Data Description

The data set consists of 24 magnitude CARABAS-II VHF-band SAR images collected during a flight campaign held in northern Sweden 2002. The phase information has been removed by taking the absolute value of the complex numbers. In each image there are 25 terrain vehicles concealed by foliage. The set of images supports single pass, two pass and multi pass target detection. This document gives a brief description of the data. More details can be found in the paper "A challenge problem for detection of targets in foliage" presented at the 2006 SPIE conference Algorithms for Synthetic Aperture Radar Imagery XIII in Orlando.

Flight geometry

During data collection the radar data was acquired in strip map SAR mode with a smallest range to the aim point of 12 km and a flight altitude of 6.36 km corresponding to an incidence angle of 58°. Three flight headings were used, 225°, 135° and 230°. The heading is defined as 0° pointing towards north with clock-wise increasing heading. CARABAS-II used a left looking mode meaning that the radar was transmitting in the directions 135°, 45° and 140°.

Format

Data is stored as IEEE floating point (32-bits) with big-endian byte order.

Calibration

Before geo-registration the images are radiometrically calibrated to give an aperture integration angle of 70° and a frequency band of 20-85 MHz.
The RCS in m^2 of a pixel can be obtained by taking the square of the value.

Geo-registration

The images are geo-referenced to geographic map coordinates in the Swedish reference system RR92. Each image has a size of 3000 rows by 2000 columns. The rows correspond to the north-south direction with the most northern coordinate stored in the first row. The columns correspond to the east-west direction with the most eastern coordinate stored in the first column. The pixel size is 1 x 1 meter.
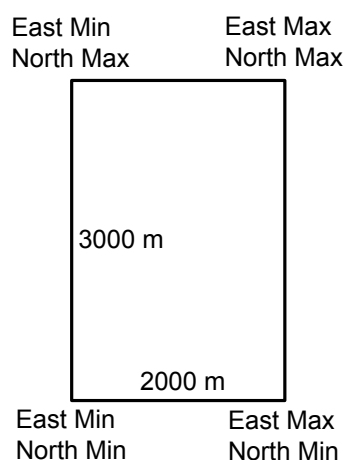
Geographic coordinates:

East min:	1653166 m
East max:	1655165 m
North min:	7367489 m
North max:	7370488 m

Image size:

Rows:	3000
Columns:	2000

Pixel size:
1 x 1 m

East Min
North Max   East Max
North Max

3000 m

2000 m

East Min
North Min   East Max
North Min

Target deployments

Four target deployments are associated with the SAR images. 25 terrain vehicles of three types were used as targets (10 TGB11, 8 TGB30 and 7 TGB40). The position of each vehicle in each deployment was measured with a GPS receiver. These ground truth measurements can be found in the files *.Targets.txt, where * is the name of the deployment. The target positions are presented in the same reference system as the images.

A row in a *.Targets.txt can look like this:
```
7369887.662121     1653648.290441     TGB11
```

Where, the first value is the northern coordinate, the second is the eastern coordinate and the third is the target type at that position. This example corresponds to the pixel coordinate:

row = round(Nmax – N) +1 = 601

column = round(E-Emin) + 1 = 483

Images

The table below summarizes the operating conditions associated with each of the 24 images in the data set.

Image file name	Flight Heading (deg)	Incidence Angle (deg)	RFI	Deployment	Forest Site	Target heading (deg)
			0=Low 1=High			
v02_2_1_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Sigismund	2	225
v02_2_2_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Sigismund	2	225
v02_2_3_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Sigismund	2	225
v02_2_4_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Sigismund	2	225
v02_2_5_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Sigismund	2	225
v02_2_6_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Sigismund	2	225
v02_3_1_2.a.Fbp.RFcorr.Geo.Magn	225	58	1	Karl	2	315
v02_3_2_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Karl	2	315
v02_3_3_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Karl	2	315
v02_3_4_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Karl	2	315
v02_3_5_2.a.Fbp.RFcorr.Geo.Magn	230	58	1	Karl	2	315
v02_3_6_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Karl	2	315
v02_4_1_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Fredrik	1	225
v02_4_2_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Fredrik	1	225
v02_4_3_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Fredrik	1	225
v02_4_4_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Fredrik	1	225
v02_4_5_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Fredrik	1	225
v02_4_6_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Fredrik	1	225
v02_5_1_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Adolf-Fredrik	1	270
v02_5_2_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Adolf-Fredrik	1	270
v02_5_3_1.a.Fbp.RFcorr.Geo.Magn	225	58	1	Adolf-Fredrik	1	270
v02_5_4_1.a.Fbp.RFcorr.Geo.Magn	135	58	0	Adolf-Fredrik	1	270
v02_5_5_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Adolf-Fredrik	1	270
v02_5_6_1.a.Fbp.RFcorr.Geo.Magn	230	58	1	Adolf-Fredrik	1	270