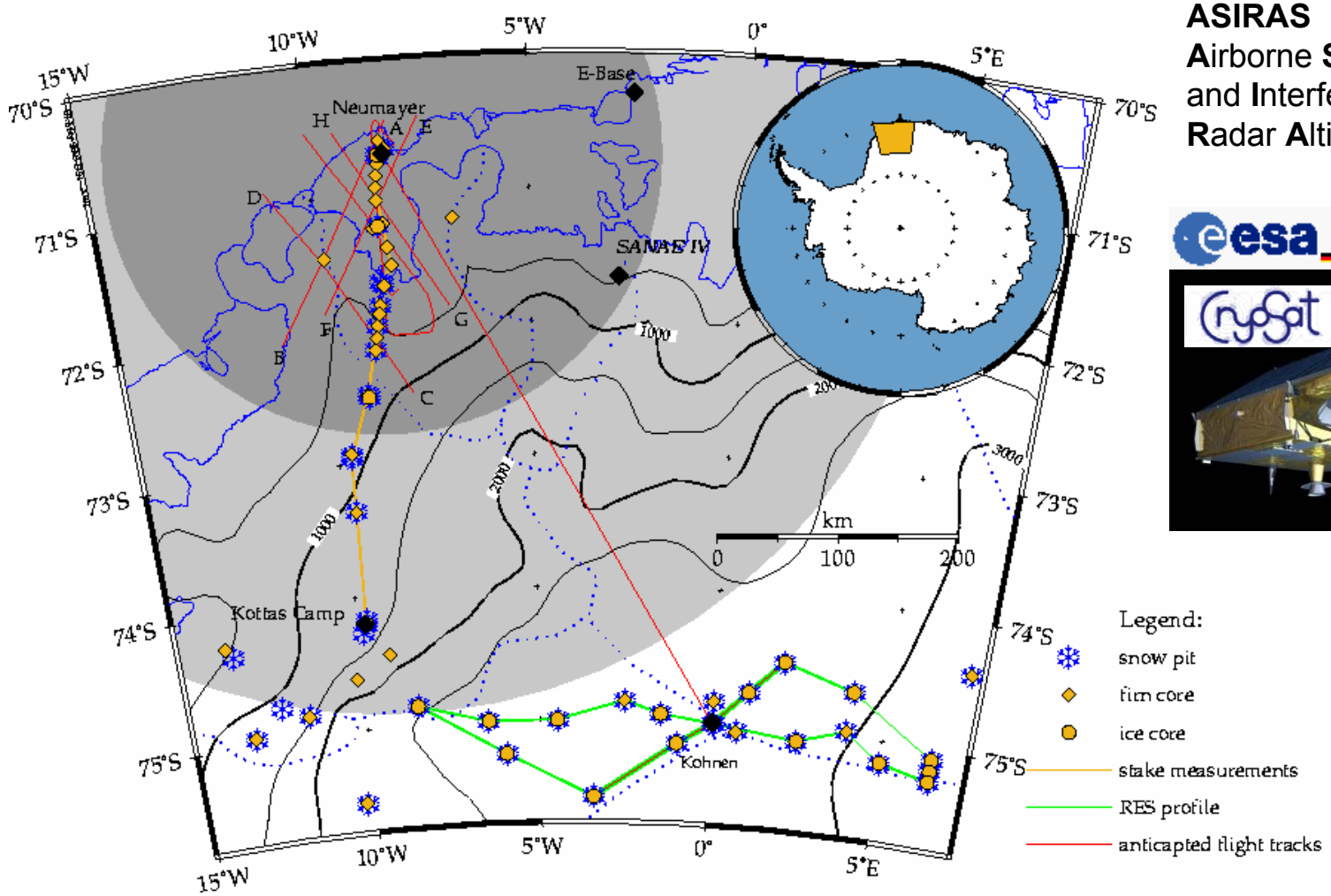
Landice CAL/VAL

Area of ground based and airborne Cal/Val measurements using ASIRAS



ASIRAS
Airborne **S**ynthetic Aperture and **I**nterferometric **R**adar **A**ltimeter **S**ystem

ASIRAS Implementation

ASIRAS Radar Altimeter Characteristics

Bandwidth up to 1 GHz

5 usec pulse mode for low altitude flights

2 RX-channels for interferometry

Tracking by means of spectral Echo Observer

Internal control by 2(3) micro computers

Flat array antennas, 2x 256 patches

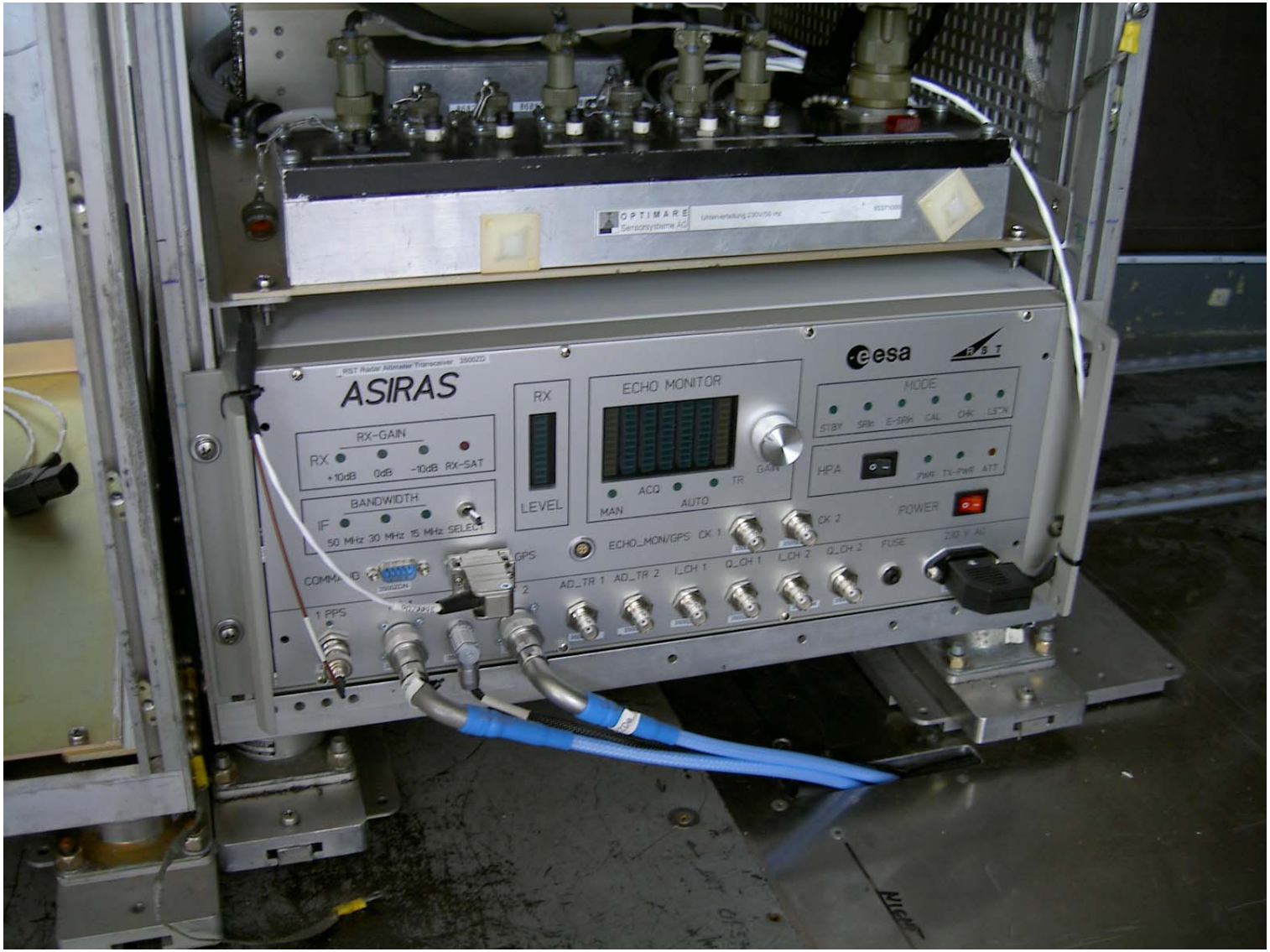
12 Bit AD-conversion

37.4 MSamples/sec in 2x I/Q channels

Data storage on dedicated PCs (RAID arrays)

Laptop control PC

ASIRAS Radar Altimeter Instrumentation

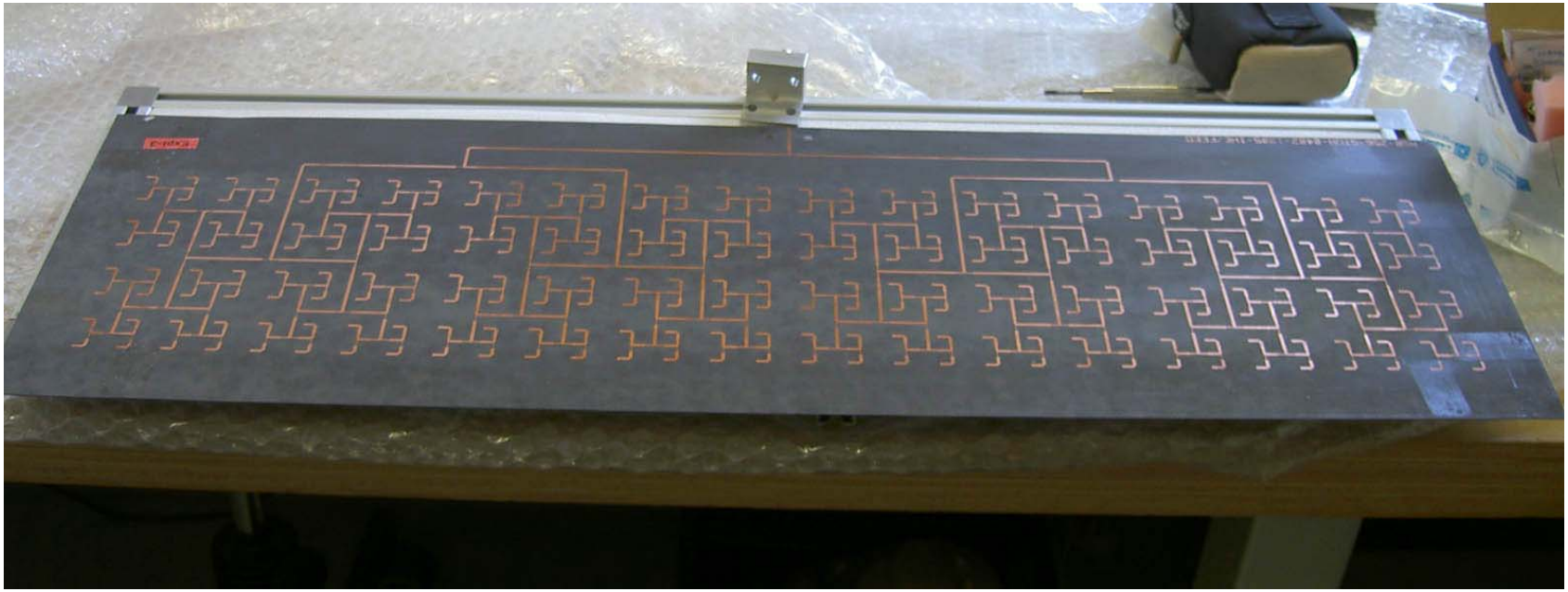


ASIRAS Antenna Assembly

ASIRAS Antenna Assembly

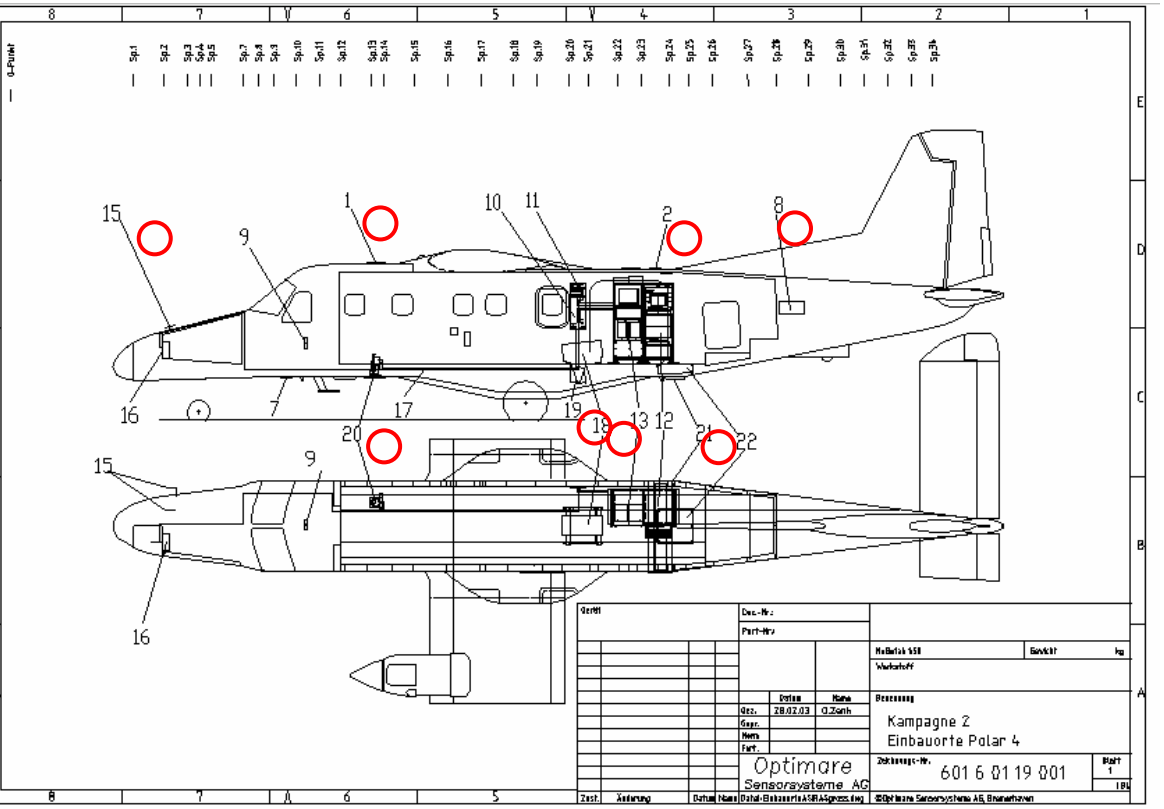
ASIRAS Antenna Assembly

ASIRAS Antenna Assembly



Flat array antennas, 2x 256 patches

Summary description of system



1 + 2 GPS Antennen für Trimble

7 Radar Altimeter

8 INS

9 GNS-X

10 Power Distribution Module

11 Data Distribution Module

12 Rack I

13 Rack II

15 Basis Meteorology Sensors

16 BMET I/O Module

17 Fiber Optic

18 Riegl Laser Scanner LMSQ280

19 Riegl LD90 Laser Altimeter

20 Sony Video Camera

21 RST - ASIRAS Antenna

22 Antenna Cable Slot

Post-processing DGPS

2 Trimble GPS on board with up to 5 base stations
L1/L2 code, phase, doppler observations

data:	latitude, longitude, ellipsoidal height
data rate:	1 Hz
online data:	1 Hz
typical errors for the height solution:	
static solutions	± 25 mm
kinematic solution:	± 50 mm

accuracy depending from baselines

Honeywell LaserNAV INS and Wulfsberg GNS-X

high speed ARINC 429 data interface logged to NAVP Sensor Processor

Primary Data:	Rate	Res.
yaw rate, pitch rate, roll rate	50 Hz	0.0054 °
true heading, pitch, roll	50 Hz	0.0039 °/s
x-, y-, z-, acceleration	50 Hz	0.0001 G

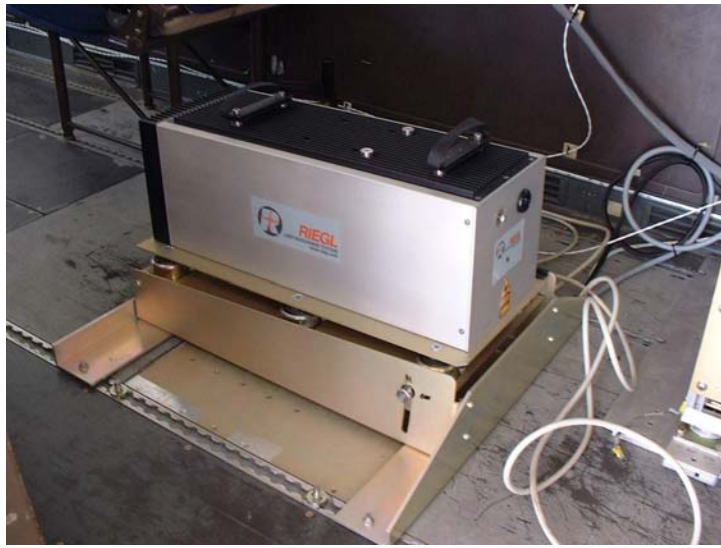
Secondary Data:

66 labels configurable like:
ground speed, track, wind direction, magnetic variation, true airspeed ...

Laser-Scanner LMS-Q280

Specifications:

measurement range:	30 m up to 1280 m
measurement resolution:	20 mm with typ. ± 25 mm acc.
data channels:	range, amplitude, true color
measurement rate	PRR=18.5 kHz, data=9250 Hz
beam divergence	0.5 mrad
scanning range	nominal 45° up to 60°
scanning rate	4 Hz to 80 Hz



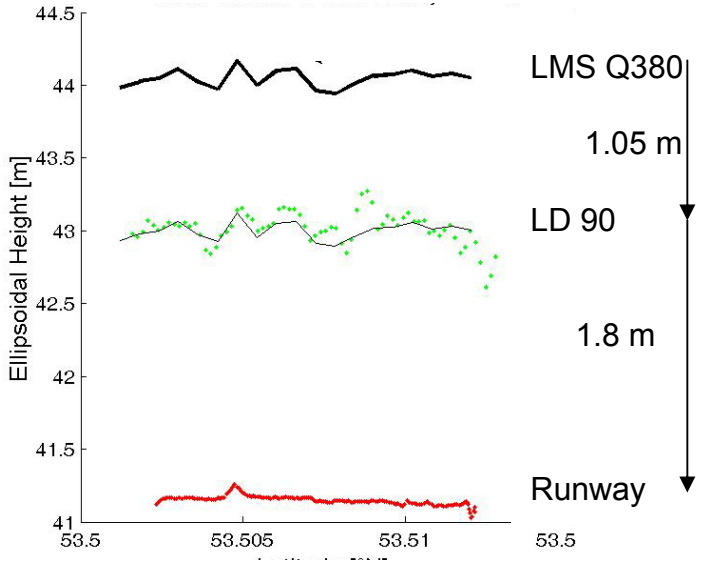
System integration:

electrics: <100 Watts @ 28 VDC

data: serial communication and
parallel data interface (ECP)
MEDUSA via LS sensor processor

timesync.: 1 PPS sync. input
sensor processor

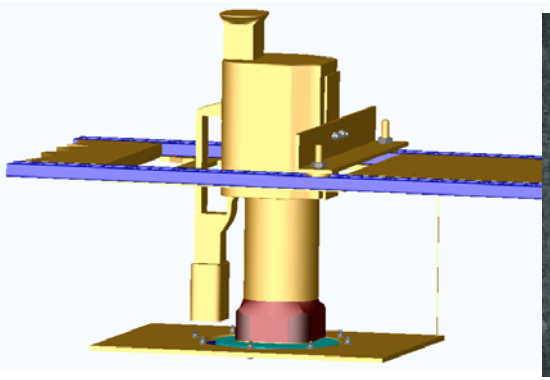
First Data:



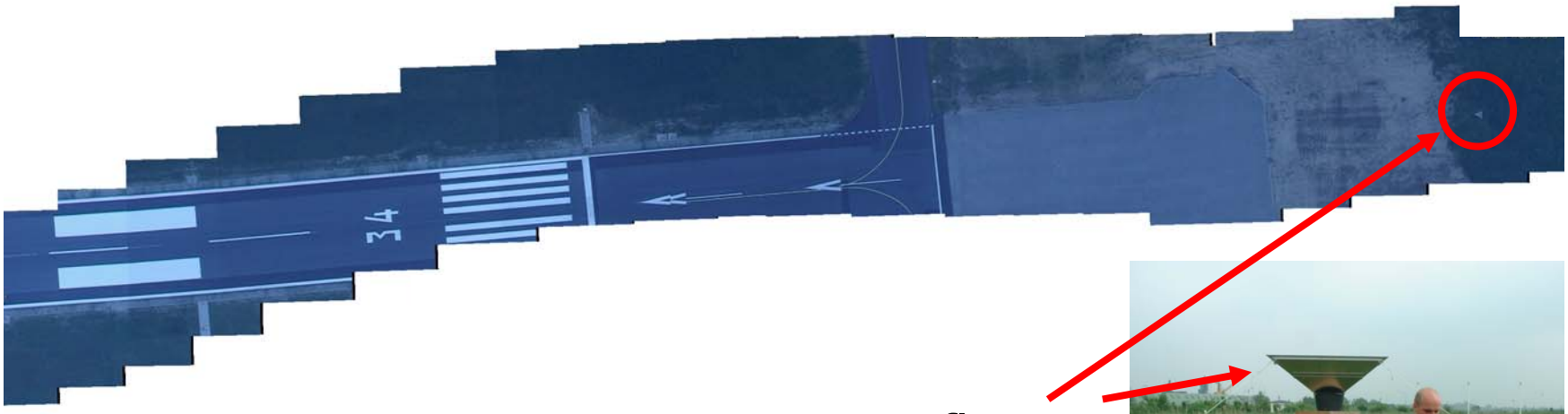
Nadir Video Camera

Specifications

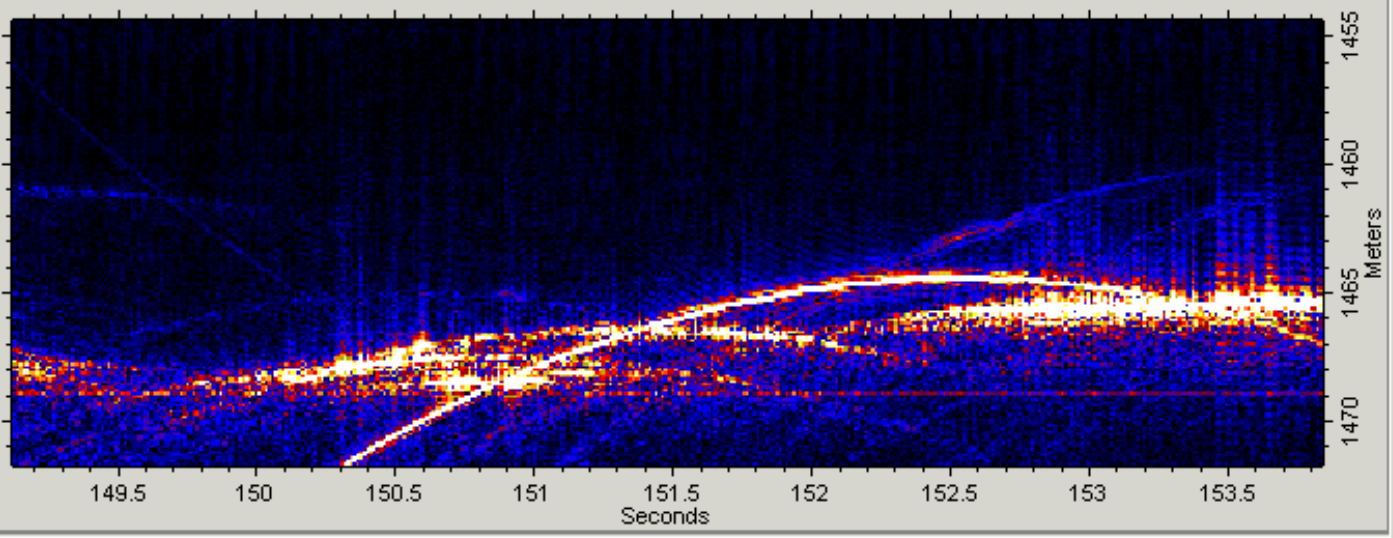
3 CCD:	approx. 450 000 pixel
focal length:	6 –72 mm
frame rate:	25 FPS
overlap:	30 % @ 3 FPS rate



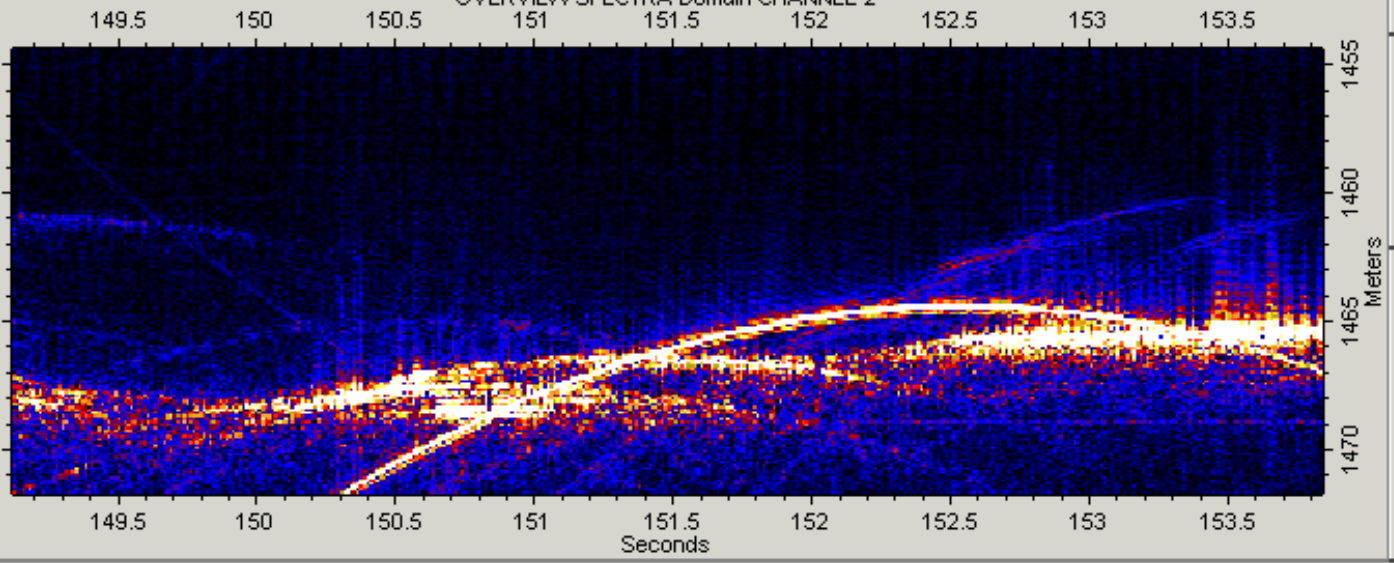
First results: over flight of runway @ ~ 1800 m altitude



corner-reflector



OVERVIEW SPECTRA Domain CHANNEL 2



Operat. Mode:	SARIn
Bandwidth [MHz]:	1000
Pulse Length [s]:	5.0E-06
PRF [HZ]:	5000 (Calculated: 4985)
Range Window [m]:	22.00
GPS Triggered:	Yes
Tracking Mode:	Manual
Config. File:	no *.cfg loaded
Log File:	A031023_05.log
File Ch. 1:	A031023_05_1_00.dat
File Ch. 2:	A031023_05_2_00.dat

Number of Files:	1 / 1
Number of Pulses:	867480
Time Resolution [µs]:	200.581
Samples in each Pulse:	256

0 Seconds 174.00

Start [m]	9991.99
End [m]	10308.40
First Pulse	743434
Last Pulse	766975

F11 En

Scroll X — Left | F4 Right

Zoom X — F5 XOut | F6 XIn

Scroll Y — F7 Up | F8 Down

Zoom Y — F9 YOut | F10 YIn

Intensity Level: 138/138

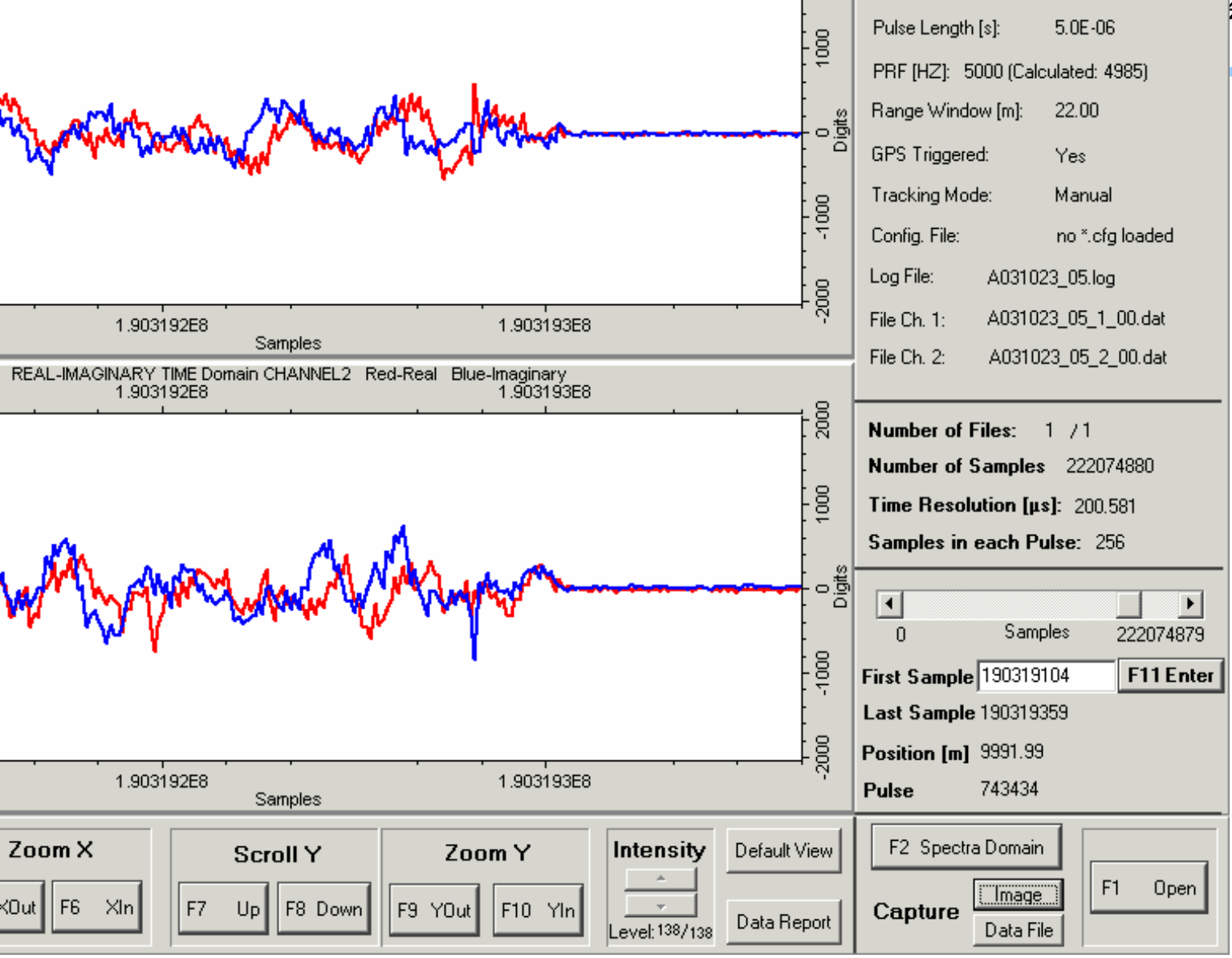
Default View

Data Report

F2 Time Domain

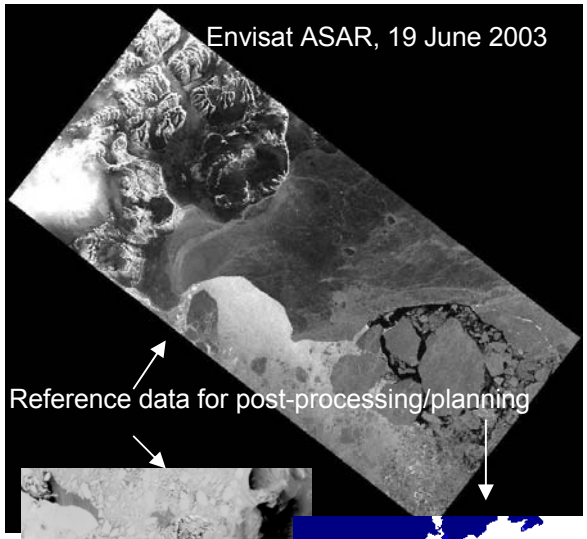
Capture Image | Data File

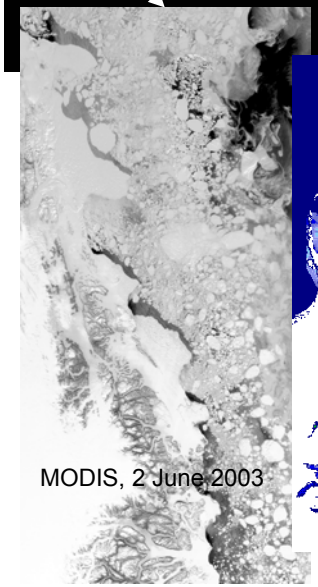
F1 Ope

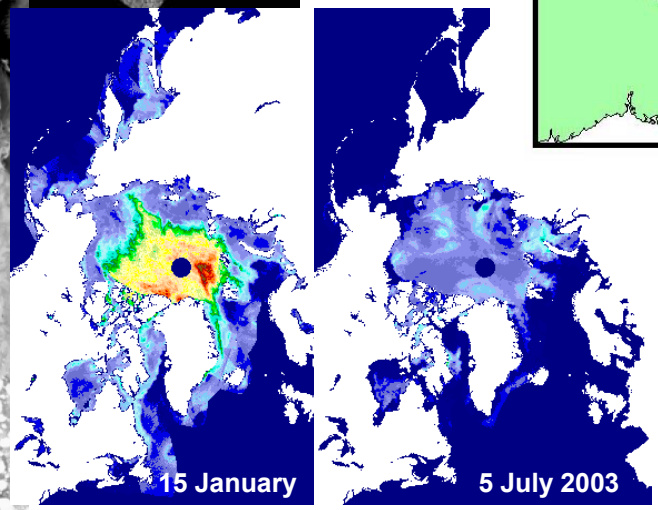

1000
0
Digits
-1000
-2000
1.903192E8
1.903193E8
Samples
REAL-IMAGINARY TIME Domain CHANNEL2 Red-Real Blue-Imaginary
1.903192E8
1.903193E8
2000
1000
0
Digits
-1000
-2000
1.903192E8
1.903193E8
Samples
Pulse Length [s]: 5.0E-06
PRF [HZ]: 5000 (Calculated: 4985)
Range Window [m]: 22.00
GPS Triggered: Yes
Tracking Mode: Manual
Config. File: no *.cfg loaded
Log File: A031023_05.log
File Ch. 1: A031023_05_1_00.dat
File Ch. 2: A031023_05_2_00.dat
Number of Files: 1 /1
Number of Samples 222074880
Time Resolution [µs]: 200.581
Samples in each Pulse: 256
0
Samples
222074879
First Sample 190319104
F11 Enter
Last Sample 190319359
Position [m] 9991.99
Pulse 743434
Zoom X
XOut
F6 XIn
Scroll Y
F7 Up
F8 Down
Zoom Y
F9 YOut
F10 YIn
Intensity
Level: 138/138
Default View
Data Report
F2 Spectra Domain
Capture
Image
Data File
F1 Open

Site location and campaign planning

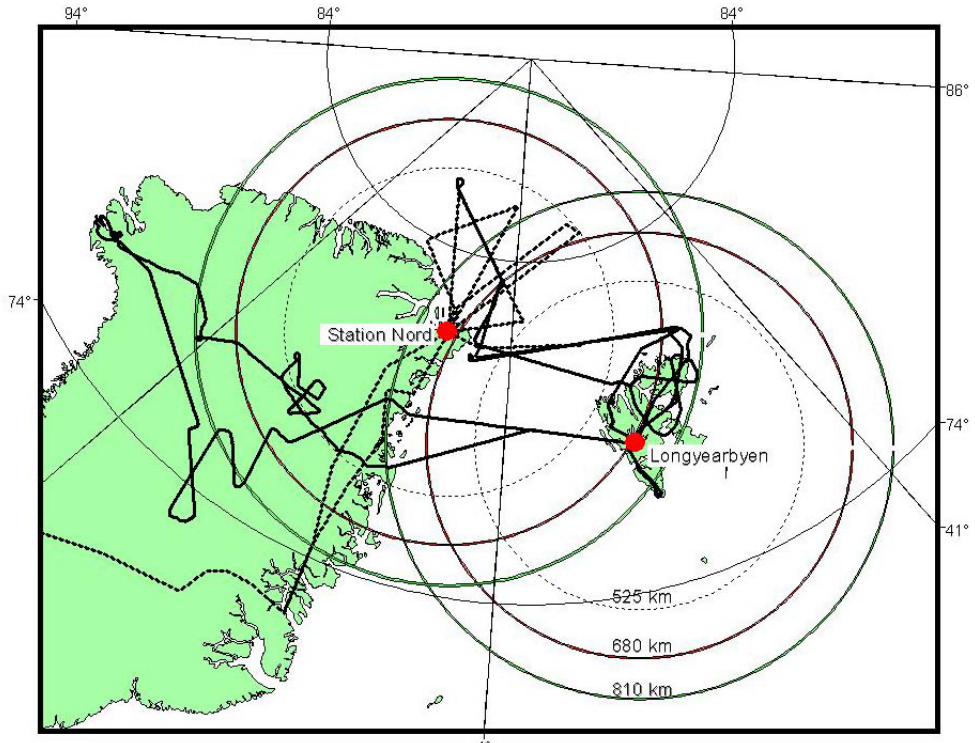
Satellite images: optical, microwave

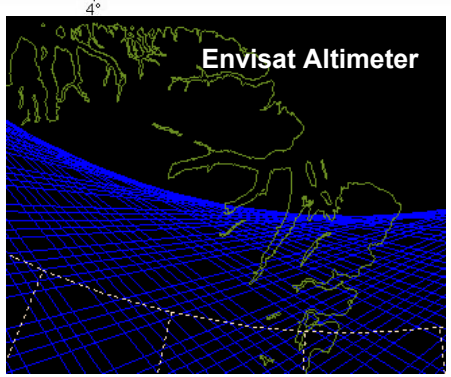






Quickscat-Scatterometer-data

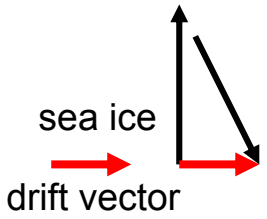




Envisat Tracks 20 June – 4 July 2003

Campaign Objectives

Instrument performance	➢Stability of ASIRAS (daily repeated CAL experiments) ➢Roll Experiments ➢Long runs over open ocean
Test of validation concept	➢Sea ice drift removal experiment
Surface type related performance	➢Dry inland ice at min/max flight altitude ➢Sea ice north of Greenland ➢Effect of penetration into dry ice ➢Decorrelation of interferometric looks ➢Angular dependence of reflectivity ➢Identification of ice surface types ➢Influence of humidity
Previous Campaigns	➢Acquisition of comparable data sets ➢Optimization of data processing



ASIRAS in Antarctica:
hopefully soon …

Thank you