	24.0 K
KOIndex	255.0 K
PLIndex	-7.0 K
Max. Buoyancy	28.0 K
Precipitable Water	21.0 kg/m**2
Confidence	100.0 %
Latitude / Longitude	28.91 N / 3.08 E

4.) RDT Overlay

Date of cloud system scan	4.1.2006 10:40 UTC
Diagnose method	By lightning flashes
Spatial quality	Nominal
Temporal quality	Nominal
Confidence level	100.0 %
First detection	4.1.2006 1:15 UTC
Direction / Speed	331.0° at 14.97 m/s
Life cycle phase	Decaying
Top pressure	425.0 hPa
Top pressure quality	Very good
Min. brightness temp.	-38 °C
Average brightness temp.	-34 °C
Area expansion rate	0.0348 1/min
Cooling rate	0.018 K/min
Negative CG flashes	0.0
Positive CG flashes	0.0
Intracloud flashes	0.0
Total number of flashes	0.0

5.) NWSSAF Cloud Type ToolTip

Cloud Type: 18.00 high semitransparent above low or medium
Location: 47.78 N, 1.82 E
Pixelvalue: 18.0

6.) Sample LSASAF ToolTip

Land Surface Temperature: 25.33 °C
Location: 39.86 N, 4.57 W
Pixelvalue: 2533.0

7.) MPE Overlay ToolTip

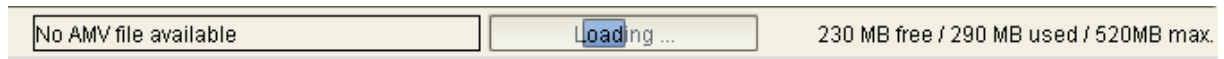
MPE	7.00 mm/hr
Latitude / Longitude	4.22 N / 16.53 W

8.) FIR Overlay ToolTip

FIR	2.00 probable fire
Latitude / Longitude	7.50 N / 11.73 W

6 STATUS BAR

The status bar is an area at lower edge of the application windows. It will give you some information about the memory currently used and available and further status messages as well as activity bar which shows that the application is busy loading images.



In the example above it shows that the user has tried to activate the AMV overlays, but no matching data is available. The blue moving area shows that the application is currently loading image data.

The memory information shows: free memory / used memory / maximum memory available to the application.

7 SW ARCHITECTURE AND BACKGROUND INFORMATION

7.1 How Images are displayed

The application makes use of Java features to display imagery. Currently images with following colour model are used within VISION+.

8 bit indexed

This colour model is used for all types of grey level images regardless of representation within the image files. To optimize contrast and resolution the images are fed through a "Look-Up" Table before they are displayed. In case of a imagery data with thermal representation the Look-Up table is generated using the upper and lower temperature configured in the preferences dialog. In the following you will find an example how this is done:

Input data shall be a 16bit XPIF containing MSG channel 9 data (IR 10.8 um) converted to brightness temperature. The used range of values within the XPIF is something between 17816 which corresponds to -95 degrees Celsius and 33316 which corresponds to +60 degrees Celsius. Cutting off now just the LSByte would result in a dynamic range 61 values for display. But within VISION+, through the use of the look-up table, we may now use the full range of 255 values as the lowest temperature within the image is converted to 0 and the highest value is converted to 255. The conversion is done during loading of the image and will therefore not decrease the speed of the application as in this case the disk speed is the limiting factor.

Additionally the 8 bit indexed colour model has the advantage of easy modification of the colour maps for display. The Java environment takes care that colour table modifications are as fast as if you would old style hardware with hardware look-up tables.

24bit RGB

Images are loaded as 24bit per pixel images if the source is already available as 24bpp image. This is the case 24bpp XPIF data. These images are not equipped with a colour map and therefore you can't change the colours of RGB image within VISION+.

24bit RGB with Alpha-Channel

These image type is used internally for instance the overlay display. The overlay is drawn to such a image and the alpha channel is used to define the image as transparent where no overlay line or symbol was drawn.

When images are displayed with the "Blue Marble" background they are also displayed in this image type.

7.2 Memory Usage and Low/High Memory Mode for Animations

The application supports two modes of operation the "High Memory Mode" and the "Low Memory Mode" for animations. The application has to support the display of a large number of large image files for animations. Therefore we have implemented a memory saving mode for animation display. The

idea of this memory saving mode to make the application able to behave in a way as if the image would have been loaded completely into the RAM of the computer, but in fact is just loads the visible portion. The different modes just affect animations. Single image are always loaded completely into memory. Now let's have a look for the different modes:

7.2.1 High Memory Mode

Images are loaded always completely into RAM. Taking account the colour models used as explained above, you can easily count the memory required for display. In case of an MSG image the image file (16bpp) is about 26MB, as this image is loaded as 8 bit indexed the application needs about 13MB to hold the image within RAM. If you would like to display an animation of 100 such images the application would need 1.3GB of memory just for images + 150 MB for other data. In case of an HRV its 63MB per image and about 6.3GB for the animation, which is more than current 32bit operating systems can handle and much more than most of the current computers have.

7.2.2 Low Memory Mode

For that reason we have implemented the "Low Memory Mode". In this mode just the part of the image visible on the screen is loaded. On a screen with 1280 x 1024 pixels the maximum image display area is something about 1064x864 pixels. For an animation of 100 images you will need just about 90MB of RAM. The amount of data to be loaded from the disk is also smaller therefore loading the images is also faster in this mode. As now VISION+ should behave at least partially as if the images are loaded completely into memory only the last image of the animation is loaded completely. The memory requirements are then 90MB + size of one image loaded as 8bit indexed. In case of the MSG Image this is in totally 103MB and for the HRV animation it is 153MB.

If you now stop the animation to zoom or pan the image it switches to the image loaded completely which allows than extremely fast zoom and pan. You will notice the difference is scroll bars appear at the right and lower border of the image frame. Once finished with the zoom/pan operation the application has to reload the image because the visible area has changed which delays restating the animation. Please remind single images are loaded always in "High Memory Mode"

Now why do we still support the "High Memory Mode"? There is just one big advantage: In this mode you can zoom and pan while the animation is running, even if you have several animations synchronized.

As the use of this mode is dependent of the available physical memory the change of this setting cannot be done within the preferences dialog. The systems administrator has to open the vision.user.properties file with an ASCII editor and modify the following line

```
vision.animationlowmemory=true      (Low Memory Mode)
```

into

```
vision.animationlowmemory=false     (High Memory Mode)
```

The application needs to be restarted after the modification.

7.2.3 Memory Usage

The current Java JRE 5.0 Update 4 - as tested with VISION+ under Windows XP (32bit) - does not support a heap size (memory available to the Java virtual machine) of more than 1.4GB according to our tests. During our tests we have found that setting the virtual memory size to half of the available physical memory gives optimum system performance. To allow fast disk load operations the operating system must have a reasonable amount of memory available for its internal file system caches. This is

more or less independent from the used caching strategies and therefore more or less independent from the operating system. The maximum heap size is configured during the start of the Java Virtual machine and the application. The parameter is `-Xmx<xxx>x`. Example `-Xmx512m` defines the maximum heap size as 512MB. The default 64MB and the maximum found is 1400MB. You will find this setting in the command procedure which launches VISION+ (`VISIONPlus.cmd` in the applications start-up folder)

7.3 Mask File / Generation Usage

Masks are generated in the directory of the currently displayed image. They are stored together with imagery data for later use.

7.4 Colour Map Structure

Within VISION+ we have changed the structure the colour maps with respect to the old VISION application. They do contain information about the use of colours for physical values instead of using the pixel count. This was required as VISION+ shall support not only images with integer values for pixels but also real values.

If you now take an image which contains brightness temperatures, than it's very helpful if the colour map just contains the relation between colours and temperature as this colour table may be used for all images regardless whether the information is stored as 8bpp, 16bpp or as real values. This reduces the number of required colour maps significantly.

Basically there are two types of colour maps available "halftone" and "discrete". The halftone colour maps are to used for imagery data. They contain markers with physical values and a related colour as RGB value. The viewer will interpolate between this markers to generate colour for all possible 256 values of the displayed 8-Bit indexed image. The discrete colour maps are intended for images which contains discrete information like cloud types, where each value have it's dedicated meaning. VISION+ does not interpolate between this markers.

The colour maps also contain information about the source for which they have been produced, i.e. the satellite and spectral channel. After loading an image VISION+ will check the source satellite and channel and will offer only matching colour maps in the first case.

Example for the contents of a halftone colour map:

```
Type=HALFTONE
```

```
Value=Temperature
```

```
Unit=C
```

```
Satellite=MSG
```

```
Channel=MSG1
```

```
-75.0=255-255-255
```

```
-51.800847457627114=250-250-250
```

```
5.11440677966101=169-169-169
```

39.139830508474574=16-16-16

71.0=0-0-0

7.5 MPEG Generation

MPEG animations are generated out single images produced by the application. Although invisible in most of the cases, the viewer loads every image of an animation applies colour map, overlay and mask (if defined) and stores a sequence of single images to the disk. Once all the images are available it launches a command procedure which converts and resizes the images into .PPM files using the ImageMagick command mogrify. Then the procedure starts a MPEG encoder which generates the MPEG file. By command line parameters the encoder is forced to repeat every image a few times to decrease the speed of the animation as the frame rate for MPEG cannot be lower than 24 frames per second. The command procedure and the encoder can be found in a sub folder of the start-up folder of the VISION+ application (..\Program Files\VisionPlu\Encoder). ImageMagick is usually installed in the program files folder.

It is possible to define a certain aspect ratio for the resulting mpeg videos. Please refer to chapter 4.1 for details.

7.6 Directory Structure

The following table shows the directories used by VISION+ and the contained files:

Directory	Files
User Home directory ...:\Documents and settings\ <user>\.2met\... </user>\.2met\... (Windows XP) /home/<user> (LINUX)	Vision.user.properties (preferences) Vision.user.scenarioXX.properties (Settings for the scenario buttons, one for each button) Vision.user.shortcut properties (Settings for all shortcut buttons)
...:\2met\VisionPlus On the drive which holds configuration information as defined during the installation	VISION+ configuration data / temporary files
...:\2met\VisionPlus\AMVProducts On the drive which holds configuration information as defined during the installation	Holds the AMV BUFR data and decoded binary files
...:\2met\VisionPlus\ BUFR_GRIB On the drive which holds configuration information as defined during the installation	Contains the BUFR tables used for decoding BUFR data
...:\2met\VisionPlus\Colormaps On the drive which holds configuration information as defined during the installation	VISION+ ColourMaps
...:\2met\VisionPlus\Course On the drive which holds configuration information as defined during the installation	Contains the ships course and position file
...:\2met\VisionPlus\MPEGS On the drive which holds configuration information as defined during the installation	Temporary directory for MPEG files
...:\2met\VisionPlus\Snapshots On the drive which holds configuration information as defined during the installation	Contains Screenshots

Directory	Files
...:\Program Files\2met\VisionPlus\Nav On the drive which holds the program as defined during installation of the program	Contains the overlay data base
...:\Program File\2met\VisionPlus\AMVSymbols On the drive which holds the program as defined during installation of the program	Contains the symbols for display of AMV data
...:\Program Files\2met\VisionPlus\HDFConfig On the drive which holds the program as defined during installation of the program	Contains the Meta Data for HDF5 display

7.7 Property and Configuration Files

The following property files are generated and used:

Vision.user.properties

This file contains the preferences as defined by the user in the “Preferences Dialog” as well as information about last directory visited by the Data Manager, last windows size of the application etc. and the memory mode.

Vision.user.shortcut properties

This file contains the settings for all shortcut buttons.

Vision.user.scenarioXX.properties

For each scenario button there is a separate file which contains the settings for each scenario button. XX is the button number counted from top to bottom.

These files are generated in the user’s home directory and therefore user dependent.

The contents of the property files are configured during use and installation (used folders for permanent data) of the application therefore they are not listed here. There is one exception related to the “Low-“ and “High Memory Mode” as described in chapter 7.2

Cities File, Text overlay file, Polygon overlay file

The cities file is an ASCII file containing information about locations, their names and their severity. It is located in the installation directory of VISION+. The structure of the files is as follows. Each line contains information about one location. All items in a line are separated by commas:

<Name>, <Longitude>, <Latitude>, <Severity>

Example: Bochum,7.3,51.5,1

The longitude and latitude have to be given as float values, the severity may be 1,2,3. The severity is used to display fewer locations for lower display resolutions.

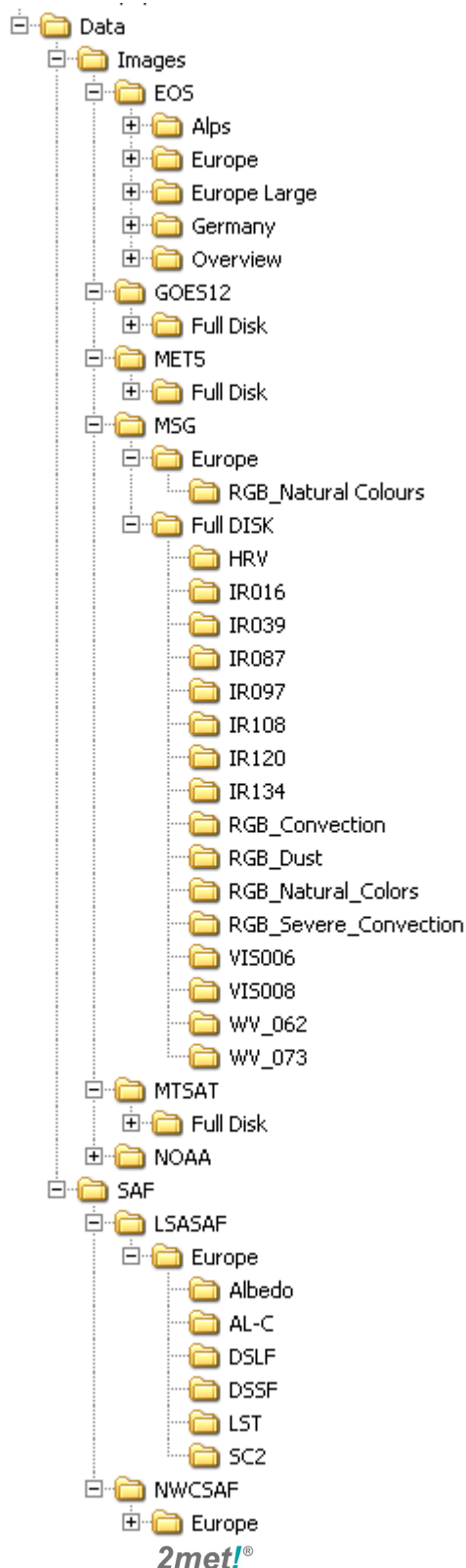
Text overlays and Polygon overlays are stored in a similar format. For polygon overlays (used for the “Position, Route, Area” overlay) the priority level is not used as priority, but for numbering the points of each polygon.

7.8 System Configuration within 2met!® Environment

7.8.1 Limitations

The versions 3.1 and below of **2met!**® PROCESSING do not support the colour maps as generated by VISION+. To generate these colour maps please use **2met!**® VISION the predecessor of VISION+. The colour maps generated by VISION+ can be processed using the PROCESSING software version 3.2 and higher.

7.8.2 **2met!**® Environment



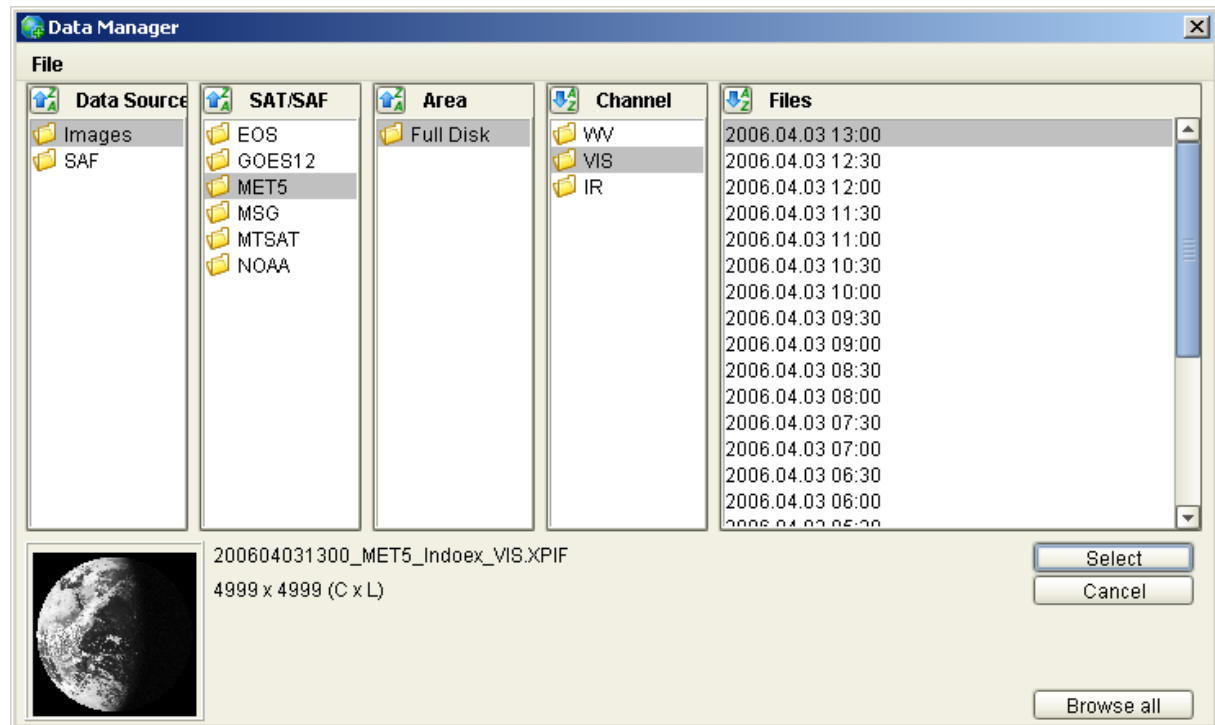
The minimum installation just contains the VISION+ application itself. However in most cases data are kept locally on the system and the system itself is supplied continuously by processing software either running on the same computer or on another host in the network. In these cases the local database needs to be cleaned up. The **2met!**® LIMIT package is used in this case. This package itself needs the VCSLOG package which contains the supervisor process to start up the LIMIT service.

The DISPATCH software package – either locally or on the remote processing system – is required to distribute the data into the directory structure as required by the data manager as mentioned below. In a later release an automatic mechanism may be added which distributes the data into the directory structure. To be able to efficiently use the Data Manager it is required that the image data base is located in a fixed directory structure. An example is given below.

The image database required for VISION+ is a fixed directory structure with either 3 or 4 levels. Images itself and other data have to be kept only at the lowest level. I.e. always on the 3rd or the 4th level!

AMV and RDT buffer data may not be displayed on their own, they can only be used as overlay type data. Therefore they must not be kept within the same directory structure but they may reside on the same logical disk.

The image on the left shows a sample directory structure. The root folder has the name Data, the next level is the selection for images and SAF data. The remaining levels for the images are satellite, geographical area and spectral channel. RGB Composites are treated as spectral channel in this example. For the SAF data the selection criteria are SAF-Type, geographical area, data sub type. The resulting display within the data manager is shown on the page below



7.9 Supported File Types

The following file types are supported:

XPIF (PIF)	up to version 1.5
HDF5	as available from LSASAF, NWCSAF (support is beta!)
RDT	data from NWCSAF in BUFR format, as overlay only
AMV	data from MPEF in BUFR format, as overlay only
GII	data from MPEF in BUFR format, as overlay only
XRIT	XRIT files from MSG, MTSAT, GOES
MPEF	MPE and FIR products in XPIF format, can be used as overlay
JPEG, TIFF	can be displayed, but many Vision+ functions will be disabled
ASCII	can be displayed, but many Vision+ functions will be disabled
ASCAT	data from EUMETCAST in BUFR format, as overlay only
SHAPE	shapefiles (shp), as overlay only (types 1, 3, 5, 8, 11, 15)

7.9.1 XPIF

All XPIF Data up version 1.5 can be displayed. Please refer to the XPIF Reference Manual for details on the XPIF.

7.9.2 BUFR

In version 1.0 of **2met!**® VISION+ only the AMV as available from MPEF/EUMETSAT and the RDT files as available from the NWCSAF can be displayed as overlays above satellite images in XPIF format. The GII data as available on EUMETCAST can be displayed as overlay data onto satellite imagery in later versions.

All the GII and AMV data may be used if they are in XRIT format as available on the EUMETCAST retransmission system. They reside in the same folder which is configured via the preferences menu:

Overlay -> AMV LRIT dir

Before the AMV data can be displayed they are preprocessed by the application. The result of this preprocessing is stored in another folder, which is again configured via the preferences menu:

Overlay -> AMV Product dir

The data in source folder is untouched to make sure that other instances of the application running on different hosts may access the same source data (i.e. in case of file server based environments)

Supported BUFR Editions are 3 and 4.

7.9.3 HDF5

In principle all HDF5 files respectively the contained data sets can be displayed in VISION+. One requirement is that all HDF5 data have the extension ".h5". Otherwise they will not be displayed within the Data Manager and are inaccessible via the ShortCut-Buttons. Most of the HDF5 data transmitted via EUMETCAST are compressed using external compression programs. These files have to be decompressed before they can be used within VISION+.

However, the projection information can currently be found only in the HDF5 files originating from the SAFs. To interpret these data, i.e. to show for example the meaning of a certain pixel count in classified data the software needs configuration files for each product. These configuration files, too, are currently available only for the SAF products. Some of the following remarks on the HDF5 products are taken from the original product description.

As all of these implementations do not describe the image contents fully using HDF5 meta data, external meta data is required. This meta data is stored in a sub folder of the applications start-up folder named HDFconfig. This folder contains a number of ASCII files, each of them describing one HDF5 subtype. Once the HDF5 implementations are changed you can easily modify the meta data files using a ASCII Editor.

Some of these HDF5 implementations do contain colour map information which is then loaded. If this information is not contained you may use the colour map editor to generate your own colour maps.

Generation of Masks is not supported for HDF5 files!

The support for HDF5 data is still at Beta level for VISION+!

The following List shows the SAF HDF5 files which can be displayed in 2met!® VISION+ in the current release. For the products below the navigation information can be extracted from the HDF5 files.

Further Processing is not supported, except from printing and conversion functions available in 2met!® VISION+.

7.9.3.1 LSASAF

Some of the LSASAF products currently do not match all specifications as listed in the format description. For example some geographical information is missing totally or partly. To allow navigation of these products the (known) projection information is set from outside and not read directly from the HDF5 file itself.

All LSASAF products are available for 4 different geographical areas (Europe, North Africa, South Africa and South America).

Product	Short Description	Remarks
SC	Snow Cover	Classified data Degree of snow coverage
LST	Land Surface Temperature	"Radiative skin temperature of land surface" in °C
ALBEDO	Land Surface Albedo - Broadband	Contains 9 datasets. Albedo is given in percent (0..1)
AL-C1	Land Surface Albedo – Channel 1 (0.6 µm)	Contains 4 datasets. Albedo is given in percent (0..1)
AL-C2	Land Surface Albedo – Channel 1 (0.8 µm)	Contains 4 datasets. Albedo is given in percent (0..1)
AL-C3	Land Surface Albedo – Channel 1 (1.6 µm)	Contains 4 datasets. Albedo is given in percent (0..1)
DSLFL	Down-welling Surface Longwave Flux	"Thermal Irradiance reaching the surface in the thermal infrared spectrum (4-100 µm)". Given in Wm ² (0..500)
DSSFL	Down-welling Surface Shortwave Flux	"Radiative Energy in the wavelength interval [0.3 µm, 4.0 µm] reaching the Earth's surface per time and surface unit". Given in Wm ² (0..1500)

7.9.3.2 NWCSAF

Following HDF5 files from the Nowcasting SAF can be displayed currently in 2met!® VISION+ . The NWC products normally contain a colour palette that is used for visualization.

Product	Short Description	Remarks
CMa	Cloud Mask and Cloud Amount	Allows detection of cloudy and cloudfree areas. Classified data: Degree of cloud coverage Contains beside the cloud data also datasets for dust detection and volcanic plume detection.
CT	Cloud Type	Cloud analysis Classified data: Cloud classes (fractional, semitransparent, high, low ...)
CTTH	Cloud Top Temperature and Height	Also contains datasets about pressure and „effective cloudiness“. Temperature: given in K Height: given in m Pressure: given in hPa Eff. Cloudiness: given in %
PC	Precipitating Clouds	Probability of Precipitation. Given in %. Currently only the probability for light and moderate precipitation is calculated (dataset PC_PROB1). The dataset PC_PROB2 for heavy precipitation is contained in the product, but empty.
CRR	Convective Rainfall Rate	„Information on convective and stratiform one associated to convection rates

Product	Short Description	Remarks
		coming from MSG-SEVIRI channels". Given in mm/h
TPW	Total Precipitable Water	"Amount of liquid water, if all atmospheric water vapour in the column were condensed." Given in mm.
LPW	Layer Precipitable Water	Contains measurements of the precipitable water in 3 different layers in cloud free areas. Boundary Layer: 1013 – 840 hPa Middle Layer: 840 – 437 hPa High Layer: < 437 hPa Additionally the product contains the "Total Precipitable Water". Given in mm.
SAI	Stability Analysis Imagery	Stability in cloud free areas. Lifted Index, given in °C
AMA	Air Mass Analysis	Air Mass Classification. Data is divided in 21 different classes. Each class describes the air mass with: Origin-Humidity-Stability (e.g. tropical, moist, stable)

8 TYPICAL PROBLEMS AND RECOVERY PROCEDURES

8.1 Problems in starting VISION+

In some case (i.e. main memory above 2GB) it may appear that VISION+ does not start. In these cases it's likely that the heap space was configured to large by the installation procedure. VISION+ is started via a command procedure located in the start-up folder named VISIONPlus.cmd. The Java virtual machine is started with some command line parameters. One of these parameters is <-Xmx...m>. This parameter defines the maximum heap space. In case of problems we recommend to reduce the size to -Xmx512m, limiting the heap size to 512MB.

8.2 VISION+ starts but the MMI seems to be empty and the application remains unusable.

Again in this case we recommend reducing the maximum heap size to values below 1GB.

8.3 VISION+ shows exceptions/faults

In case VISION+ shows a fault or an exception we recommend closing the application and restart, even in case that the VISION+ seems to be fully functional. In such case it may have happened that some internal structure is mixed causing additional problem in using it.

9 ANNEX A: USER STATION BANNER

The user station banner is a user-configurable interface that allows easy access to all parts of the *2met!*[®] Software. This is actually only available for Windows OS.



When installing one of the *2met!*[®] software packages, it automatically adds a new menu entry for its basic applications to the user station banner. E.g. the *2met!*[®] PROCESSING add a „Processing“ menu entry to the user station banner's main menu.

The menus of the user station banner can easily be extended. To add or remove a menu entry, simply select the „Add/Delete“ command from the „File“ menu.



A dialog allows selecting the place of the new menu item and the application that will be started by it.

Select the location for the new menu entry in the tree control, choose a name for the new menu item (Item) and the full path to the application connected to this menu entry. A button allows browsing for the application. Choosing „Add Item“ adds the new menu entry, while „Delete Item“ deletes the item currently selected in the tree control.

