



**Selex Systems Integration GmbH**  
Gematronik Weather Radar Systems

**Dual Polarized X-Band Radar 50DX**

**RainGain April 2013**

presented by Maik Schürmann



# METEOR 50DX

# METEOR 50DX



Mobile Version



Stationary Version

# METEOR 50DX



- Location: Columbia, Antonio Narino Airport
- Type: Fixed Installation
- Altitude: 1834m



# Scientific Customers



<b>METEOR 50DX</b>	<b>1</b>	<b>France</b>	<b>2013</b>	<b>ENPC ParisTech</b>
<b>METEOR 50DX mobile</b>	<b>1</b>	<b>Germany</b>	<b>2011</b>	<b>KIT Karlsruhe Institute of Technology</b>
<b>METEOR 50DX mobile</b>	<b>2</b>	<b>Iceland</b>	<b>2011</b>	<b>Icelandic Meteorological Office</b>
<b>METEOR 50DX mobile</b>	<b>1</b>	<b>UK</b>	<b>2011</b>	<b>University of Leeds</b>
<b>METEOR 50DX mobile</b>	<b>1</b>	<b>Japan</b>	<b>2011</b>	<b>Japan Agency for Marine- Earth-Science and Tech.</b>
<b>METEOR 50DX</b>	<b>1</b>	<b>Russia</b>	<b>2010</b>	<b>Hydrom. University of St. Petersburg</b>
<b>METEOR 50DX mobile</b>	<b>1</b>	<b>Brazil</b>	<b>2010</b>	<b>INPE, Instituto Nacional de Pesquisas Espaciais</b>
<b>METEOR 50DX</b>	<b>1</b>	<b>France</b>	<b>2009</b>	<b>Meteo France</b>
<b>METEOR 50DX mobile</b>	<b>4</b>	<b>Italy</b>	<b>2006</b>	<b>DPC Department of Civil Protection</b>
<b>METEOR 50DX mobile</b>	<b>1</b>	<b>Italy</b>	<b>2005</b>	<b>ARPA Piemonte</b>

# METEOR 50DX Summary

## METEOR 50DX

- Medium range high-power X-Band Weather Radar System
- Doppler, Dual Polarization
- Detection of rainfall, radial wind
- Classification of rainfall intensity, type, wind, turbulence
- Compact, robust, Mobile, easy to install

## Benefits

- Extremely sensitive
- High resolution
- Rapid update rate
- Precise Measurements, Tracking, Warnings & Nowcasting

## Applications

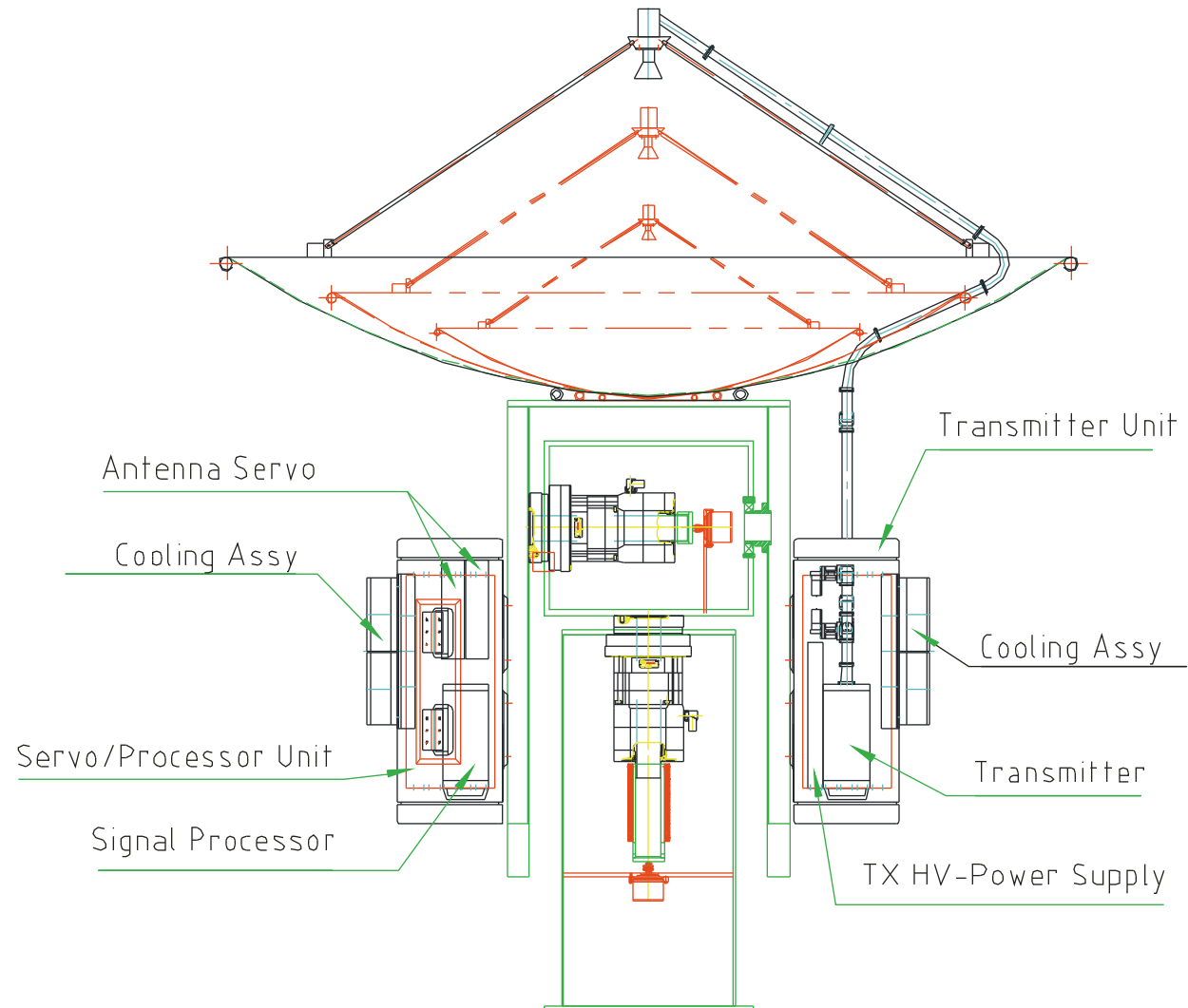
- Gapfiller in country-wide meteorological networks
- Research and temporary research campaigns
- Sensor for hydrological systems (flood/river/urban area monitoring, water reservoirs, drainage systems)
- Sensor for aviation met systems in the terminal area (hazardous weather, wind shear, gusts)

## Support

- Warranty (24 months)
- Training and operational support
- Tailored service contracts

# METEOR 50DX

## Full “Radar-over-Elevation”, no Rotary Joints





# METEOR 50DX

## Key Performance Parameters



Operating Frequency Range	<b>9.36 – 9.38 GHz or 9.30 – 9.35 GHz</b>
Peak Power (at Magnetron Output)	<b>100 KW</b>
Beam Width (1.8m standard)	<b>1.3°</b>
Antenna Gain	<b>42.5, dB</b>
Pulse Modes	<b>4</b>
Pulse Width (PW), configurable	<b>0,33 – 2.0 <math>\mu</math>s or</b>
Range Resolution @ Short Pulse	<b>50 - 500 m</b>
Pulse Repetition Frequency (PRF)	<b>250 – 2500 Hz</b>
Operational Range	<b>100 km</b>
Maximum Unambiguous Velocity @ 5:4	<b>+/- 80 m/s</b>
MDS @ Long Pulse	<b>-113 dBm</b>
Sensitivity (dBZ) @ LP& 100km	<b>~ -11 dBZ</b>
Sensitivity (mm/hr) @ LP, 100km	<b>~ 0.002 mm/h</b>



# METEOR 50DX

## Environmental Conditions

Specification	Value	Unit
Temperature range with radome	- 25 to + 55	°C
Temperature range without radome	- 10 to + 35	°C
Relative humidity maximum (non-condensing)	10 to 95	%
Maximum operational wind load Without radome	130	km/h
Permissible operational wind load with radome	200 In gusts	km/h
Precipitation rate	60	mm/h
Weather	Fog, rain, hail, thunderstorm	
Atmosphere	Saline, corrosive	
Installation height	Sea level to 3 km	



- **April 2013 Kick-off meeting**
- **December 2013 FAT**
- **January 2014 Delivery on site**
- **February 2014 Site Acceptance**
- **March 2014 End of Project**

**potential Risks of delay due to:**

- **Development of NextGen Signal Processor**
- **Infrastructure**
- **„Late“ award of contract**

# RAVIS Maintenance Software

# BITE – Built-In Test Equipment

Quick  
Easy

**Quick radar diagnostics & troubleshooting**

**Comprehensive analysis of all units at all detail levels**

**Klystron > 500 BITE messages!**

**Consequent graphical, top-down visualization**

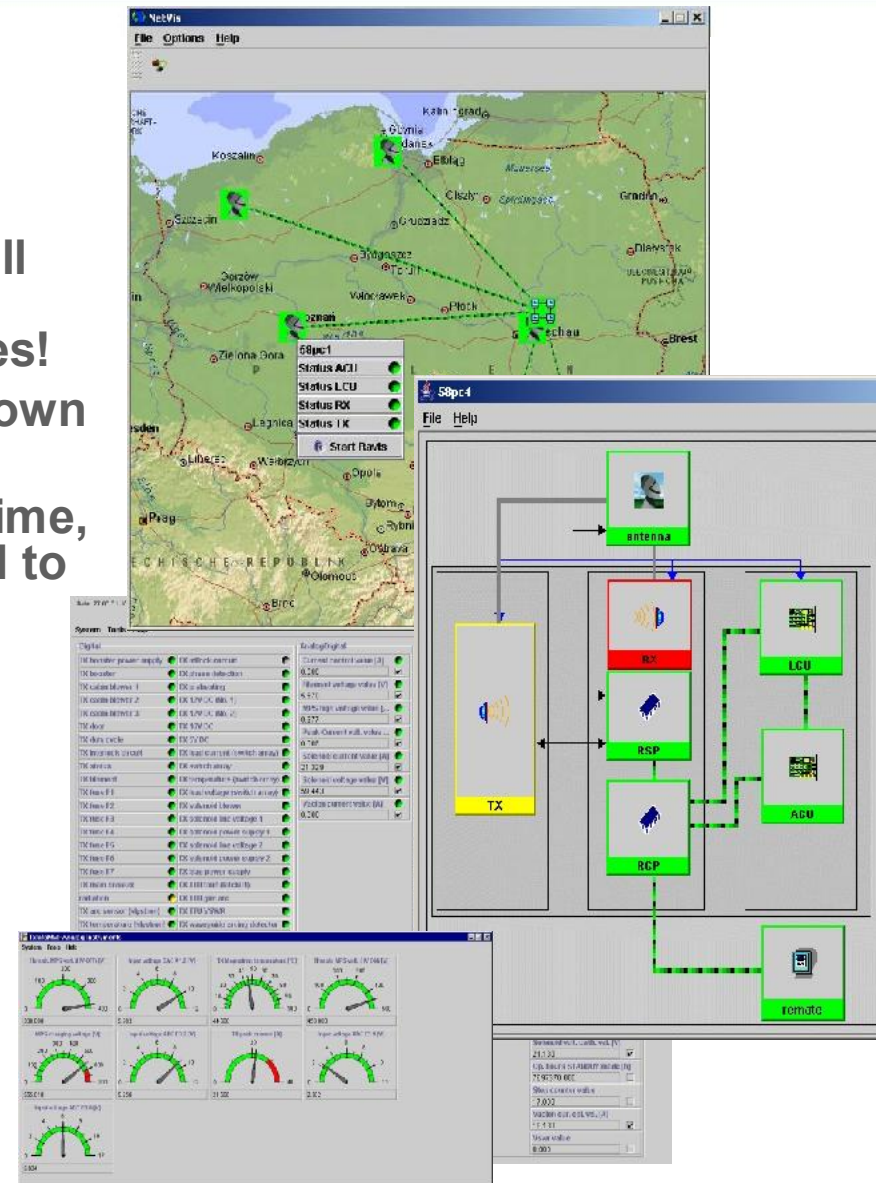
**Automated (or manual), realtime, online surveillance in parallel to the running operation**

Automated  
Online

**Textual, graphical, acoustical alerts**

**Alerting via E-mail / SMS**

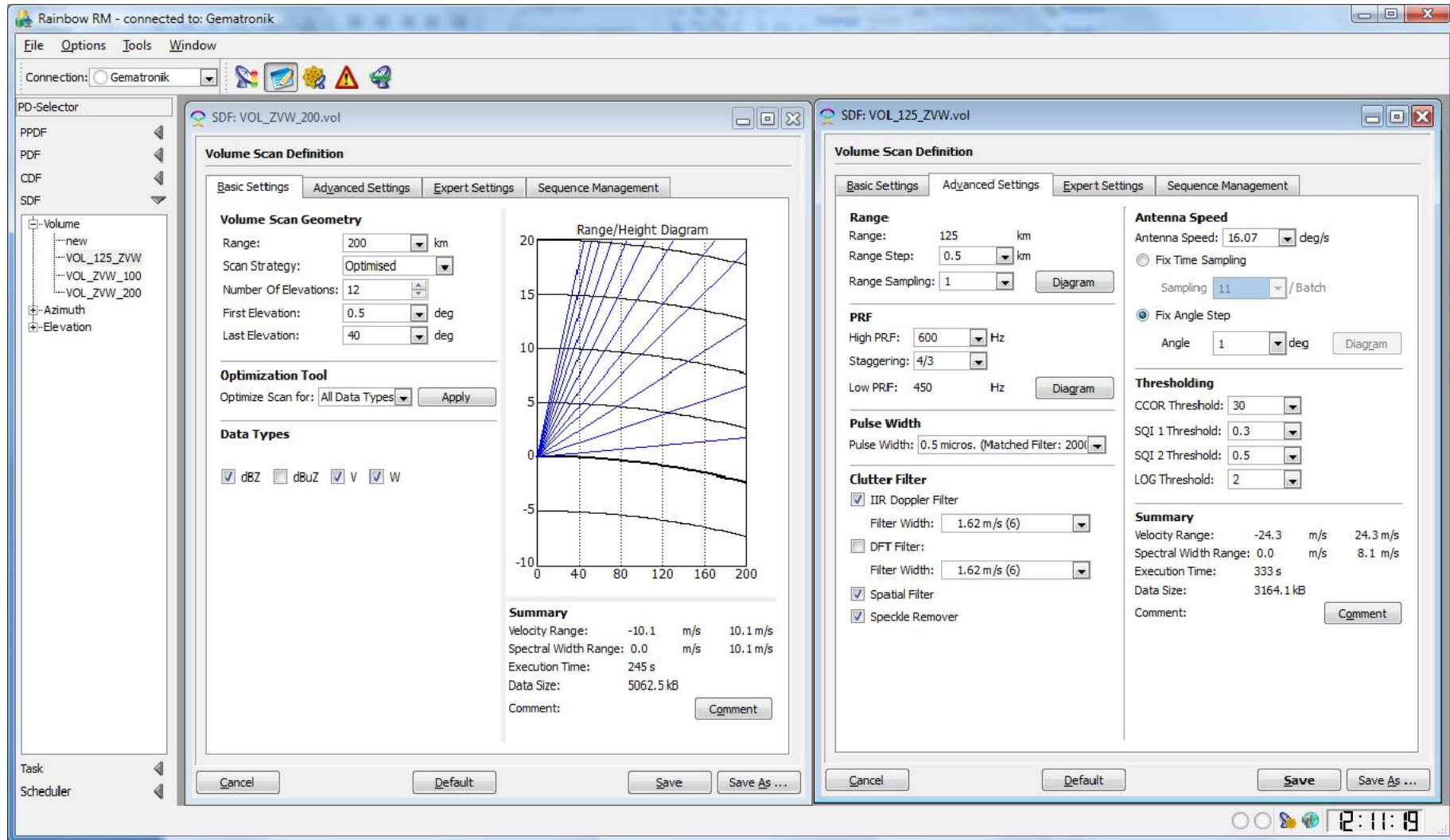
**Easy to configure & extend**



# RAINBOW Display Software



# Flexibility...



The screenshot displays the Rainbow RM software interface, connected to Gematronik. The main window shows two overlapping dialog boxes for defining volume scans. The left dialog is for 'SDF: VOL\_ZVW\_200.vol' and the right is for 'SDF: VOL\_125\_ZVW.vol'. Both dialogs have tabs for 'Basic Settings', 'Advanced Settings', 'Expert Settings', and 'Sequence Management'. The 'Basic Settings' tab is active in both.

**Left Dialog: SDF: VOL\_ZVW\_200.vol**

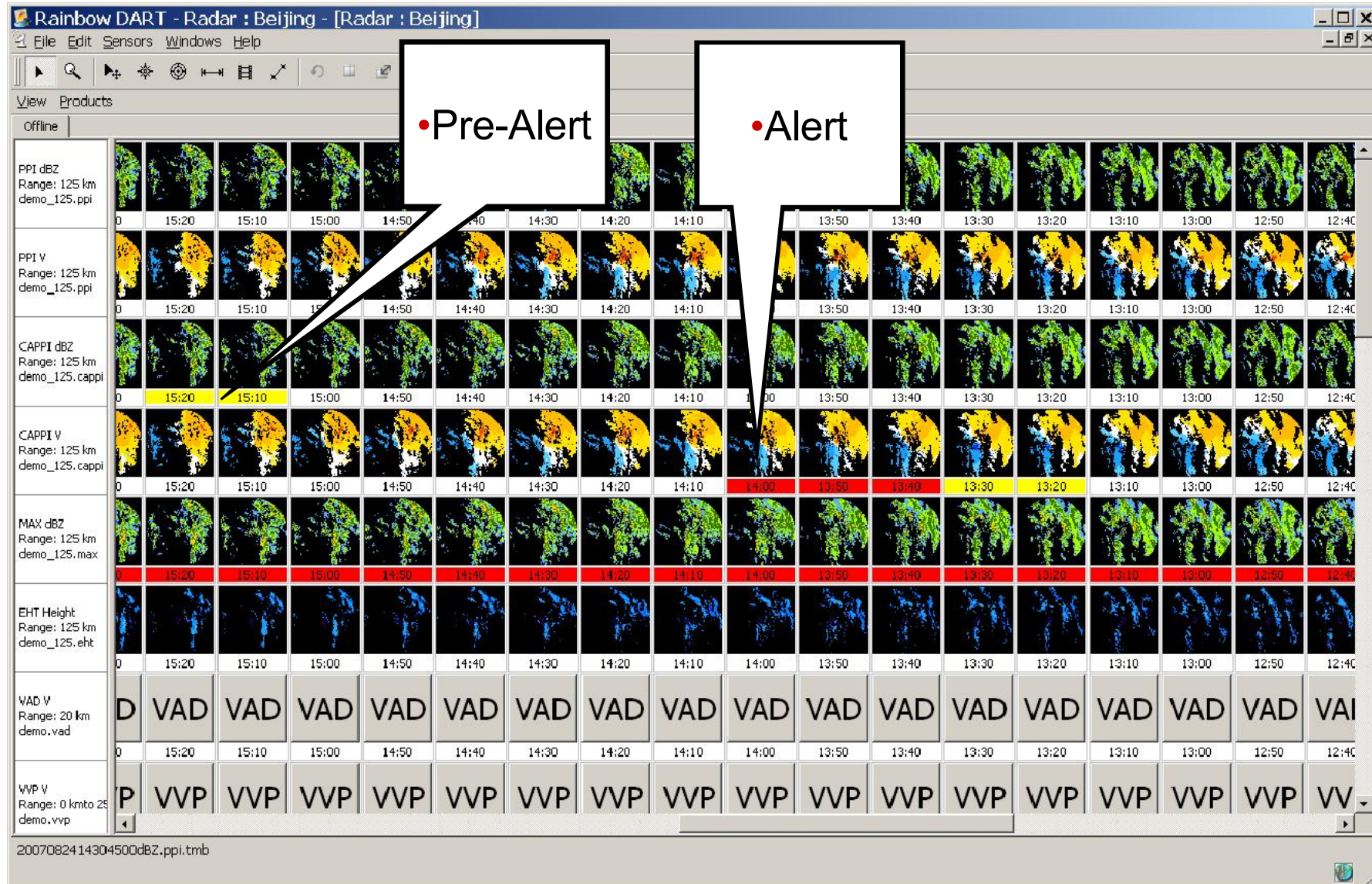
- Volume Scan Geometry:**
  - Range: 200 km
  - Scan Strategy: Optimised
  - Number Of Elevations: 12
  - First Elevation: 0.5 deg
  - Last Elevation: 40 deg
- Optimization Tool:** Optimize Scan for: All Data Types [Apply]
- Data Types:**  dBZ  dBuZ  V  W
- Range/Height Diagram:** A plot showing range (0-200 km) vs height (-10 to 20 km) with scan lines.
- Summary:**
  - Velocity Range: -10.1 m/s to 10.1 m/s
  - Spectral Width Range: 0.0 m/s to 10.1 m/s
  - Execution Time: 245 s
  - Data Size: 5062.5 kB

**Right Dialog: SDF: VOL\_125\_ZVW.vol**

- Range:**
  - Range: 125 km
  - Range Step: 0.5 km
  - Range Sampling: 1 [Diagram]
- PRF:**
  - High PRF: 600 Hz
  - Staggering: 4/3
  - Low PRF: 450 Hz [Diagram]
- Pulse Width:** Pulse Width: 0.5 micros. (Matched Filter: 200)
- Clutter Filter:**
  - IIR Doppler Filter (Filter Width: 1.62 m/s (6))
  - DFT Filter (Filter Width: 1.62 m/s (6))
  - Spatial Filter
  - Speckle Remover
- Antenna Speed:**
  - Antenna Speed: 16.07 deg/s
  - Fix Time Sampling (Sampling: 11 / Batch)
  - Fix Angle Step (Angle: 1 deg [Diagram])
- Thresholding:**
  - CCOR Threshold: 30
  - SQI 1 Threshold: 0.3
  - SQI 2 Threshold: 0.5
  - LOG Threshold: 2
- Summary:**
  - Velocity Range: -24.3 m/s to 24.3 m/s
  - Spectral Width Range: 0.0 m/s to 8.1 m/s
  - Execution Time: 333 s
  - Data Size: 3164.1 kB

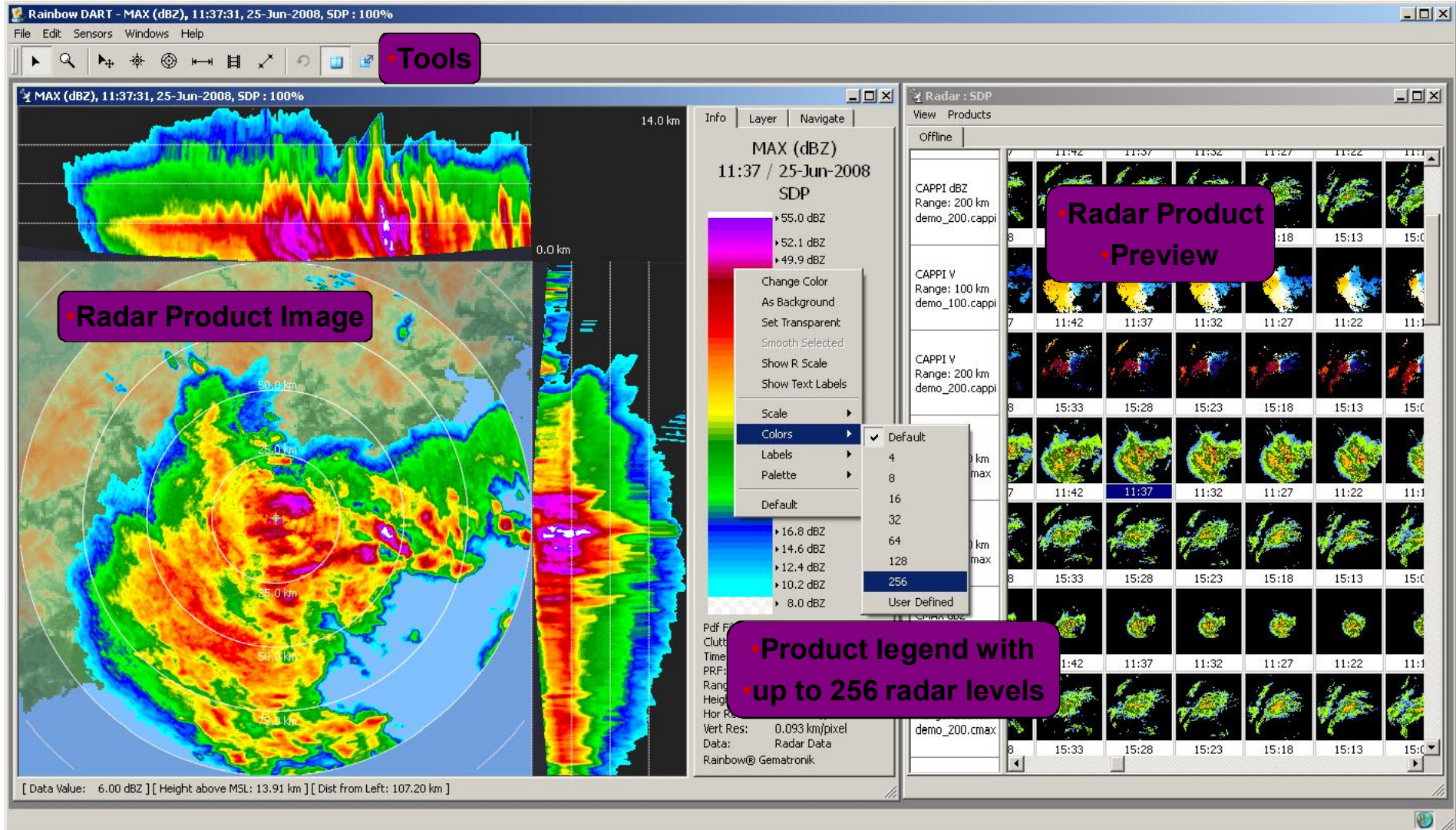
The interface includes a menu bar (File, Options, Tools, Window), a connection dropdown (Gematronik), a PD-Selector sidebar, and a Task Scheduler at the bottom. The system tray shows the time as 12:11:19.

# Product Preview





# Rainbow DART Product View



The screenshot displays the Rainbow DART software interface. The main window shows a radar product image (labeled "Radar Product Image") with a color scale legend (labeled "Product legend with up to 256 radar levels"). The legend is titled "MAX (dBZ) 11:37 / 25-Jun-2008 SDP" and lists values from 55.0 dBZ down to 8.0 dBZ. A context menu is open over the legend, showing options like "Change Color", "As Background", and "Scale". The "Scale" menu is expanded, showing options from 4 to 256, with "256" selected. The interface also includes a "Tools" menu, a "Radar : SDP" panel, and a "Radar Product Preview" grid of small radar images.

**Tools**

**Radar Product Image**

**Product legend with up to 256 radar levels**

**Radar Product Preview**

MAX (dBZ) 11:37 / 25-Jun-2008 SDP

- 55.0 dBZ
- 52.1 dBZ
- 49.9 dBZ
- 16.8 dBZ
- 14.6 dBZ
- 12.4 dBZ
- 10.2 dBZ
- 8.0 dBZ

Scale: 256

Radar : SDP

View Products

Offline

CAPPI dBZ Range: 200 km demo\_200.cappi

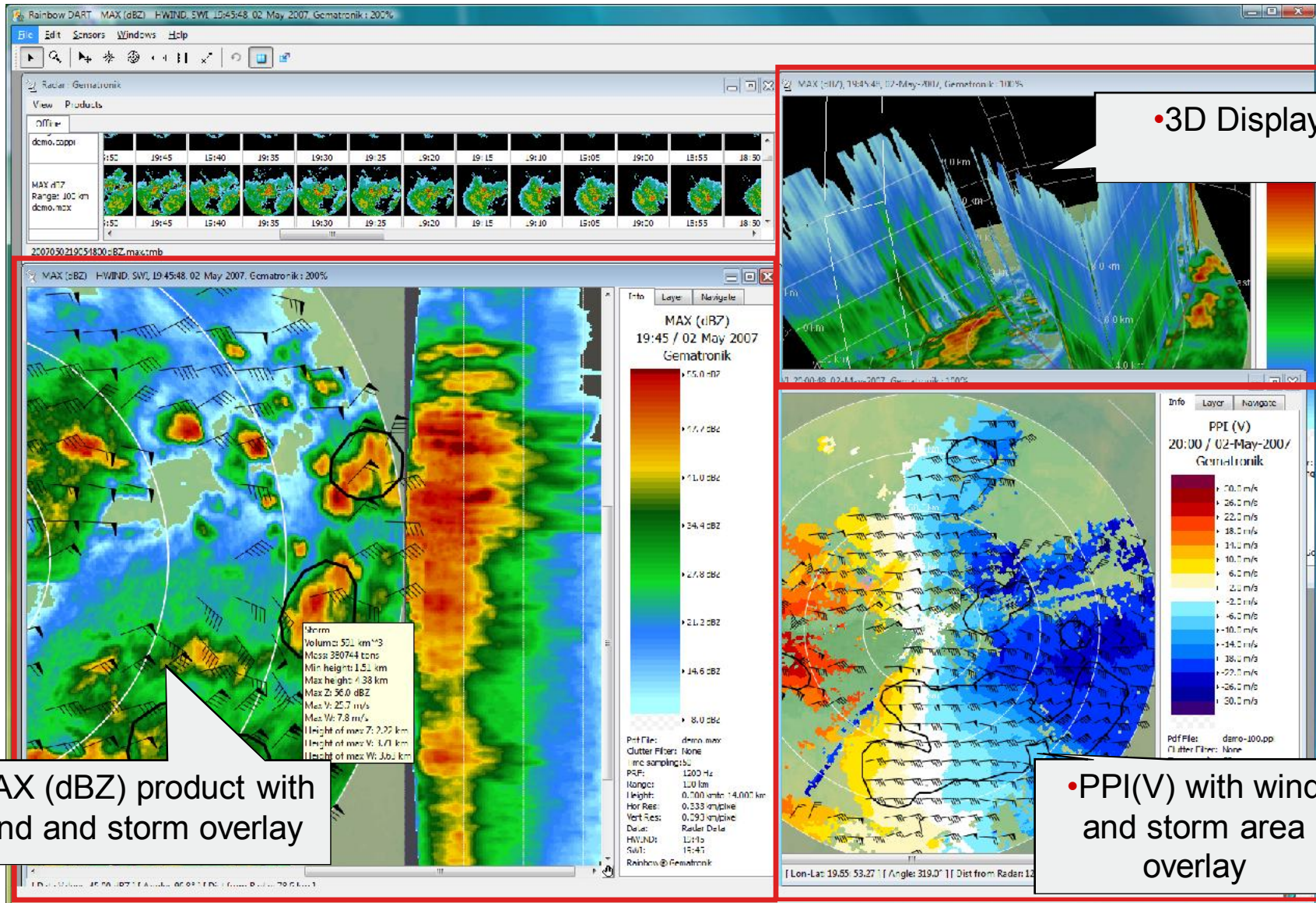
CAPPI V Range: 100 km demo\_100.cappi

CAPPI V Range: 200 km demo\_200.cappi

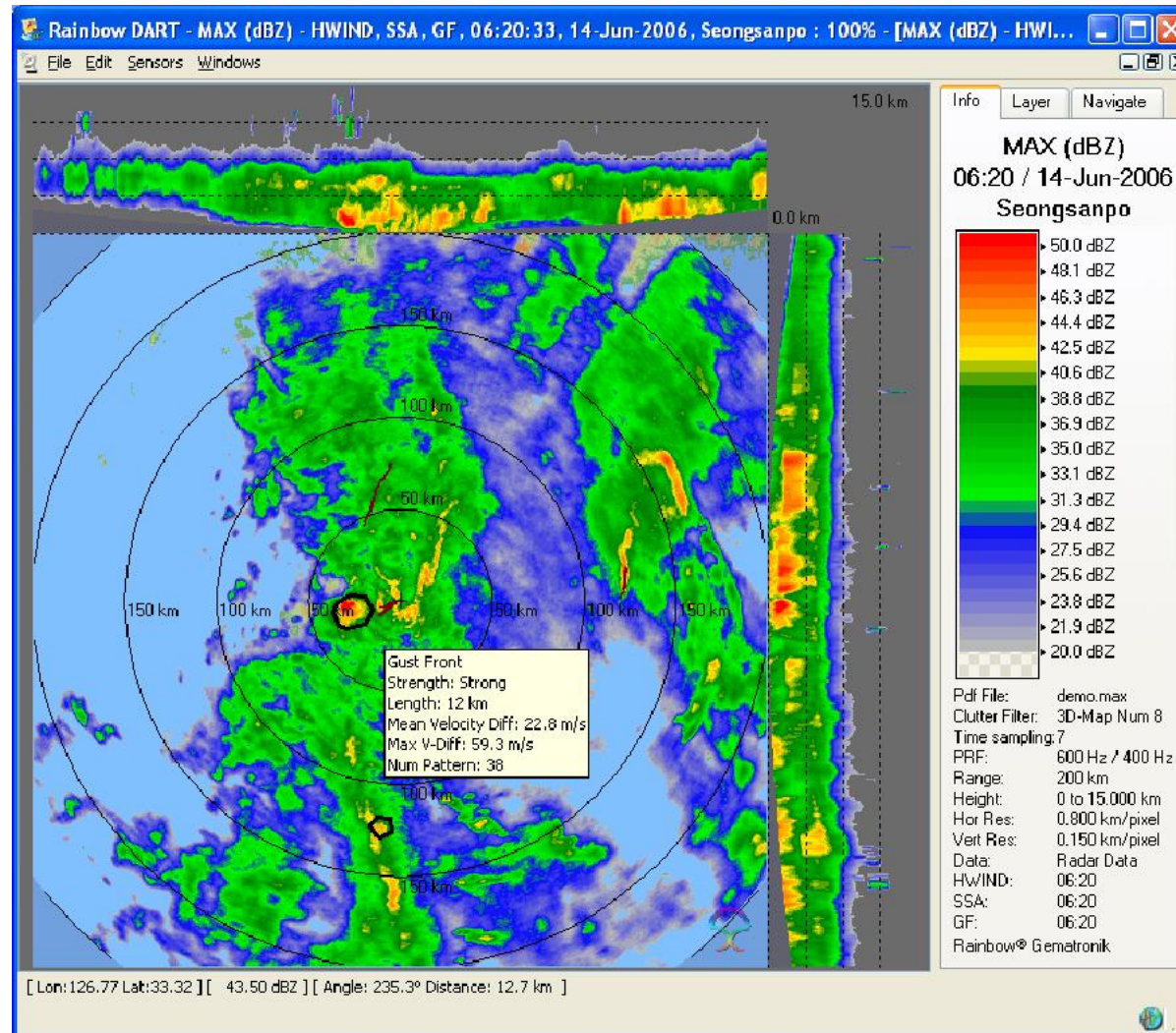
[ Data Value: 6.00 dBZ ] [ Height: above MSL: 13.91 km ] [ Dist from Left: 107.20 km ]



# Rainbow DART Product View

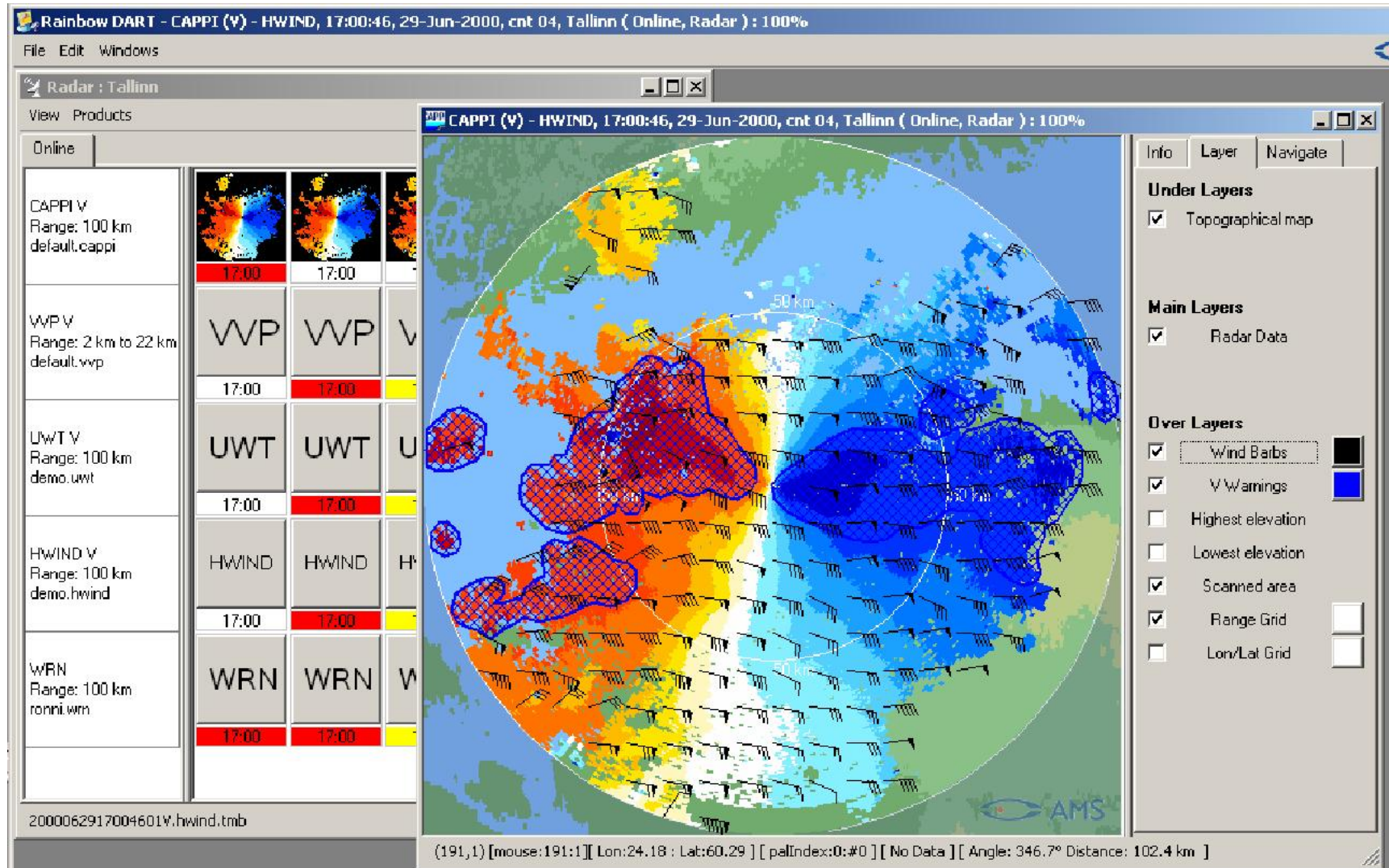


# Typical Reflectivity Product

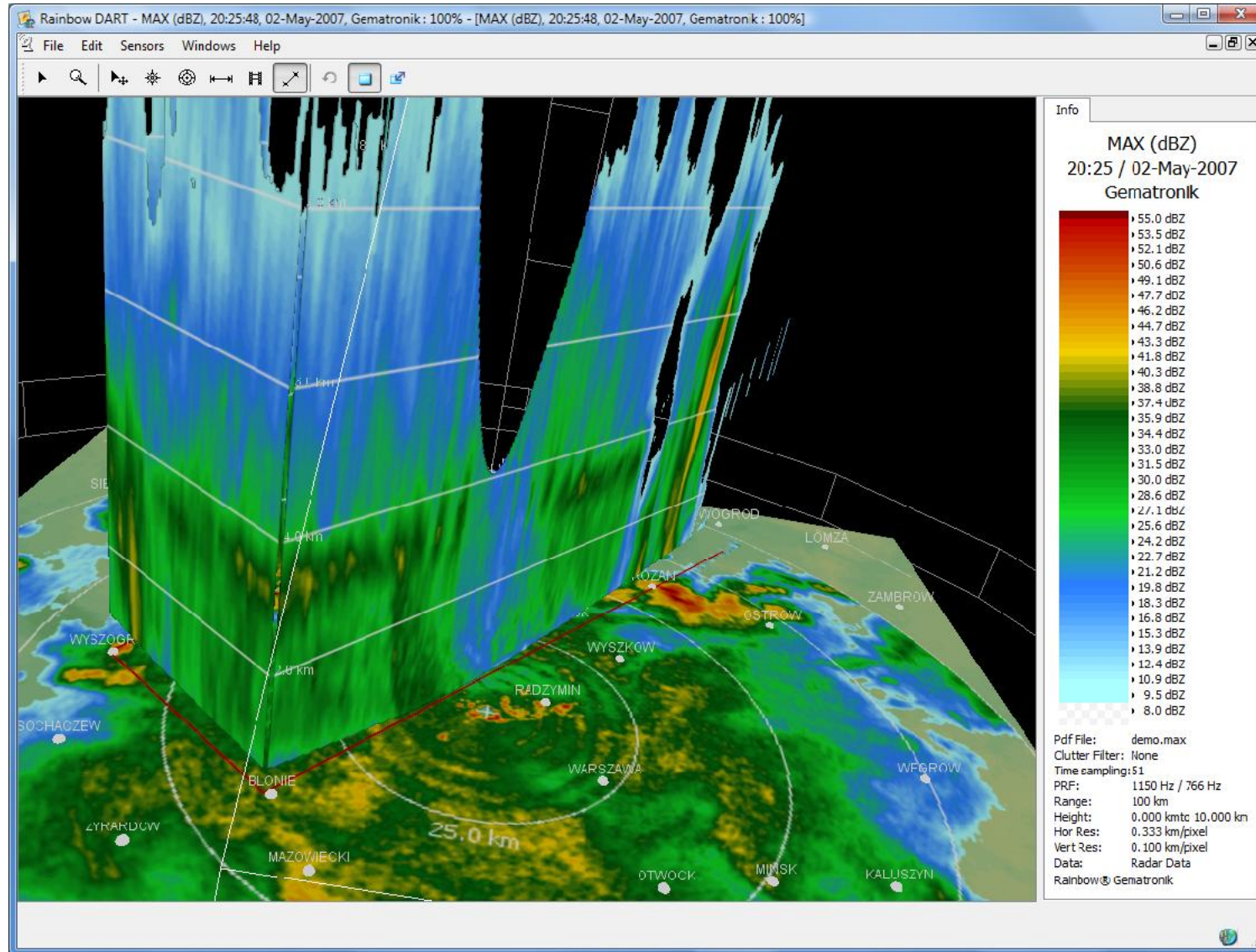




# Velocity Product with Wind Overlay

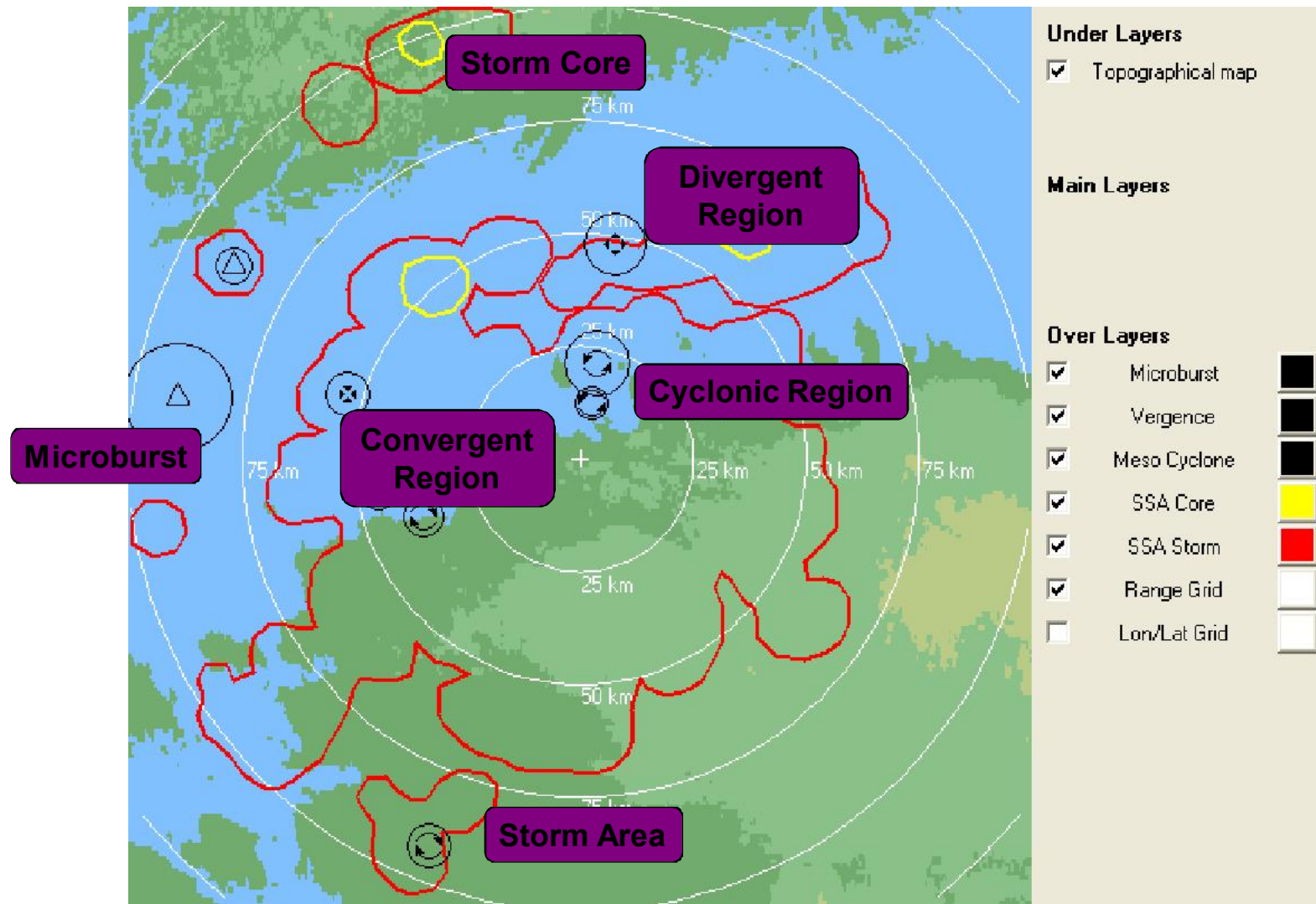


# 3D Analysis of Convective Systems





# Symbols for Severe Weather Phenomena



# METEOR 50DX



- Location: France, Sait-Andre-Les-Alpes
- Type: Fixed Installation
- Altitude: 1775m



# METEOR 50DX



On the road in France



On the road in Libya



Off the road in Iceland



On the road in Brazil

# METEOR 50DX



On the road in Poland



Special Site Inspection Nice Airport



Measurement Campaign Nice Airport



Fuel for the generator, South Africa



# METEOR 50DX



Volcanic Ash Tracking in Sicily



Measurement Campaign Arpa Piemonte, Italy



Volcanic Ash Tracking in Island



50DX welcome ceremony South Africa

# METEOR 50DX



Volcanic Ash Tracking in Island, Artic version, double-axis, wide-base tyre