Experiments@EISCAT

- Common Programs (CP)

  – 1000 (2000) hours/year

  – Almost same modes since 1980's

  – Data 'belongs' to all associates

- Special Programs (SP)

  – 2000 hours/year

    - Amount according to share

  – Associate 'owns' the data 365 days

- Other Programs

 – IPY, Time Buyers, Peer Review, EISCAT staff ...

Common Programs

- World Days
  - ~20 days/year
  - URSI working group decides

- Synoptic
  - Statistical studies
    - Season, solar cycle...

- Unusual events
  - Solar eruptions, Eclipse

- (Staff tests)
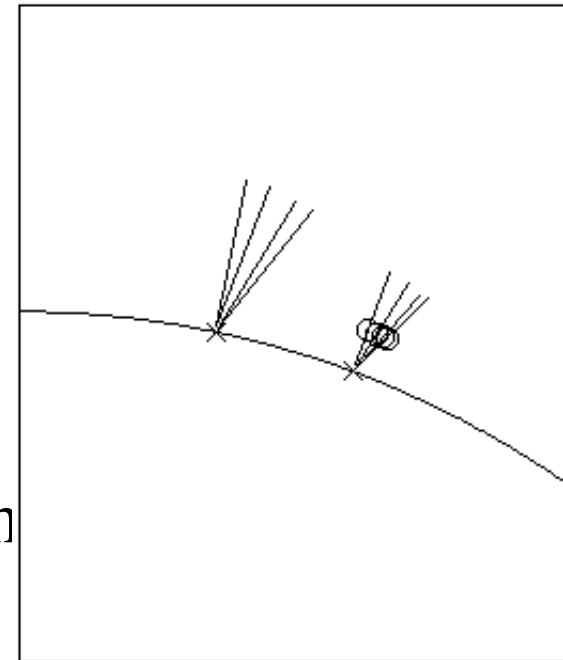
Common Programs

- CP1

  - Stationary along B

  - Auroral studies

  - High time resolution, < 10 s

  - Moderate range resolution, ~3 km

  - Height profiles of Ne, Te, Ti, Vi (+ E field)

    - E+F region, 90-600 km

CP1
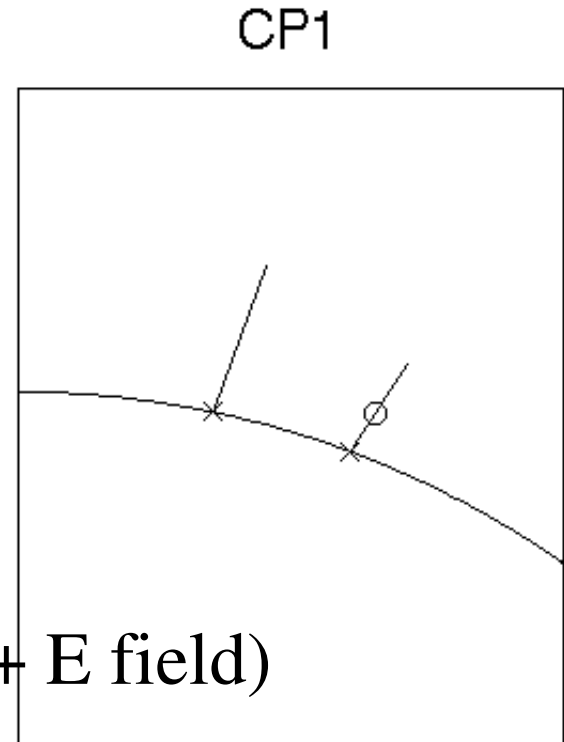
Common Programs

- CP2

  - 3-4 position scan

  - TID, tides

  - Time resolution 3-6 minutes

  - Moderate range resolution, ~3 km

  - Height profiles Ne, Te, Ti, $\underline{V}$i

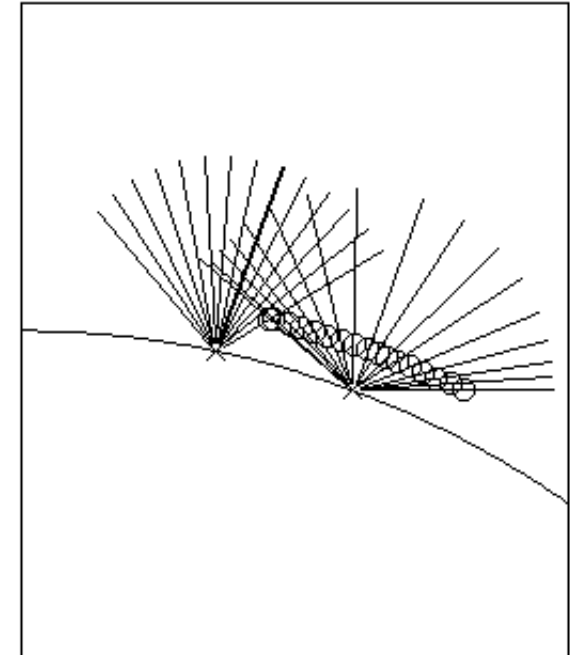   - E+F region 90-500 km

    - <1° latitude at F region
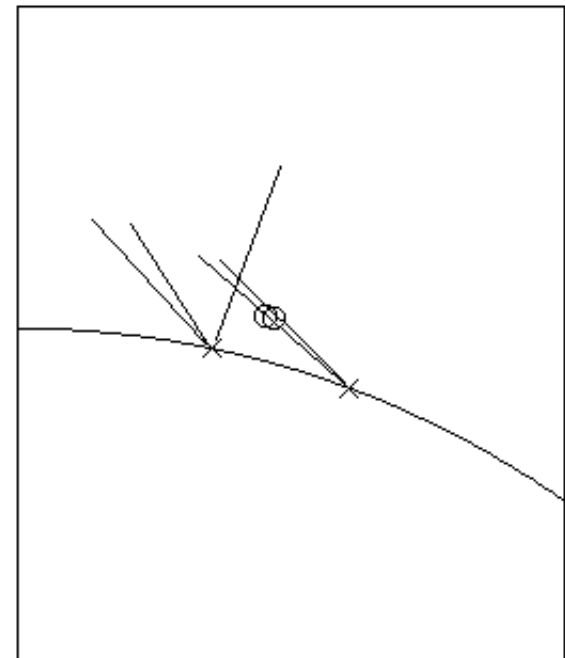
Common Programs

- CP3
  - Wide latitude scan
    - Small East-West motions
  - Convection, troughs, winds
  - Time resolution 20-30 minutes
  - Low range resolution, ~10 km
  - Latitude/height profiles Ne, Te, Ti, Vi
    - E+F region 90-600 km
    - 10º latitude at F region

Common Programs

- CP4

  - Low elevation 2 position scan

  - Convection, troughs

  - Time resolution ~10 minutes

  - Low range resolution, ~10 km

  - Latitude profiles Ne, Te, Ti, Vi

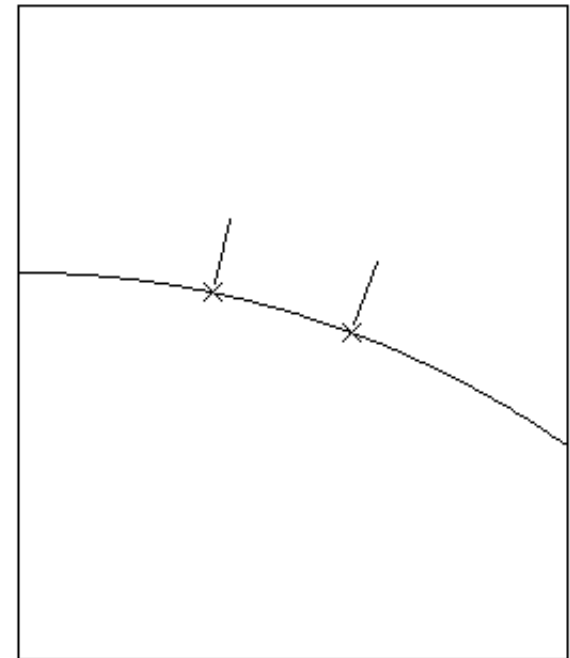   - E+F region 90-600 km
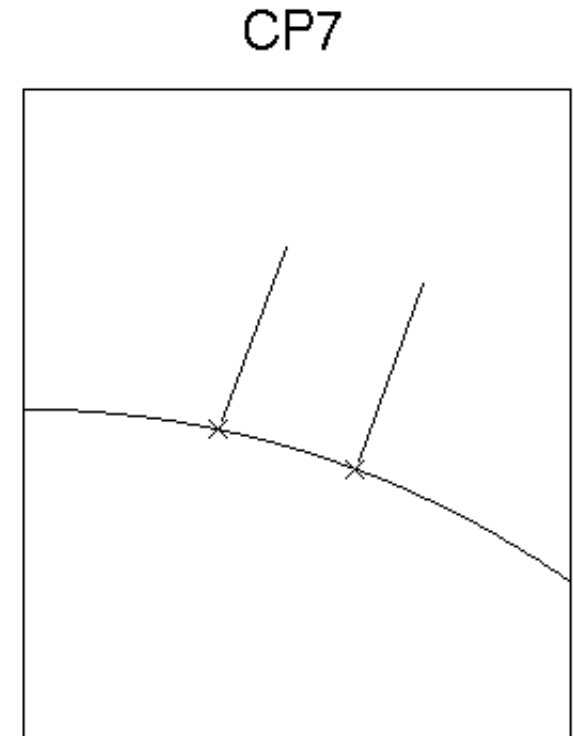
    - 10º latitude at F region

CP4

Common Programs

- CP6

  - Stationary vertical

  - Moderate time resolution, < 1min

  - High range resolution, ~1 km

  - High spectral resolution, 10 Hz

  - Profiles of Ne, spectral width, Vi

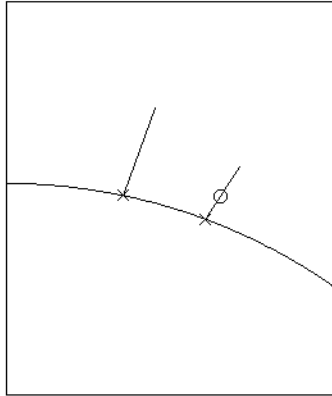 - D region, 70-100 km

CP6

Common Programs

- CP7

  - Stationary at high elevation

  - Topside studies

  - Low time resolution, ~5 minutes
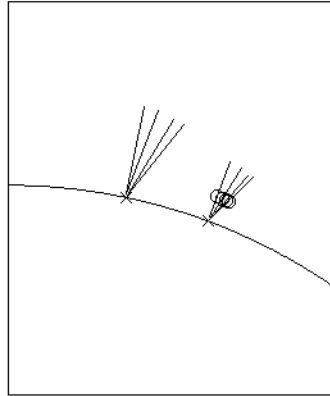
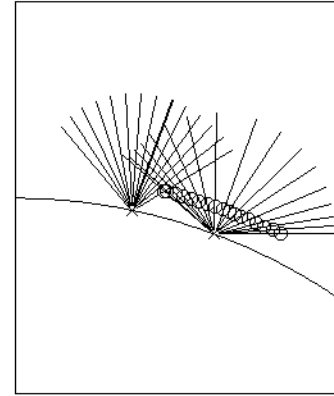 - Profiles of Ne, Te, Ti, Vi

  - F+ region, 100-2000 km
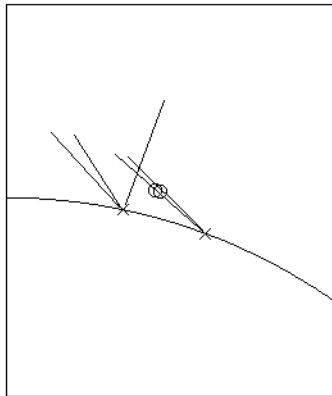
CP7

Common Programs
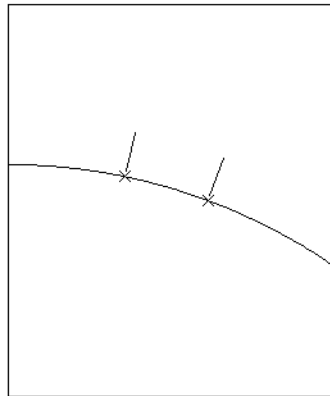
CP1

CP2

CP3

CP4

CP6

CP7
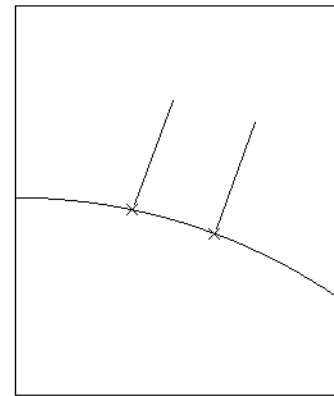
Alternating codes

- Used in all EISCAT Common Programs

- Powerful

  - Side lobe free

  - Same code for all altitudes

    - All transmitter power used at all altitudes

- Robust

  - Background removed in the decoding process

    - Taken at target ranges

- Need stable target over the cycle time

Alternating codes

- Oversampling relative the bit length

    - Fractional lags

    - Reduces code cycle

    - Improved height resolution

        - Lower ranges

    - Wider frequency band (high temps)

        - Higher ranges

Special Programs

- Like a CP but at other times
  - Availability of other instruments
    - Satellites, Cameras, Coherent radars, Heater
  - Special events
    - PMSE
- Use CP dsp setup but point somewhere else
  - Rockets, aurora ....
- Use own developed dsp
  - For experienced users

Common Programs

	CP1	CP2	CP3	CP4	CP5	CP6	CP7
Dsp exp U	beata	beata	tau1	tau1			
Dsp exp V	beata			tau8		manda	tau7
Dsp exp L	beata	ipy	folke	folke		manda	tau7
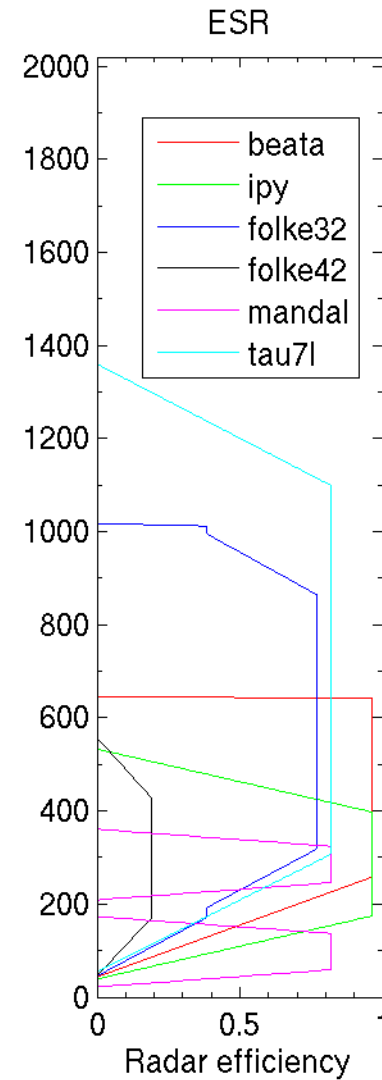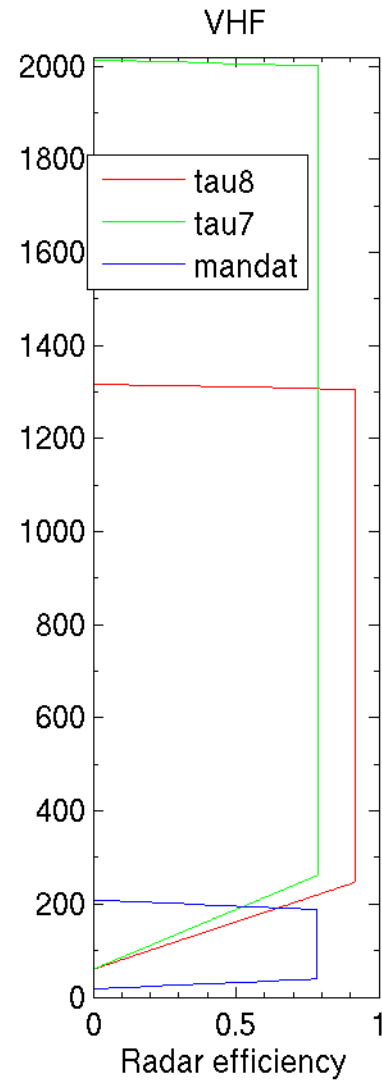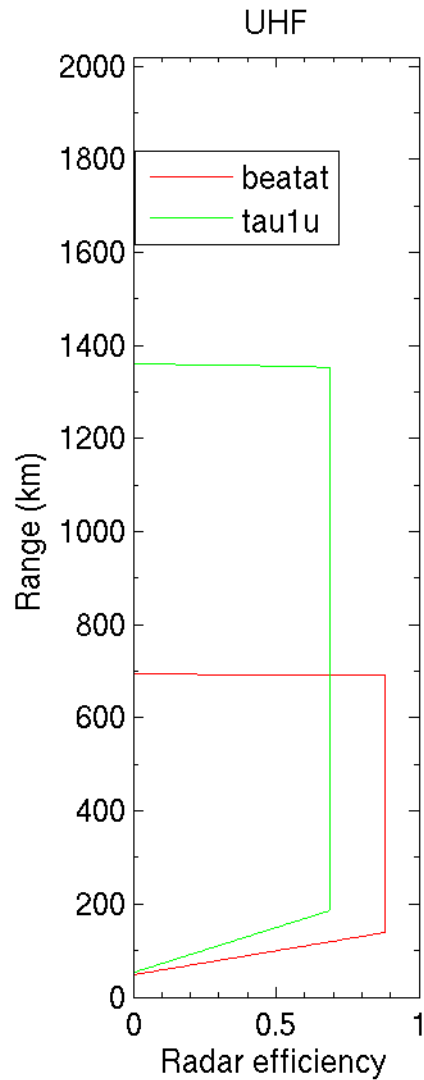
KST experiments

Dsp exp	Type
beata	High elevation, (D)EF region, moderate/high resolut
tau1	Low elevation, E+F region, moderate resolution
tau8	High/Low elevation, E+F region, moderate resoluti
manda	High elevation, D(EF) region, high resolution
tau7	High/Low elevation, (E)F region +topside, low resolu
arc_dlayer	High elevation, D region, high resolution
arc1	High elevation, E+F region, high resolution
tau2pl	High elevation, E+F region, moderate resolution

KST experiments

Dsp exp	Radar	Pulses (µs)	Sampling (µs)	Resolution (km)	Ranges (km)	Plasma line	Time resolution (s)
beata	UHF	32x20 AC	10	1.5 – 3	49-694	1x3x2.5MHz	5
	VHF	32x20 AC	20	3	49-694	2x1x2.5MHz	5
tau1	UHF	two 16x60 AC	12	1.8 – 9	54-1361		5
	VHF	two 16x72 AC	24	4 – 11	61-2014		5
tau8	VHF	two 16x84 AC	14	2 – 12.5	61-1317	1x1x1.7MHz	5
manda	UHF/VHF	61x2.4 AC	1.2	0.18-0.36	19-209		4.8
tau7	VHF	two 16x96 AC	12	2 – 14	61-2014		5
arc_dlayer	UHF/VHF	64x2 AC	2	0.3	60-140		5
arc1	UHF	64x6 AC	6	0.9	96-422		0.44
tau2pl	UHF	two 16x36 AC	12	1.8 – 5.4	50-702	1x8x170 kHz	5

KST experiments
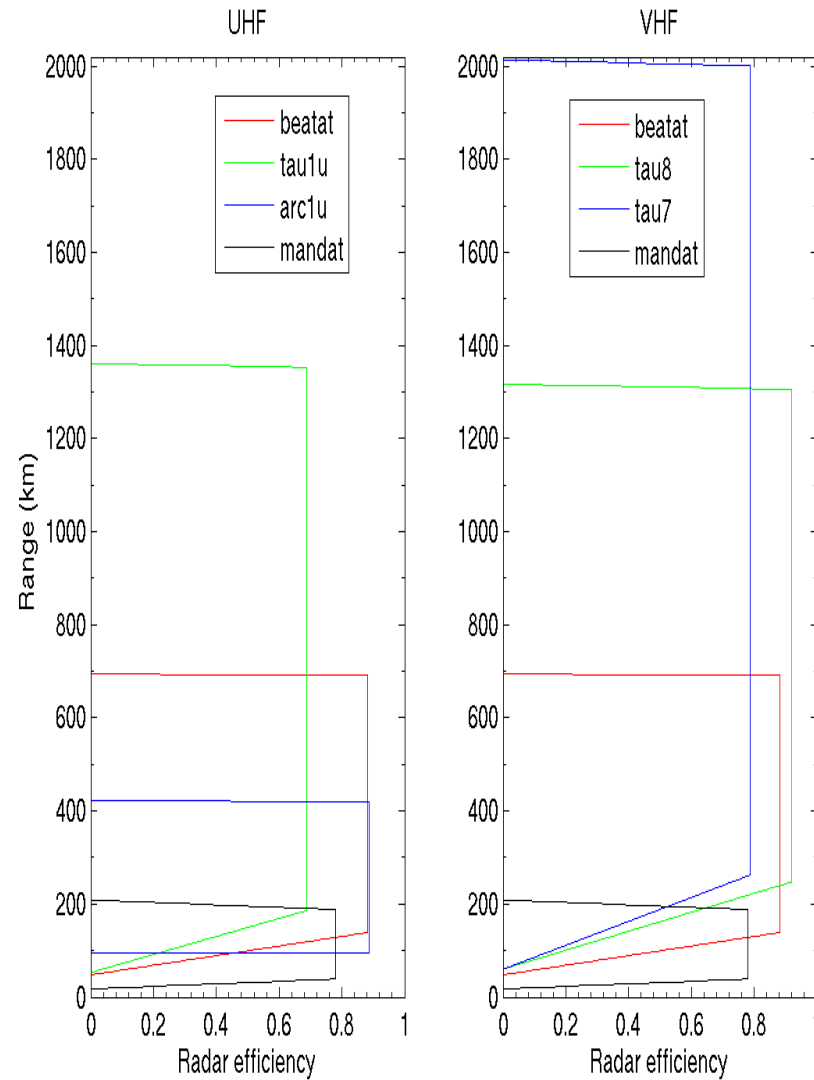
ESR experiments

Dsp exp	Type
beata	High elevation, E+F region, moderate resolution
folke	42m, E+F region, moderate resolution Low elevation 32m, E+F region, moderate resolution
manda	High elevation, D(EF) region, high resolution
ipy	High elevation, (D)EF region, moderate/high resolution
tau7	High elevation, F region+topside, low resolution
arc_slice	High elevation, E+F region, high resolution
hilde	42m, E+F region, moderate resolution Low elevation 32m, E+F region, moderate resolution
taro	42m, E+F region, moderate elevation High elevation 32m, E+F region, moderate resolution
steffe	High elevation, E+F region, moderate resolution
tau0	Low elevation, E+F region, moderate resolution

ESR experiments

Dsp exp	Antenna	Pulses (μs)	Sampling (μs)	Resolution (km)	Ranges (km)	Plasma line	Time resolution (s)
beata	Single, switchable	30x50 AC	25	3.8 – 7.5	36-1034	2x1x2.5 MHz	6
folke	Dual 4:1	16x60 AC 4x16x60 AC	20	3 – 9	46-557 46-1018	1x1x1.5MHz	6.4
manda	Single	64x4 AC	2	0.3-0.6	23-361		4
ipy	Single, switchable	30x30 AC	15	2.2 – 4.5	43-507	2x1x2.5 MHz	6
tau7	Single, switchable	16x120 AC	5	0.8 – 18	56-1360	2x1x2.5 MHz	6
arc_slice	Single, switchable	64x6 AC	6	0.9	85-481		0.5
hilde	Dual 1:1	16x32 + 16x96 AC 2x16x60 AC	16 20	2.4 – 14 3 – 9	36-965 (2000) 58-1304		5.1
taro	Dual 2:1	16x50 AC	25	3.8 – 7.5	46-812		6.4
steffe	Single, switchable	16x30 + 16x105 AC	15	2.2 – 16	36-1034	2x2x1.7 MHz	6
tau0	Single, switchable	2x16x60 AC	20	3 – 9	58-1304		6.4

ESR experiments

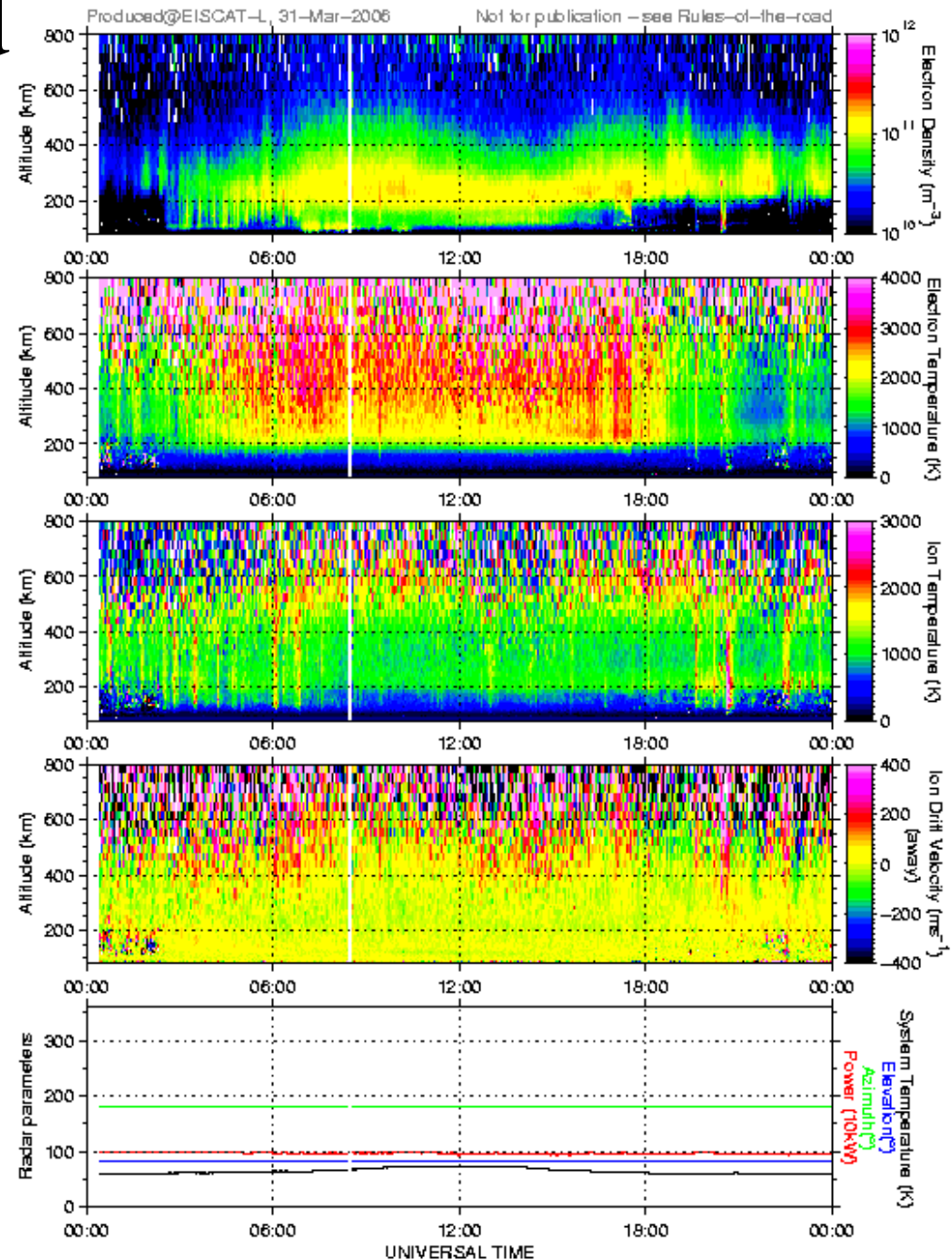ESR EISCAT
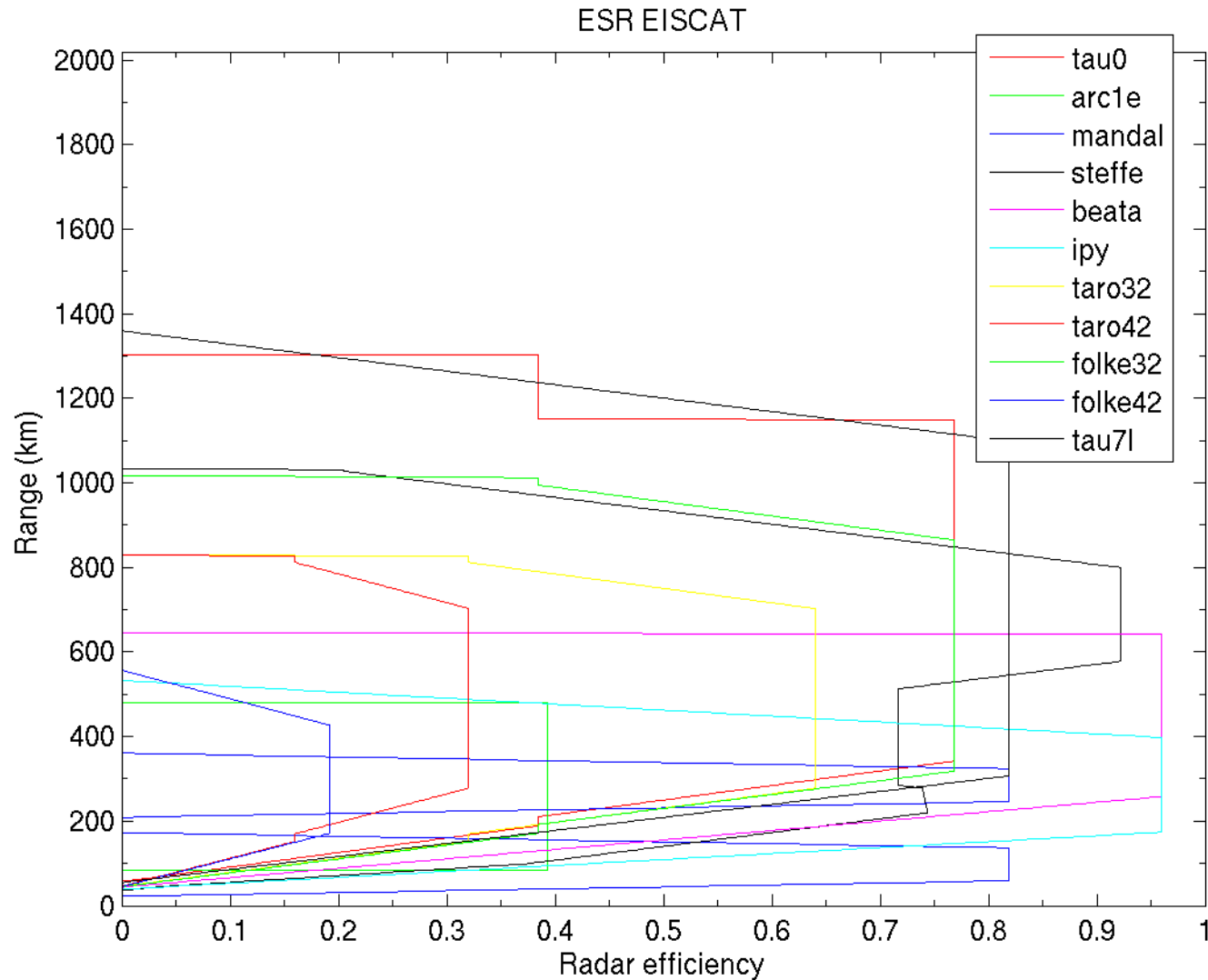
Normal overspread method

- Correlations within the pulse

- Most experiments
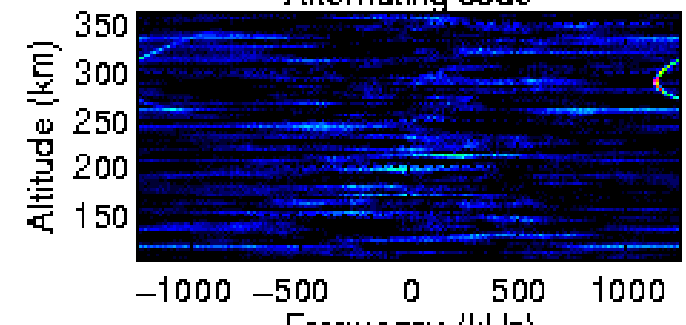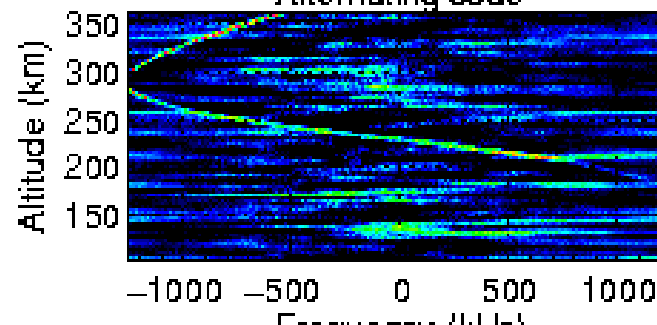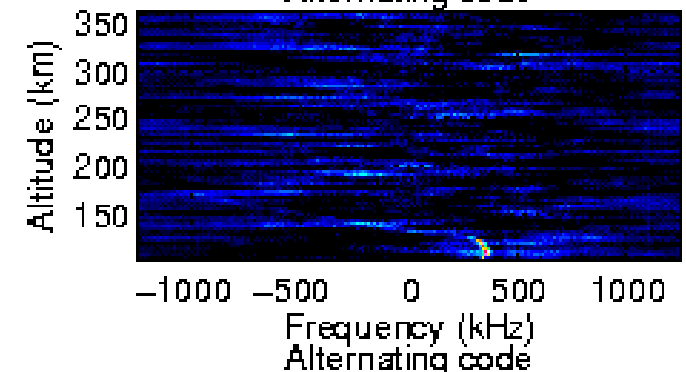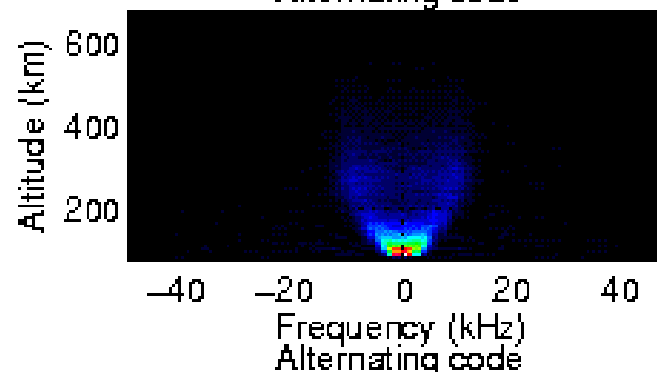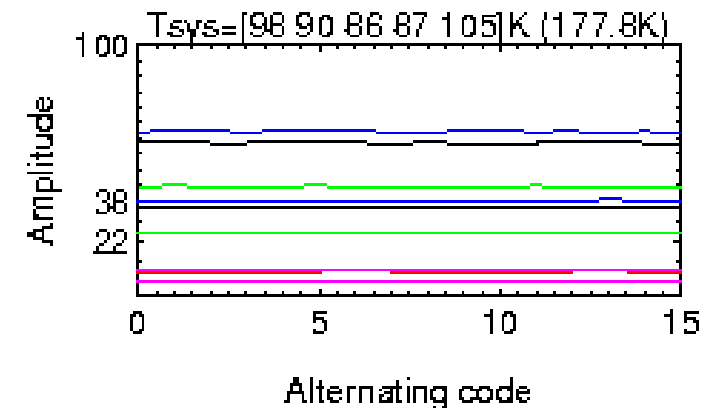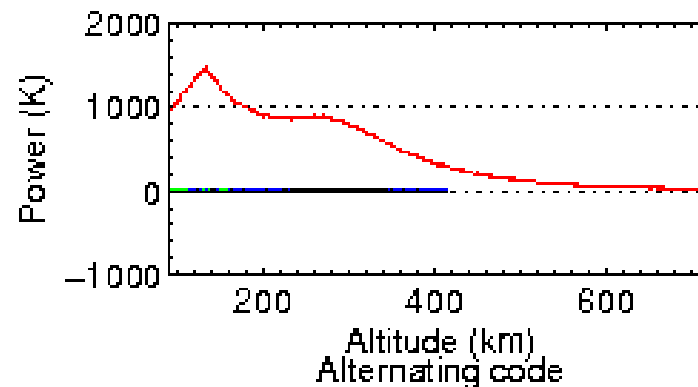
Normal overspread method

- Analysable by GUISDAP

  - Lower height limit dependent on radar

    - UHF >90km

    - VHF >120 km

    - ESR >100 km

Underspread method

- Correlations between pulses

- D region

  - VHF

    - OK

  - UHF

    - Debye limit problem

  - ESR

    - Ground clutter

- Not yet GUISDAP

- CP6

  - combines over- and underspread methods

manda 2011-07-19 1251:38 4.8s 1562kW 90.0/90.0