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COMMISSION FOR BASIC SYSTEMS  
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS

ITEM: 4

**SCOPE-Nowcasting Ad-hoc Steering Group, First Meeting**

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Original: ENGLISH

## **Overview of Data Visualization Tools**

*(Submitted by the Secretariat)*

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### **Summary and Purpose of Document**

A non-exhaustive overview of data visualization tools is provided, some of which specifically designed for satellite datasets. Tools such as the ones mentioned here are necessary for processing and analysis of satellite imagery and products, including for nowcasting applications.

This overview is intended to guide the utilization of satellite-based products for nowcasting, specifically in developing and least developed countries.

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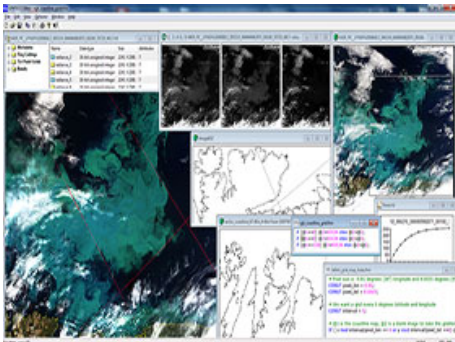
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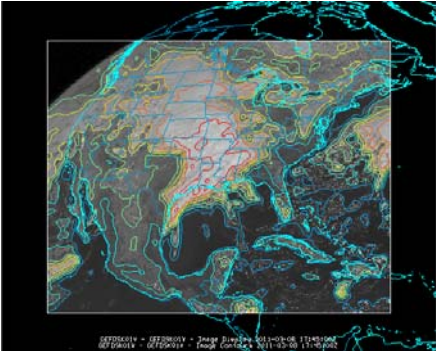

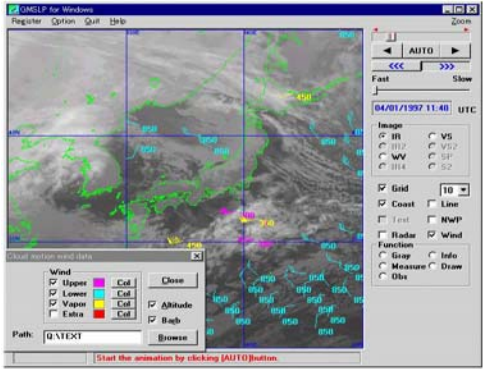
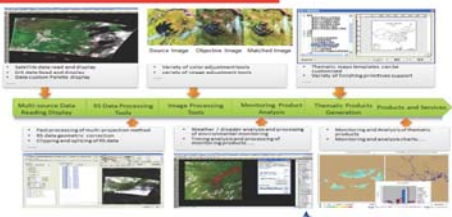
## SUMMARY

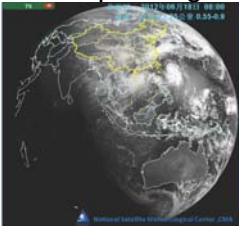
### Introduction

An overview of common satellite data processing and analysis software tools has been maintained on the WMO Space Programme webpage at [http://www.wmo.int/pages/prog/sat/accessandtools\\_en.php](http://www.wmo.int/pages/prog/sat/accessandtools_en.php), under the auspices of the Commission for Basic Systems Expert Team on Satellite Utilization and Products (ET-SUP). The following tables are non-exhaustive, for information purposes only and do not imply any form of recommendation or endorsement by WMO.

**Table 1: Visualization and Analysis Tools (Open source)**

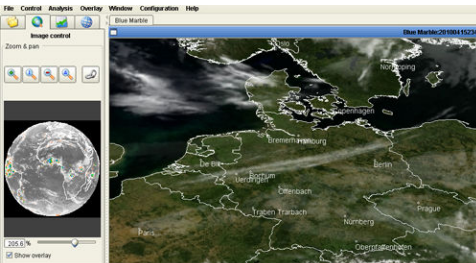
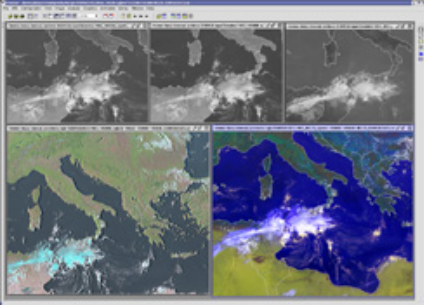
Name	Provider	Input Formats	Comments; Quicklook
AWIPS	Unidata, University of Wisconsin, USA; Raytheon	GRIB, BUFR, HDF, shapefiles, Others	Operational system used by US National Weather Service; open source software for R&D  AWIPS Workstation
<a href="#">AWIPS-II</a>	Unidata, University of Wisconsin, USA	GRIB, HDF, Others	Full release in 2014; open source software
<a href="#">BILKO</a>	UNESCO	GIF, PCX, BMP, HDF, NetCDF, Envisat-generic, GeoTIFF	Many GIS and image analysis features; for PC environment  Polar projection of MERIS data in BILKO tutorial
<a href="#">DIANA</a>	met.no (Norway)	netCDF, OpenDAP, GRIB, BUFR, GeoTIFF, HDF5	Combined visualization of fields, satellite, radar imagery, other charts; separate viewers for vertical soundings, time series; for Linux environment

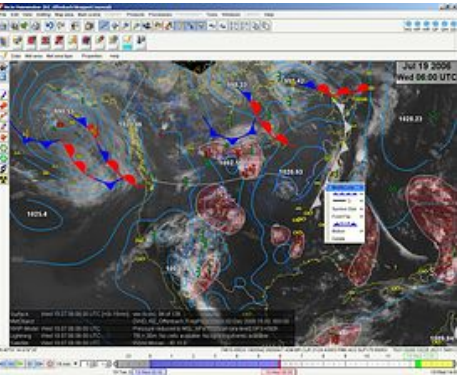
<p><a href="#">McIDAS-V and HYDRA</a></p>	<p>Unidata, University of Wisconsin, USA</p>	<p>netCDF, GRIB, BUFR, HRIT/LRIT, shapefiles, many imager formats, GEMPAK</p>	<p>Visualization and data analysis software package displays weather satellite (including hyperspectral) and other geophysical data in 2- and 3-dimensions; PC, MacOS, Linux environments</p>  <p>Satellite image with contours in McIDAS-V</p>
<p><a href="#">pytroll</a></p>	<p>DMI, SMHI</p>	<p>Many imager formats (HRIT/LRIT, AAPP, HDF-EOS, HDF5, EOS 1a/1b)</p>	<p>Processing and display of MSG, AVHRR, VIIRS and other imagery</p>  <p>Overview RGB composite image generated in pytroll</p>
<p><a href="#">SATAID</a></p>	<p>JMA</p>	<p>GMS/MTSAT and GOES formats</p>	<p>Visualization and diagnosis of meteorological satellite imagery; viewer and script menu modules; special viewer for tropical cyclone analysis; For PC</p>  <p>IR imagery and cloud wind vector data</p>
<p><a href="#">SPRING</a></p>	<p>INPE</p>	<p>GIS formats (ArcView, ArcInfo, MapInfo, DBF), ASCII</p>	<p>GIS and satellite data processing system; for PC and Linux</p>
<p>SMART</p>	<p>CMA</p>		<p>Satellite Monitoring Analysis Remote-sensing Toolkit, for polar orbiters (FY-3 series), for disaster and env monitoring; processing, multi-source display; English version pending</p>  <p>© All Asia-Oceania Meteorological Satellite Users Conference National Satellite Meteorological Center, JMA</p>

<p>SWAP</p>	<p>CMA</p>		<p>Satellite Weather Application Platform, mainly for geostationary orbiters (FY-2 series): data collection, processing, display and animation, visualization (incl RGBs), analysis; multiple source display; English version pending</p> 
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**Table 2: Visualization and Analysis Tools (Commercial Off-The-Shelf)**

(N.B.: non-exhaustive listing; for information purposes only; does not imply any form of recommendation or endorsement by WMO)

Name	Provider	Input Formats	Comments; Quicklook
<a href="#">2met!</a>	SCISYS	netCDF, BUFR, GeoTIFF, LRIT/HRIT, other	Data reception, processing, and display software. 
<a href="#">ArcGIS</a>	ESRI	netCDF, shapefiles, other imagery and raster formats	GIS tool with numerous spatial mapping features, for PC, MacOS and Linux
<a href="#">CineSat</a>	GEPARD, TransImage, 3D Research	HDF5, GRIB, BUFR, HRIT, LRIT, HRPT, standard graphics formats, other	Meteorological imaging software, for (NRT) analysis, nowcasting, display 
<a href="#">ENVI Product Family</a>	Exelis	Shapefiles, standard graphics formats, imagery and raster formats	Image processing and geospatial analysis tools; for PC, MacOS, Linux
<a href="#">GEOMATICA</a>	PCI Geomatics	netCDF, BUFR, GeoTIFF, other	Image processing and geospatial analysis; for PC and Linux
<a href="#">IDL</a>	Exelis	netCDF, GRIB	Modular programming language for processing image data
<a href="#">MAGICS++</a>	ECMWF	GRIB, netCDF, BUFR	Meteorological plotting software
<a href="#">MEOS</a>	Kongsberg	HRPT, other	Ground receiving station software for antenna control and monitoring
<a href="#">NINJO</a>	EuMetSys	GeoTIFF, PNG, JPG, HDF5, BUFR, GRIB, other	Meteorological workstation software for layer-based monitoring, processing, display of imagery and other data

			 <p>Overlay of different sources of spatial Information including satellite image</p>
<p><a href="#">Visual Weather</a></p>	<p>IBL Software</p>	<p>BUFR, CLIMAT, TEMP, GRIB, other</p>	<p>Satellite visualization and analysis software for meteorological forecasting</p>