**<u>Looking at severe convection over Germany in 2.5-min Rapid Scans</u>**

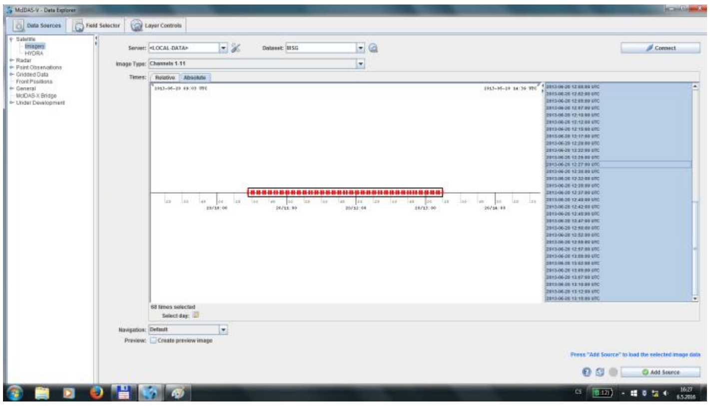
1. New McIDAS-V skills:
   a. Creating loops and saving loops
   b. Animation controls
   c. Measuring pixel size

2 Key concepts:
   a. Conceptual Model of severe convective storms
   b. Cold-ring and cold-U shape storms, overshooting tops, gravity waves, ice plumes, storm outflow, lifecycle of storms

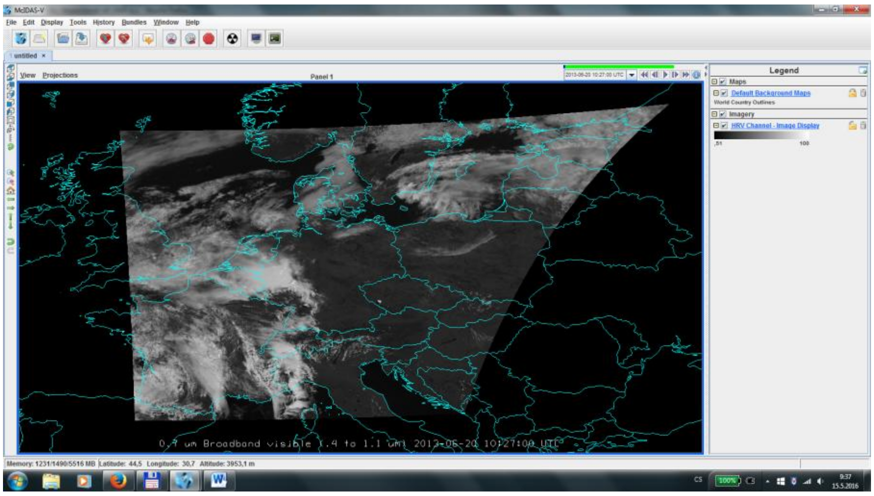
Step-by-step instructions for this case (key questions are in yellow):

1. Open McIDAS-V
2. Open SEVIRI HRIT data (channel HRV) for 20 June 2013 (10:27 – 13:15 UTC) – it will take some time to upload all data, but it is worth because of detailed animations!

a. In the **Data Explorer** window, select the **Data Sources** tab
b. Select **Imagery** under **Satellite** in the panel on the left side
c. Select Server: <LOCAL-DATA>
d. Select the **Dataset**: MISAHRV
e. Click **Connect** and wait
f. Select the **Image Type**: HRV Channel
g. Go to the **Absolute** tab and select all the images from 10:27 to 13:15 UTC (Note: to select multiple datasets in the right column you can press the Shift key and select with up or down arrows. If you want to select all of them, click on one of them and press Ctrl+a)



h. Click **Add Source** and wait
i. In the **Field selector** tab, select **0.7 um Broadband visible → Reflectivity** under the **Fields** panel and wait (takes more time to load a loop)
j. Select **Imagery → Image Display** in the **Displays** panel
k. Select the **Advanced** tab and put the **Magnification** slider to the maximum 1 (or use green arrows)
l. Go to the **Region** tab and select an area that includes Germany and Benelux
m. Click **Create Display**, wait (please, be patient). The display should look like this:




3. Now, add the layer with channel IR10.8: open SEVIRI HRIT data for the same time period (dataset MISA)

a. In the **Data Explorer** window **Data Sources** load the MISA dataset, all times

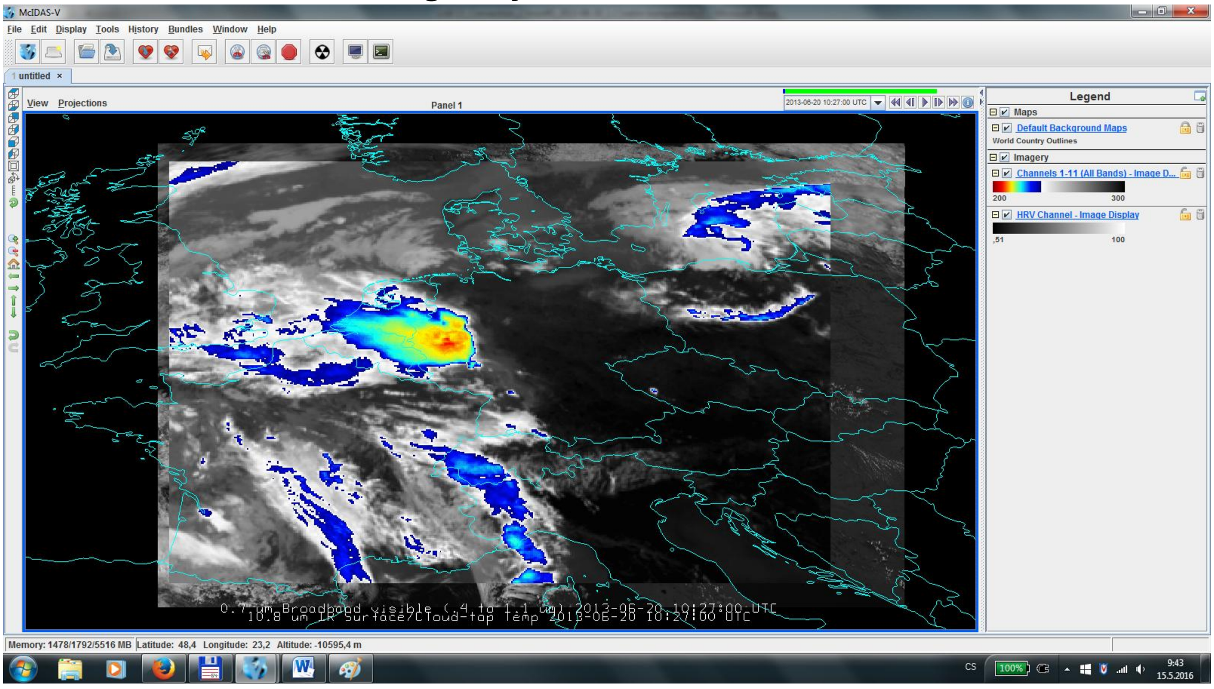
b. In the **Field Selector** choose **10.8 µm IR Surface/Cloud-top Temp → Temperature** and wait

c. **Displays** → Image Display, **Advanced** → full resolution (green arrows), **Region** → select roughly the same area as before (Germany and Benelux)

d. Click **Create Display** and wait

e. Change the colour scale to the "Setvak scale": in the Map Display Window Legend right-click on the scale under **10.8 um IR Surface/Cloud-top Temp**, **System → Legacy → Setvak** and change the range of the displayed BT to 200 to 300 K

4. Change the projection: in the **map window** in the **Legend** right-click any layer in **Imagery**, select **View** and **Use Native Image Projection**. It should look like this:




Now every pixel is a regular square without any inaccuracies caused by computations because of different projections. It is just like MSG/SEVIRI can see the scene. What is the difference in the resolution between HRV and other channels? Toggle the HRV and the IR images to compare them. What extra features can you see in the HRV image (that you cannot see in the IR image)?

5. Measure the distance and compute the resolution over Europe.

a. Zoom on the storm over Germany, wherever the colourful pixels are occurring

b. In the McIDAS-V window click on **Display → Add Range and Bearing**

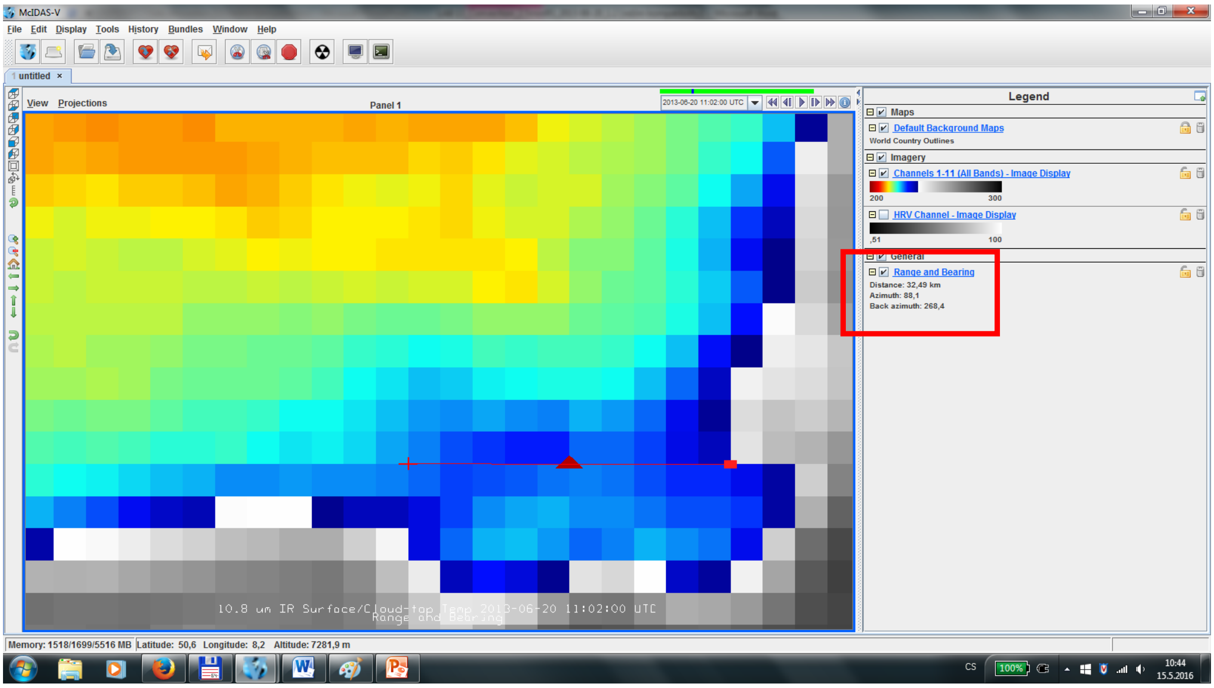
c. A red line with + on the left end, ▲ in the middle and ■ on the right end will appear on the screen (you can change the colour of this line)

d. In the IR image drag + to the edge of the pixel and ■ to the edge of the 11th pixel, such that the line become a horizontal line (see the picture below)

e. Read the distance of the line/10 pixels (below **Range and Bearing** in the **Legend** panel) and compute the approximate width of one pixel

f. Do the same in the south-north direction

What is the rough spatial resolution of SEVIRI over Europe?




6. Analyse storm development and cloud-top features in animation.

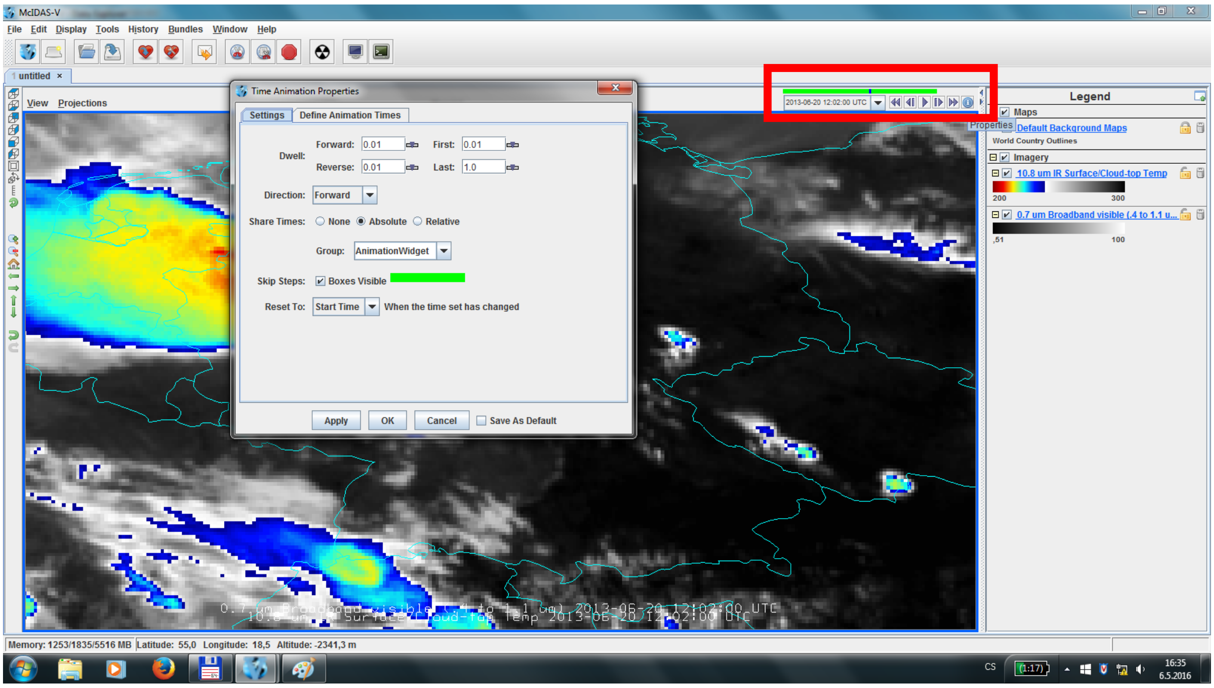
a. Watch individual images and move forward or backward by arrows (shown by the red box on the picture below).

b. Run the Super Rapid Scan animation (IR10.8 and HRV): click on the arrow ►

c. Change the speed of the animation (click on the info button)

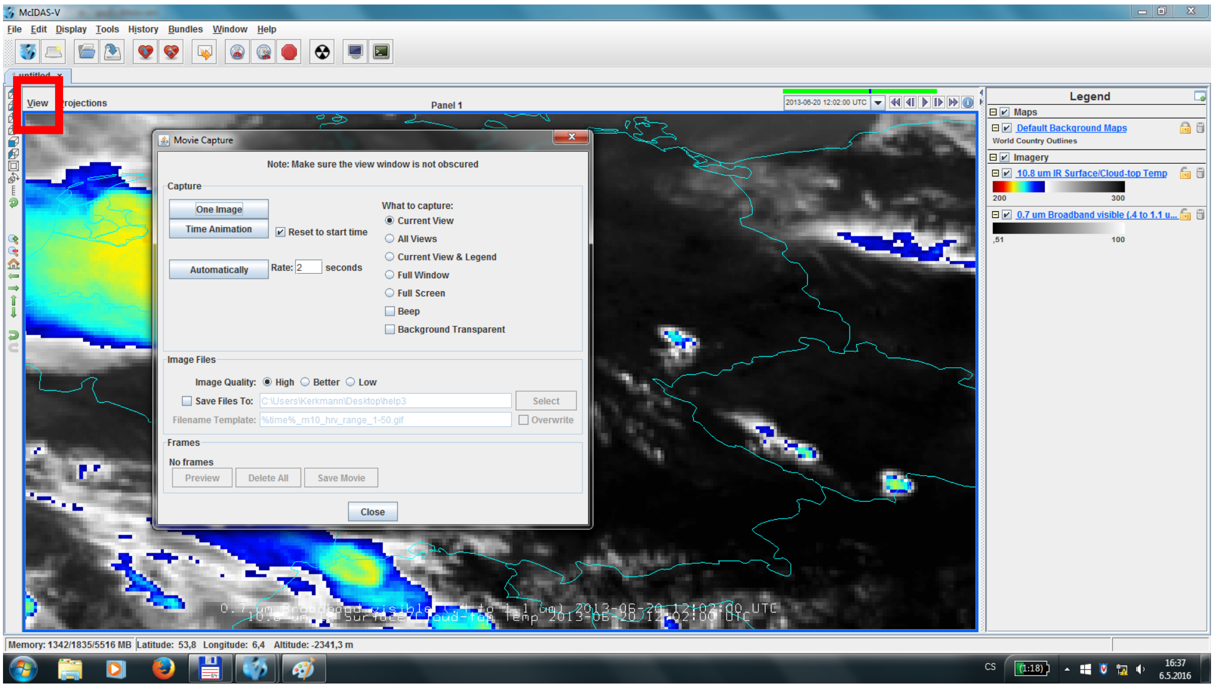
d. Set "**Forward**" speed and "**First**" to 0.1 (10 images per second)

e. Click **OK**




Study carefully the thunderstorm over Central Germany. Can you observe some severe features on the cloud-top? Which of them? When? What about the features around the storm cloud? What does it mean for the lifecycle of the storm?

f. Save the loop: in McIDAS-V map window **View** → **Capture** → **Movie**




g. Tick "**Save Files to**" and Select destination directory (on flash drive)
h. In the **Filename Template** put "%time%_ir108_col.png" or "%time%_hrv.png" (you must **specify the extension .png** to get PNG images!)
i. "**Image Quality**" should be set to High (default)

j. Click on **Time Animation**, this starts the capturing process!
k. Wait until all images are captured (when the loop is finished)
l. Do not save the QuickTime movie (click **Cancel**)
m. Close the **Movie Capture** window
n. Check that the images have been saved correctly!!

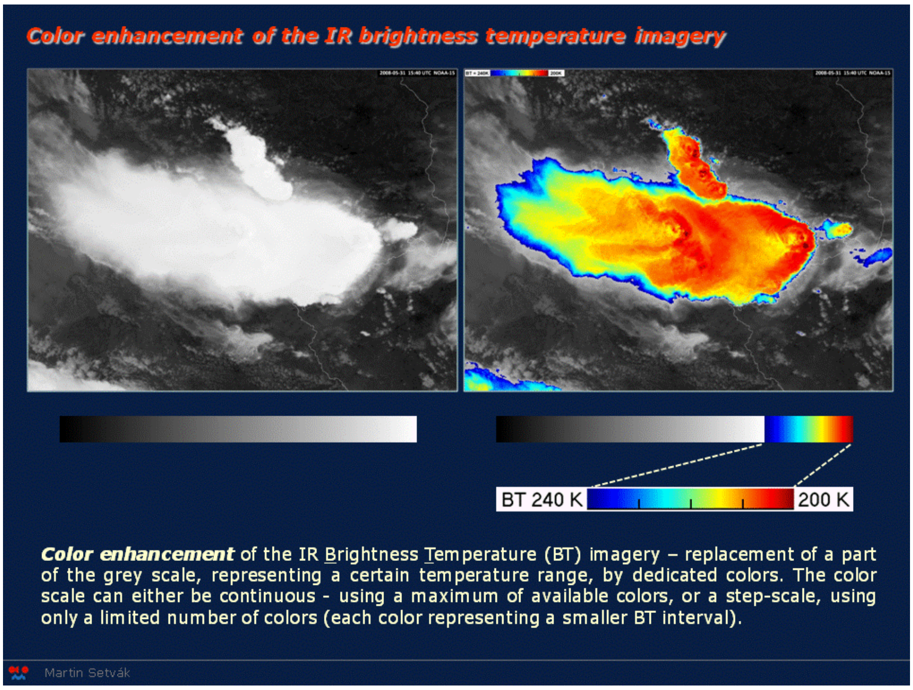
**BONUS FOR FORECASTERS:**

Considering the IR10.8 colour-enhanced images, is it a cold-ring or cold-U shaped storm? Can you identify a storm-top feature, which might be responsible for the particular shape of the storm? Which of the other SEVIRI channels can you use to verify your assumption? Try to verify!

When you have finished the Lab, you may look at other SEVIRI rapid scan cases: 18 June 2013, 20 June 2013, 12 September 2012.

## Annex 1: How to create the Setvak IR colour table

For info, check the Convection Working Group website.




a. Open an IR image and set range from 200 to 300 K

b. Right-click on the colour bar of the IR image, select **Edit Colour Table**

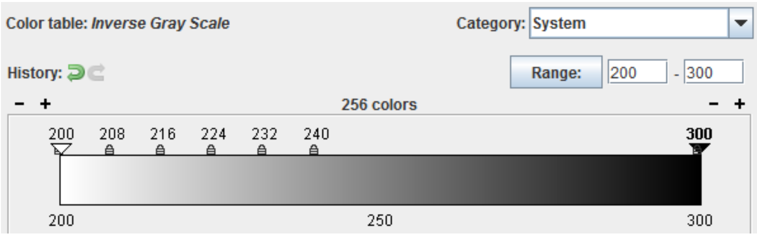
c. A new window (**Colour Table Editor**) will pop up

d. Top Menu: select **Color Tables → System → Inverse Grey Scale**

**e.** Add 5 new breakpoints in the colour table by right-clicking on the colour bar **Add Breakpoint → At Data Point → Value = 208**, Click **OK**

f. Repeat this for breakpoints at **216**, **224**, **232** and **240** K.

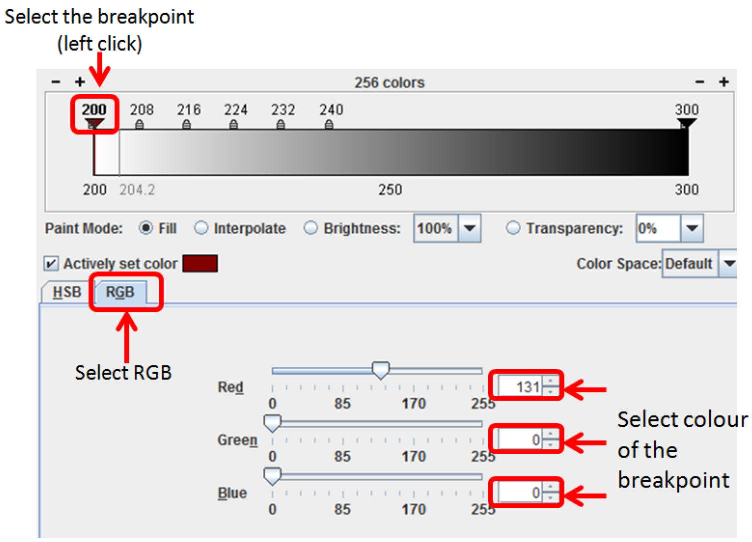
g. Lock all breakpoints: right-click on the breakpoint → **Lock Breakpoint**. This is to prevent you from moving/changing the breakpoints. The **Colour Table Editor** should look like this:



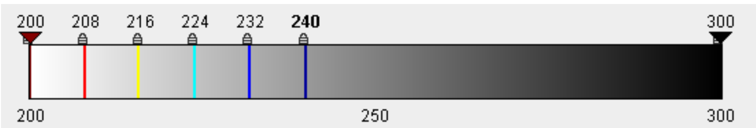

h. Then, select breakpoint **200** K (left-click)

i. Select the colour for this breakpoint by clicking on the **RGB** tab

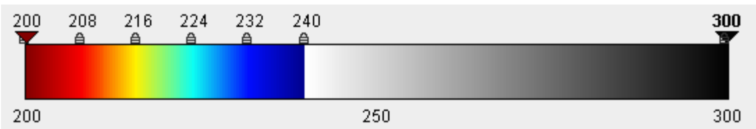
j. Select Red=**131**, Green=**0**, Blue=**0** (dark red), see screenshot below:




k. Do the same for the breakpoint **208** K (**255,0,0**) red
l. Do the same for the breakpoint **216** K (**255,255,0**) yellow
m. Do the same for the breakpoint **224** K (**0,255,255**) cyan
n. Do the same for the breakpoint **232** K (**0,0,255**) blue
o. Do the same for the breakpoint **240** K (**0,0,131**) dark blue
p. You should now see some nicely coloured lines in the colour bar window (see below)




q. Now, to interpolate between these breakpoint colours, you have to:
 **i.** Right-click on the **208** K breakpoint, and select from the drop down list: **Edit Colours → Interpolate → Left**
 ii. Do the same for the **216** K, **224** K, **232** K and **240** K breakpoints
r. Now, let us also enhance the warm part of the colour table (240 to 300 K) by selecting the **240** K breakpoint again (left-click)
s. Change the colour to white (RGB **255,255,255**)
t. Right-click on the **300** K breakpoint, and select from the drop down list: **Edit Colours → Interpolate → Left.** The colour bar should look like this:




u. Save the new colour table: Colour Table Editor window: **File → Save As →** Select name