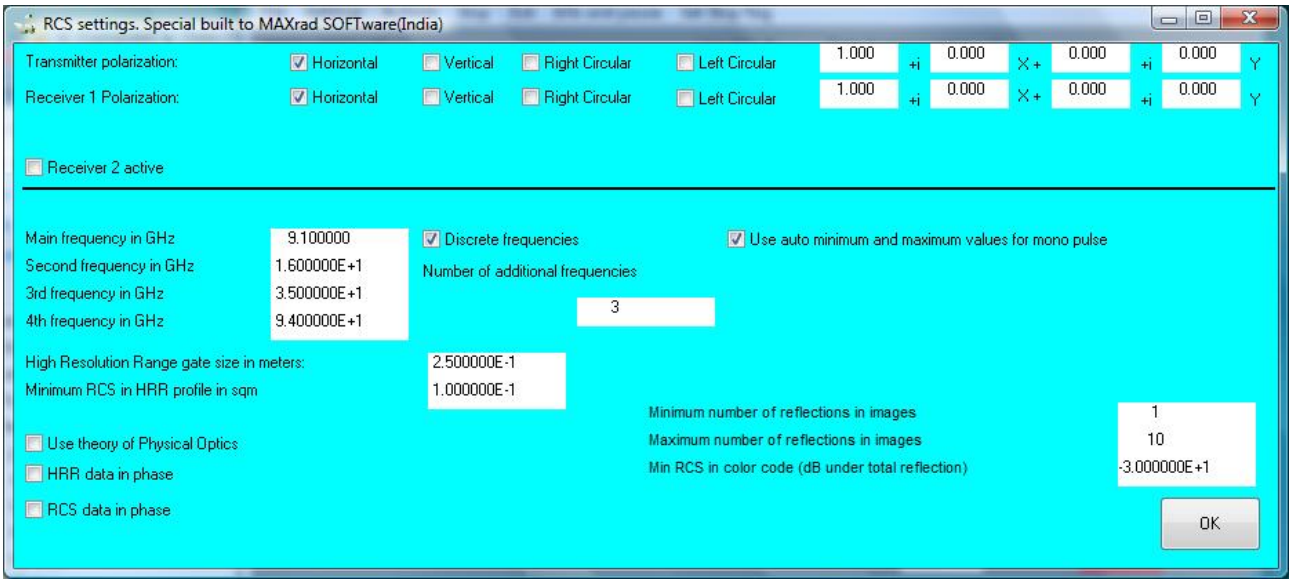
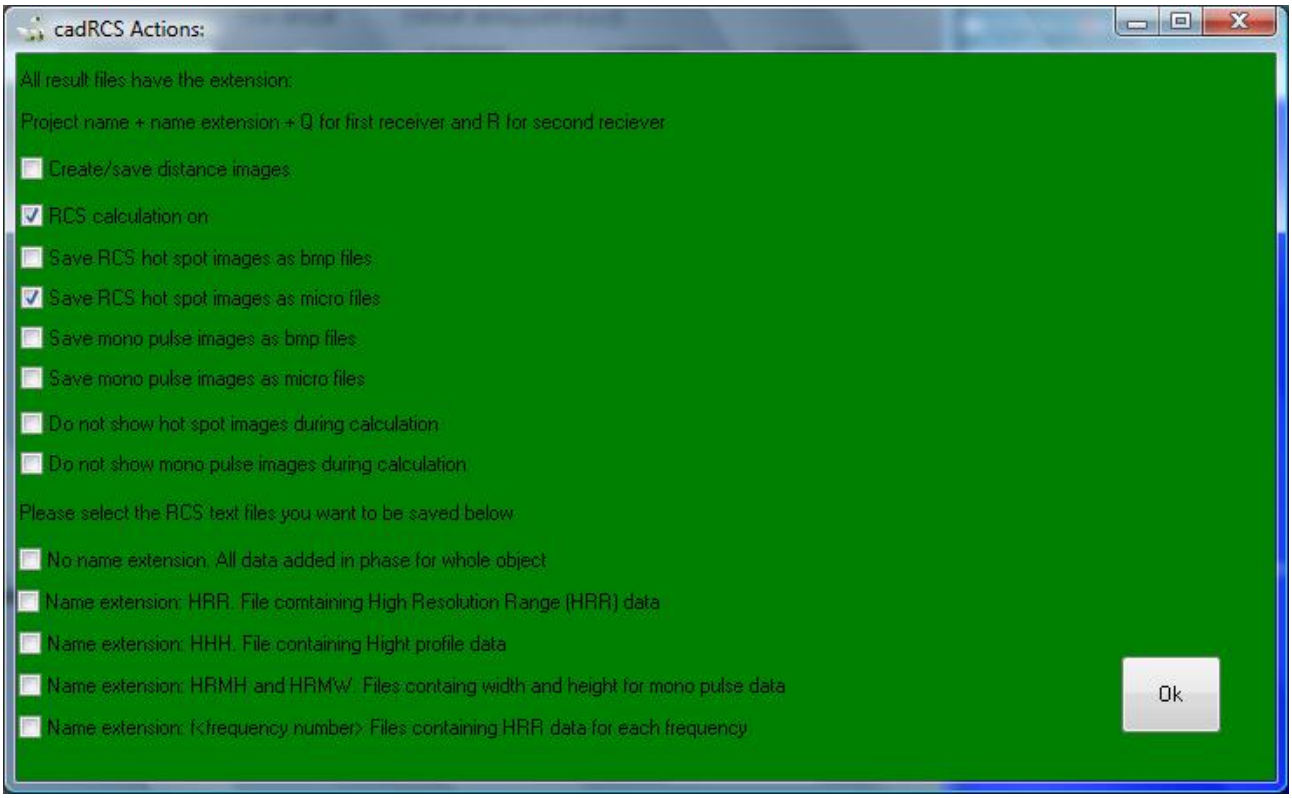
Full Analysis of an aircraft.

In this example it will be shown how to make a full RCS analysis of an aircraft with cadRCS. In the full analysis mode all azimuth and elevation angles will be calculated.
Amazing3D.com has designed this airplane and have been so kind to allow us to use this as a training example for cadRCS.
You can download the CAD file here:
http://www.cadrcs.com/Downloads/f22/f22.zip
Start cadRCS and accept the license terms, then go to: File -> Open CAD file. Open the f22.bna file. Go to File -> Project name and working directory. In Windows it is important that you create the working directory here otherwise the system can block the code cadRCS for writing files on it. Select Full analysis, different angles As you see the aiming point and the default aiming point are both (0,0,0), so this is OK, otherwise you need to go to: Settings -> Change CAD position etc. and move the object so so default aiming point = (0,0,0).
Set Start evaluation to 0.0 and Stop evaluation to 60.0 (default values). Set Framesize width to 25.0 and Framesize Height to 25.0. Go to Settings -> RCS settings and set the values as below:



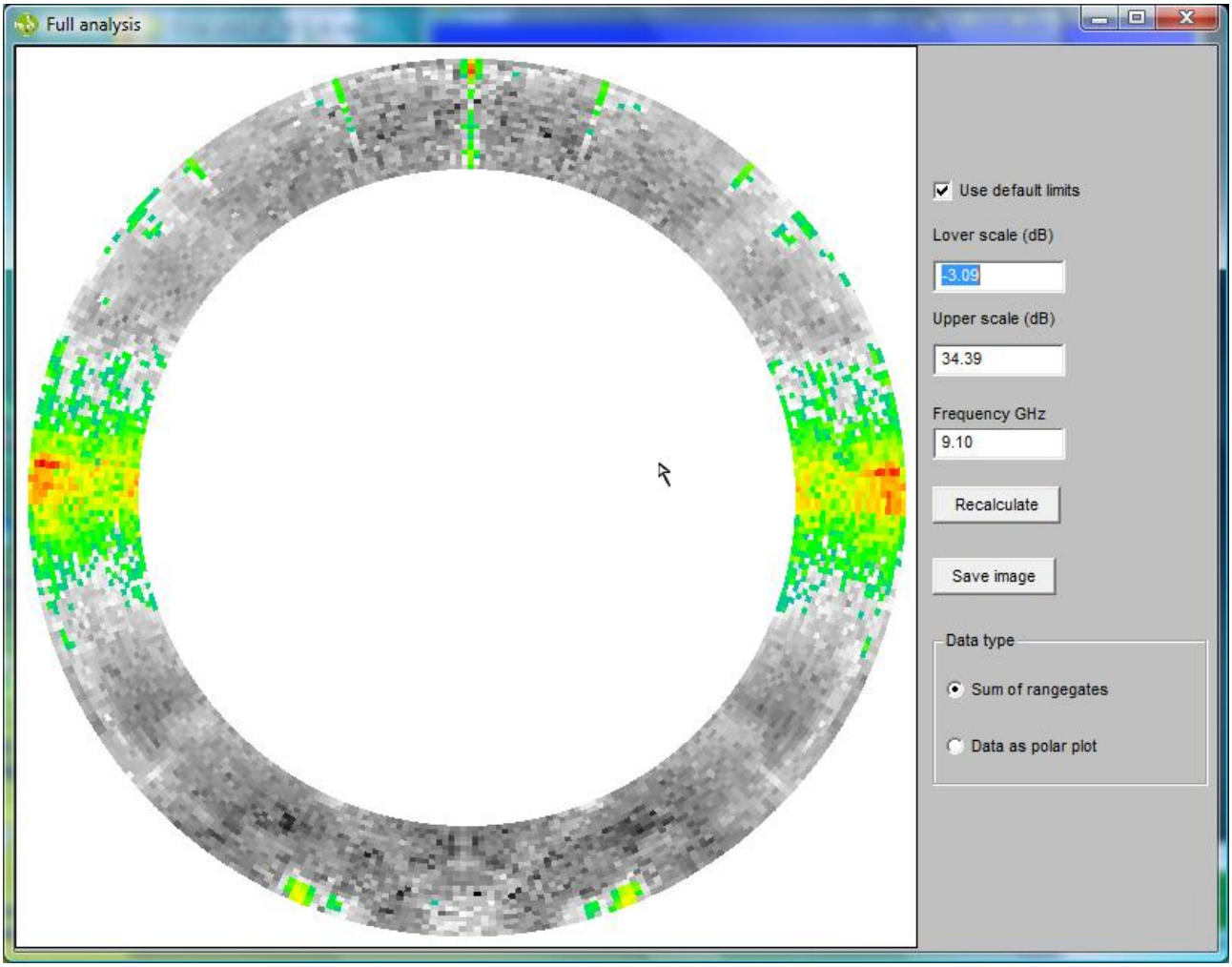
Push OK.

On the main menu go to Actions and set the actions as below:



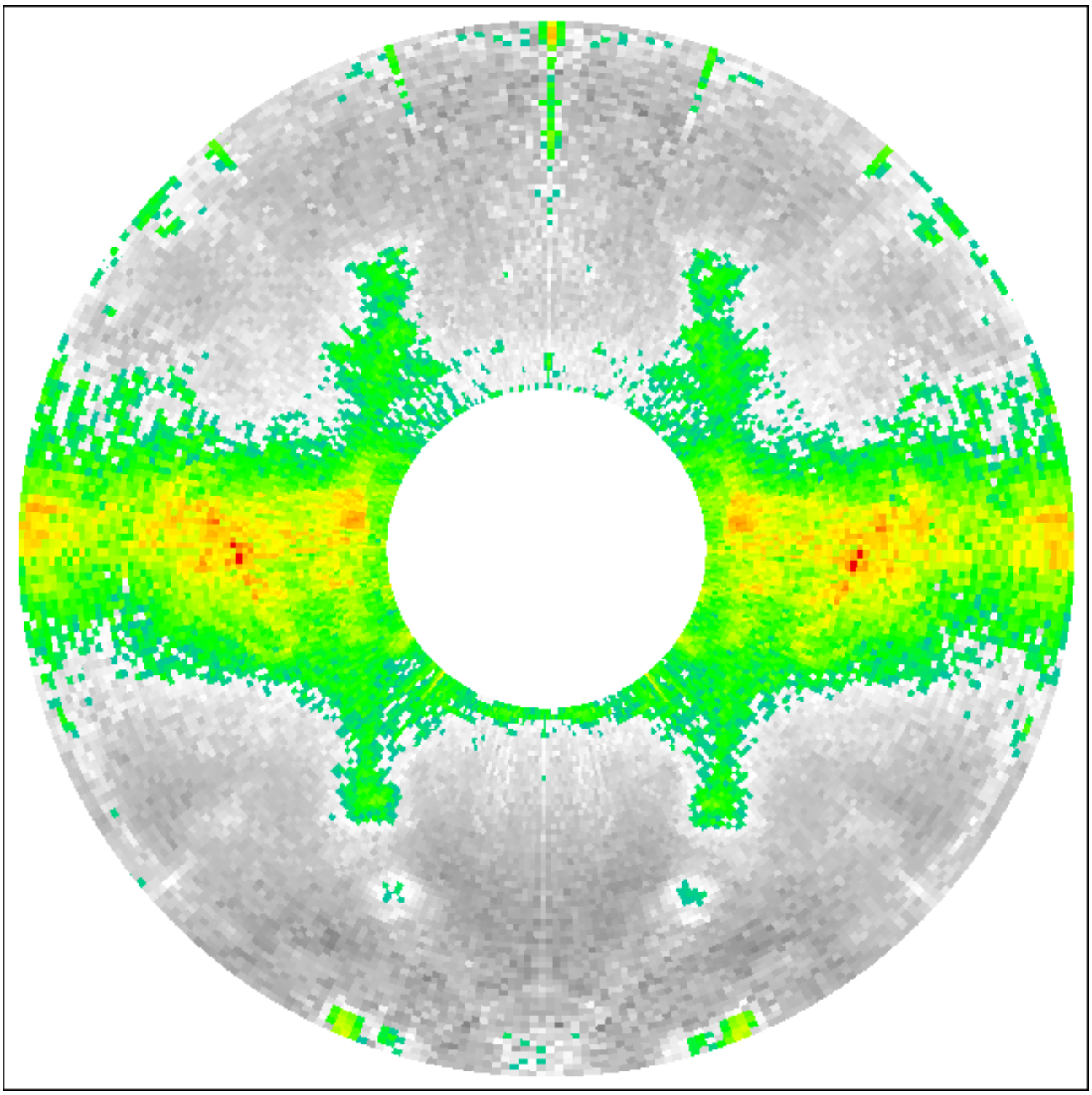
On the main menu you can see that cadRCS now are ready to do 21960 calculations, this will take some time so start it just before you go home by pushing Process.

After cadRCS have finished calculating then close cadRCS and start movie. Now the existing version of movie can only import 8.126 mic files, so select first the mic files from 1 to 7920 and push Pack micro files and save it in a directory, where you want the results from all the calculations. Then push Make full picture and you get the window:



Unselect Use default limits and set lower scale to -10.0 dB and Upper scale to 40.0 dB. Push Recalculate and the Save image and put it in your directory with the results and name it so you know that this is first part of the calculation from 0.0 degree elevation to 60.0 degree elevation and that the frequency is 9.1 GHz. On the main menu for movie – the window: Polar plot of RCS in sqm select the next frequency 16.0 GHz and go back to the window Full analysis and push Recalculate. Save the image as before and repeat this step for the other frequencies 35.0 and 94.0 GHz. Now you need a colour scale and this you can get by going to the window: High Resolution Range Profile and check that the Start scale and End scale are the same as you used for the Full analysis images. Then push Save HRR plot and choose a name so you know where to find the colour scale for the full analysis images. Close movie and restart it again. Then select the next mic files from file number 7921 to 15840 and make the same procedure with them as with the first files from 1 to 7920. Close movie and select the last files from 15841 to 21960 and repeat the procedure.
You can download these results here:
http://www.cadrcs.com/Downloads/f22/f22part1.zip

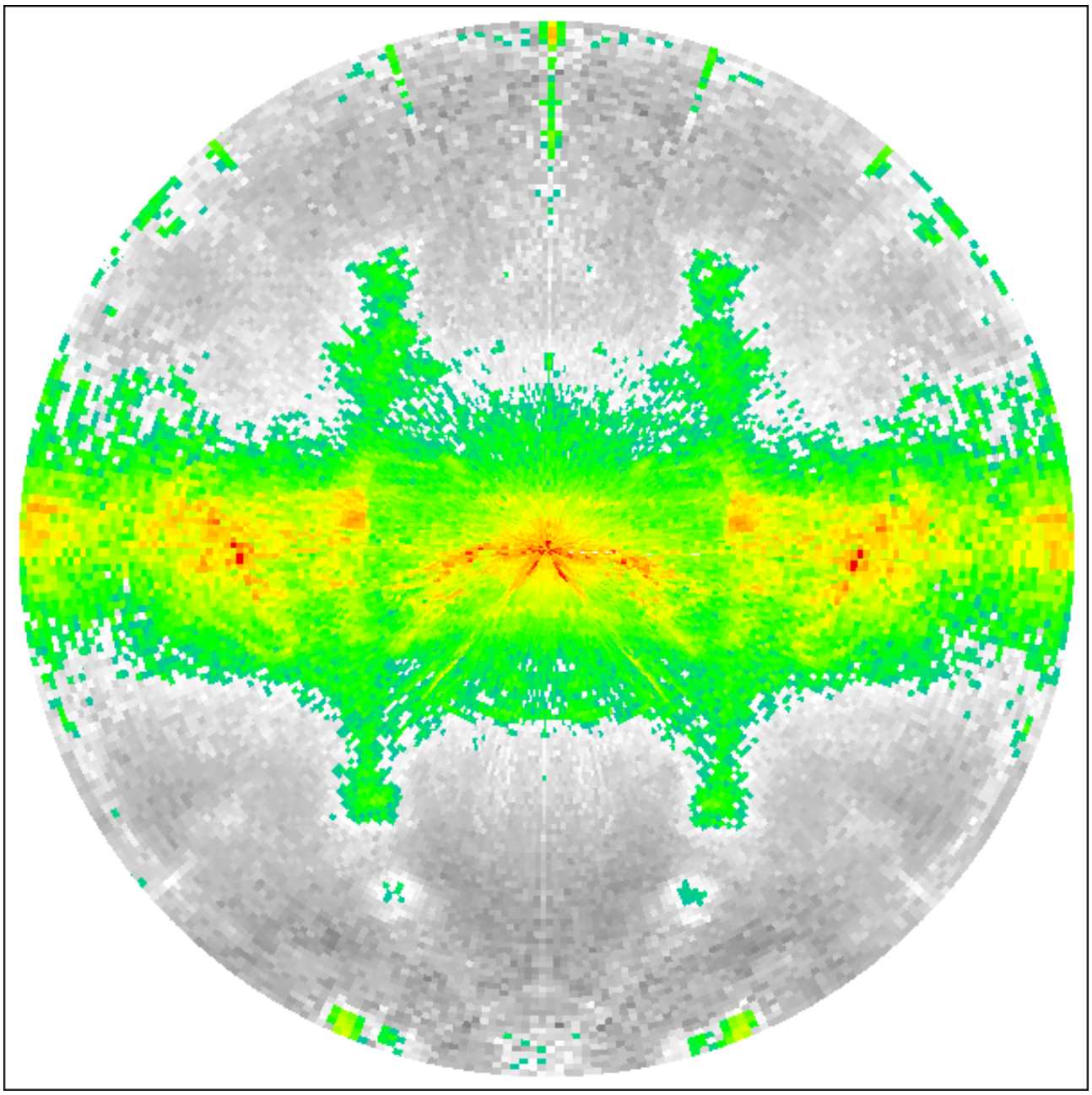
Now you can use an image code to set the full analysis images together to one image, you can for example use the code Paint from Windows. After you have done this you will get the picture below showing the results from 0 to 60 degrees elevation and for all azimuth angles for 9.1 GHz:



To calculate the remaining elevation angles start cadrcs and import the settings from the first run. Then save the project in another directory and select: Full analysis, equal angles. Set Start elevation to 60.0 degrees and Stop elevation to 90.0 degrees. The Spherical angle resolution shall be 1.0 degree. Now on the main menu you see that cadRCS will do 5738 numbers of calculations, so push Process and wait for the results to be calculated.

The results from this run can be downloaded at:
http://www.cadrcs.com/Downloads/f22/f22part2.zip

Now close cadRCS and start movie; pack all mic files into one pmi file and save it as before. Push Make full picture and do the same steps as before. Now you can put all pictures together with your image tool showing the results from 0 to 90 degree elevation and all azimuth angles. Then you get an image like this for 9.1 GHz:



From this picture you see that there are areas where the RCS is very low, so if the plane is threaded by a radar homing it goes to one of these areas and as close to 0 Doppler shift in the direction of the missile an then throw chaff. In this way the pilot have the best chance that the chaff will work. Of course you need to choose the image for the frequency the radar homing missile are using, but to have all this information stored in the planes computer isn't any problem.