84/40

EISCAT
TECHNICAL
NOTE

EISCAT Incoherent Scatter Facility Catalogue of Observations 1981-1983

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S-981 27 Kiruna, Sweden
February 1984
EISCAT Technical Note
Printed in Sweden
ISSN 0349-2710

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1. Introduction

The European Incoherent SCATter, EISCAT, radar facility began operation in Northern Scandinavia in September 1981. The main purpose of this report is to provide a catalogue of observations covering the period September 1981 through December 1983. This report also briefly describes the facility, its location and operating parameters. Some general information is given about the types of observational programmes.

Brief descriptions of the more often used operating modes are included so that the reader may better assess the suitability of individual experiments for particular scientific investiga tions.

2. Background

The EISCAT Scientific Association was established in December, 1975 as an educational and scientific organization for the purpose of conducting high latitude upper atmospheric research using the Incoherent Scatter Radar (ISR) technique. Research councils from six European countries, (United Kingdom, West Germany, France, Sweden, Norway, and Finland), through the EISCAT Association, support the facility. The Association pro vides the instrumentation and observational opportunities for scientists from the six member countries to pursue their re search in Northern Scandinavia.

The Incoherent Scatter radar technique is a very powerful one for studying the upper atmosphere. Using it, many important parameters characterizing the ionosphere and neutral atmosphere can be measured or inferred on a continuous basis over a large altitude region, typically 90-700 km. A list of representative deriveable parameters is given in Table 1. The ISR technique, therefore opens up wide new fields of upper atmospheric rese arch. It is in some ways complementary to the intensive rese arch efforts undertaken with satellites and rockets, but offers the advantages of continuous time and extended altitude cover age.

Electron density
Electron temperature
Ion temperature
Plasma velocity
Ion composition
Ion-neutral collision frequency
Hall and Pedersen conductivity
Electric Field
Electrojet currents
Neutral wind velocity
Neutral density
Neutral temperature
Energy deposited by precipitating electrons
Joule energy dissipation
Energy spectrum of electron precipitation

TABLE 1 - Representative Physical parameters deriveable from EISCAT experiment

3. Location and geometry

The EISCAT facility presently consists of a tristatic UHF radar system operating at 933 Mhz. A second powerful radar system, operating in the VHF band at 224 Mhz, is scheduled for comple tion in 1984. Inasmuch as the data to date are derived from the UHF system, only it will be described in this report. More details can be found in Folkestad et.al (1983).[1]

The EISCAT UHF system consists of a transmitter located at Ramfjordmoen, near Tromsö, Norway, which operates as a mono static radar Additional receiving stations are located at Kiruna, Sweden and Sodankylä, Finland. The tristatic config uration permits measurement of the vector velocity of the iono-spheric plasma flow. A 9600 baud data link connects the three stations Figure 1 is a map of northern Scandinavia showing the locations of the stations. Their geographic and geomagnetic coordinates are given in Table 2. Because steerable antennas are used, the EISCAT system can probe regions hundreds of kilo meters horizontally distant from the stations.

At high latitudes, many ionospheric phenomena are best placed in a geomagnetic frame of reference. Figure 2 shows invariant latitude as a function over the region of Northern Scandinavia viewed by EISCAT. The IGRF 1980 for January 1984 was used to model the earth's magnetic field.

Headquarters for EISCAT is located at Kiruna, Sweden, where the administrative and financial work of the organization takes place. Data processing distribution, and archiving is also done at HQ using a large, ND-500, computer.

1

Folkestad, K., T. Hagfors, and S.Westerlund, "an Updated Description of Technical Characteristics and Operational Capabilities", Radio Science, 18, 6, 1983.

		Tromsö	Kiruna	Sodankylä
Geographic				
Latitude deg		69.586 N	67.867 N	67.364 N
Longitude deg		19.23 E	20.44 E	26.63 E
Altitude m		86.3	417.6	197.6
Distance from Tromsö km		-	197.6	390.5
Azimuth to Tromsö deg E		-	346.02	312.49
Azimuth to Kiruna		164.88	-	284.71
Azimuth to Sodankylä		125.57	98.96	
Geomagnetic				
Corrected Geomagnetic Lat.-deg		66.1 N	64.3 N	63.4 N
Corrected Geomagnetic Long-deg		103.4 E	102.8 E	107.2 E
Invariant Latitude	ground	66.3 N	64.4 N	63.6 N
	300 km	66.8 N	65.0 N	64.2 N
L value	ground	6.17	5.38	5.05
	300 km	6.44	5.61	5.26
Dip angle	ground	77.62	76.79	76.72
	300 km	77.59	76.72	76.63
Declination	ground	3.38	3.96	7.44
	300 km	1.60	2.26	5.41

TABLE 2 Geographic and geomagnetic data for EISCAT sites

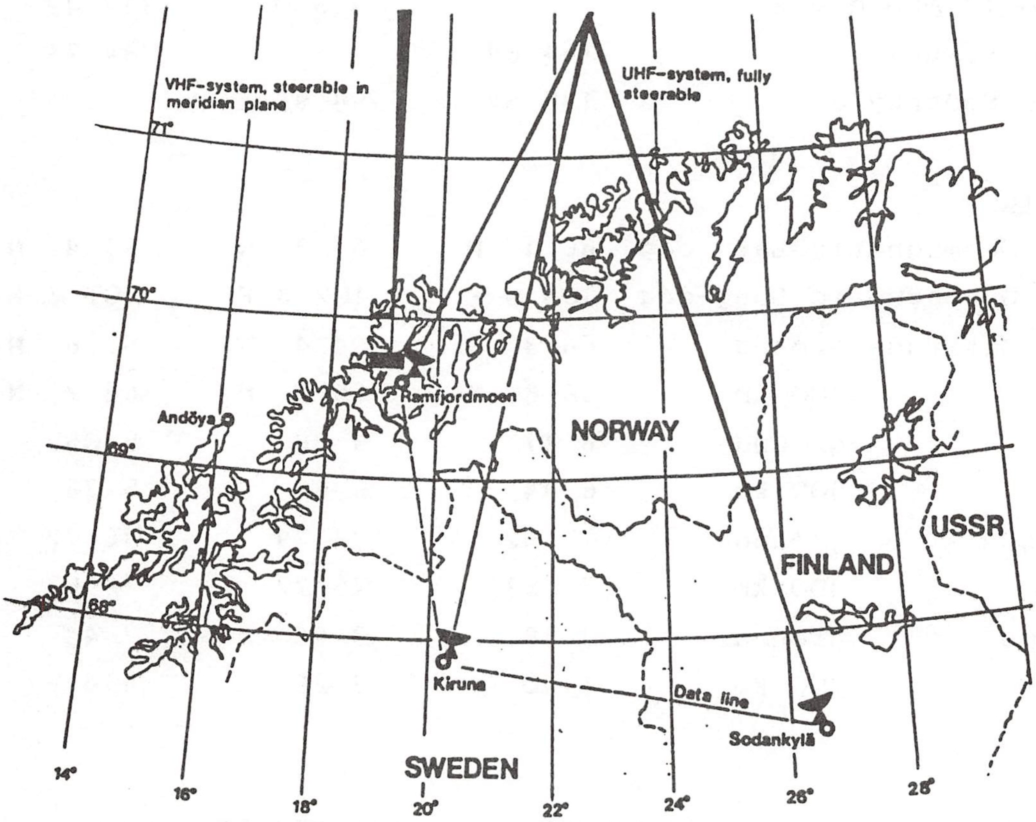

FIG 1 Map of Northern Scandinavia showing locations of EISCAT stations.

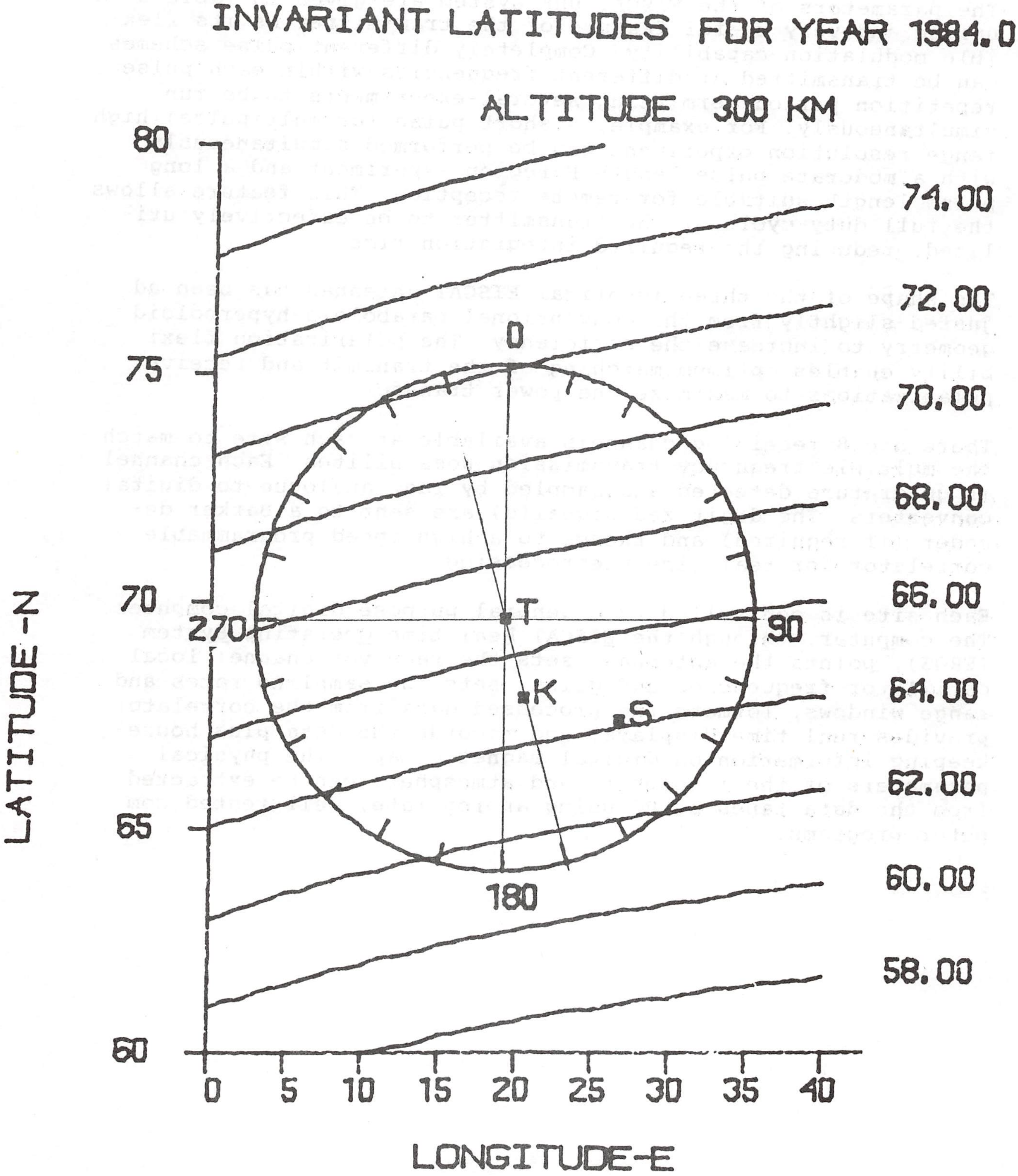

FIG.2. Contours of constant invariant latitude as a function of geographic latitude and longitude. The scales have been adjusted so that at the latitude of Tromsö distances are equal in both axes. The azimuth circle centered on Tromsö has a radius of 620 km and includes the area viewed at elevation angles above 26°.

4. Facility description

The parameters of the EISCAT UHF system are given in Table 3. A unique and very useful feature of the transmitter is its flexible modulation capability. Completely different pulse schemes can be transmitted at different frequencies within each pulse repetition period permitting several experiments to be run simultaneously. For example, a short pulse (or multipulse) high range resolution experiment can be performed simultaneously with a moderate pulse length F-region experiment and a long pulse length suitable for remote reception. This feature allows the full duty cycle of the transmitter to be effectively utilized, reducing the required integration time.

The shape of the three identical EISCAT antennas has been adjusted slightly from the conventional paraboloid-hyperboloid geometry to increase the efficiency. The polarization flexibility enables optimum matching of the transmit and receive polarizations to maximize the power transfer.

There are 8 receiving channels available at each site to match the multiple frequency transmission possibilites. Each channel is quadrature detected and sampled by fast analogue-to-digital converters. The digitized signal(s) are sent to a Barker decoder (if required) and thence to a high speed programmable correlator for real-time preprocessing.

Each site is controlled by a general purpose digital computer. The computer, through the EISCAT Real-time Operating System (EROS), points the antennas, sets the receiver channel local oscillator frequencies and gains, sets the sampling rates and range windows, formats the processed data from the correlator, provides real time displays, and records the data plus housekeeping information on digital magnetic tape. The physical parameters of the ionosphere and atmosphere can be extracted from the data tapes at HQ using appropriate, well-tested computer programs.

Transmitter	
Peak Transmitted Power	2.0 MW
Maximum duty cycle	12.5%
Operating frequencies	929.5+0.5n(0<n<15)MHz
Pulse widths	10-10000 μs
Maximum waveform repetition rate	1000 Hz
Modulations	on-off, phase-flip, frequency-step
Antenna - all sites	
Diameter	32m
Efficiency	70%
Optics	Cassegrain
Polarization	arbitrarily selectable (circular usually transmitted)
Axes	Azimuth/Elevation
Azimuth range	540^{o}
Elevation range	95^{o}
Maximum angular rate	1.3^{o}/sec (each axis)
Receivers	
Type	Cooled Parametric amplifier (remote sites) GaAsFET (Tromsö)
System Temperature	~45K (remote sites) ~130K (Tromsö)
Number of channels/site	8
IF filter Bandwidths	1.2,8.0,30.0 MHz (selectable)
Detector	Synchronous demodulator yielding quadrature components
Post-detection filters	12.5,25.0.50.0,100.0, 250.0 kHz (selectable)

TABLE 3 - Parameters of EISCAT UHF system.

5. Complementary Instrumentation

A large number of complementary instruments, ionosondes, magnetometers, riometers, photometers, all-sky cameras and the like, are routinely operated in Northern Scandinavia monitoring the region viewed by EISCAT. In addition several other facilities of related research interests exist: the STARE, SABRE and SAFARI auroral radars; the MPAe heating facility, HILAT Satellite receiving station, and Partial Reflection experiment, near Tromsö; the rocket ranges at Andöya in Norway and ESRANGE near Kiruna. The three sites are located near three very active institutions of auroral research: the Sodankylä Geophysical Observatory, the Kiruna Geophysical Institute and the Tromsö Auroral Observatory, resulting in fruitful interactions between scientists from those institutions and EISCAT. A more complete description of the supporting instrumentation is given by Pellinen and Nevanlinna (1982).[1]

6. EISCAT Observing programmes

The observing time at EISCAT is divided into two main categories, called common programmes (CP) and special programmes (SP). As a goal, time on the facility is approximately equally divided between these two types of programmes. The CP and SP observations provide observing time and data to scientists from the EISCAT associate countries.

In addition, observing time can be made available to EISCAT staff and to non-associate (third party) scientists. A brief description of the types of programmes, ownership and use of data is given in the Appendix A, "Guidelines for Management of Scientific Programmes, Observing Time and Use of Data."

6.1 Common Programmes

At present, common programmes are scheduled to run for 24 or more continuous hours, approximately 40 times per year. This operational level was achieved in mid-1983.

The goal of the CPs is to provide a data base for long term synoptic studies. Therefore, a small number of experimental modes are employed and each mode is used approximately once per month. Data from the common program operations are available to scientists from all six Associate countries.

In the catalogue proper, common programme operations are identified by the initial letters CP in the experiment name. Following the first two letters is a number designating which of the CP's was run. Following the number is another letter designating the version of the program. Each version of a CP has evolved and been improved from the previous version while leaving the basic experiment concept unchanged. In this section we briefly describe the three CPs most frequently used during the period 1981-1983.

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[1] R.Pellinen and H.Nevanlinna, 1982, CCOG Newsletter No 82/1 "Supporting Observations for EISCAT and Viking in Northern Europe", Committee for Coordination of Observations made on Ground, Finnish Meteorological Institute, Box 503, SF-00101 Helsinki 10, Finland

In CP0, the transmitter beam is held fixed parallel to the earth's magnetic field in the F-region. The remote site rece iving beams are also held fixed to intersect the transmitting beam at 312 km. A two-pulse waveform was employed with a short (60 μs) pulse for good resolution E-region electron density profiles and a moderate pulse (360 μs) for F-region measurements of density, temperature, and velocity. This CP permits hightime resolution measurements to be made in a single pointing direc tion. Thus it is well suited for studying substorm phenomena

In CP2, the transmitter beam is pointed sequentially to three different directions. The three positions form a triangle with vertices spaced by about 130 km in the ionosphere. The remote antennas follow this motion in the F-region. With this experi ment, it is possible to study various phenomena which travel over the facility. The three pointing directions employed also enable closer coordination and correlation with other ground-based observations located near Kiruna and Sodankylä

For CP3, the transmitter antenna is scanned in geomagnetic latitude, in a plane approximately perpendicular to the mag netic L shells. The receiving antennas follow the transmitted beam at an altitude of 300 km. The geomagnetic latitude region covered at the 300 km tristatic measurement altitude is from 61° to 71° in 16 discrete steps. This experiment provides mea surements of the latitudinal variations of ionospheric para meters with 30 minutes of time required for the full scan. CP3 is very well suited for the study of boundaries and boundary motions in the auroral, polar cap (occasionally), and sub auroral regions

More detailed descriptions of the common program versions are given in Appendix B.

Requests from EISCAT associate scientists for CP data should be made through their national coordinator (Appendix C)

Inquiries from non-EISCAT associate scientists regarding data from common programme experiments should be directed to:

Director,
EISCAT Scientific Association
Box 705
S-98127 KIRUNA
Sweden
Telex. 8778.

6.2 <u>Special Programmes</u>

Special programmes (SPs) are defined individually by an associate or group of associates. Observation time on the EISCAT facility for special programme operations is allocated to each associate in proportion to his financial contribution to EISCAT. Data recorded during SP operations is released only to the associate responsible for the experiment for a period of one year.

Many special programme operations have been performed. Some have been in conjunction with rocket or satellite experiments, or other groundbased facilities (e.g. STARE radar, MPI Heating facility, optical observatories). Others have been oriented toward studying particular phenomena of interest to individual associate scientists (e.g. mesosphere, stratosphere, plasma waves, ion composition). Still other SPs have utilized better resolution in space or time than is available with the common programmes.

The large number of different special programme experiments which have been run to date preclude including descriptions in this report. Inquiries regarding SP operating modes and data availability should be addressed to the national coordinator of the EISCAT associate country responsible for the SP experiment of interest. A list of the national coordinators is given in Appendix C.

7. Lists of Observations

The following lists show the dates and times during which the EISCAT UHF transmitter was in operation and ISR data were recorded at Tromsö. For most of the periods shown (approximately 75% of the time) both of the remote receiving stations also recorded data. Universal time (UT) is used throughout. Local solar mean time at the Tromsö station equals universal time plus one hour and seventeen minutes. Thus local solar midnight occurs at 2243 UT. Local magnetic midnight occurs at about 2145 UT, ± 20 minutes depending on season.

Experiment names are coded in the following manner.

Common Programs: CP-DD-V
where DD = a single digit, 0-3, sometimes preceeded by the letter M.
V = version of program, a letter.

Special Programs: SP-AA-NAME
where AA is the associate country responsible for the experiment, and
NAME is a descriptive name given to the experiment. The country codes are:

FI= Finland
FR= France
GE= West Germany
NO= Norway
SW= Sweden
UK= United Kingdom
EI= EISCAT staff.

When more than one country participates in an SP experiment, the AA designator is given as AA/BB/CC... where the list separated by slashes shows the participating countries

When one country or the same group of countries runs several contiguous experiments, the experiment names are separated by slashes NAME1/NAME2/... .

Data gaps of less than 20 minutes are not shown.

1981 Observations

START-UT YYMMDD	HHMM	END-UT YYMMDD	HHMM	EXPERIMENT NAME
810820	1545	810820	2115	CP-M1-B
810916	0900	810917	0715	CP-M1-B
810923	0930	810924	0800	CP-M1-B
810930	1130	811001	0900	CP-M1-C
811002	0825		1058	CP-M1-C
811006	2200	811007	0738	CP-M1-C
811007	0846	811008	0900	CP-M1-C
811014	1415		1532	CP-M1-C
	1737	811015	0900	CP-M1-C
811021	0910		1452	CP-O-D
811022	0745		0900	CP-O-D
811025	1640	811026	0900	CP-O-E
811104	0930	811105	0900	CP-O-E
811111	0900		1454	CP-O-F
811118	0900		1016	CP-O-F
	1111	811119	0900	CP-O-F
	1854		2000	SP-GE/UK-EB1
811123	2004		2327	SP-GE-STAGE
811125	0901	811126	0034	CP-M2-B
811126	0050		0130	SP-GE-EB1
	0149		0844	CP-M2-B
	1734		2300	SP-GE-STAGE
811129	1000	811130	0100	CP-M3-A
811130	0215		1000	CP-M3-A
811201	1530		1620	SP-UK-EB2
	1714	811202	0150	SP-GE-STAGE/EB3
811202	0800		1314	SP-FR-CPM3
811203	1640	811204	0130	SP-GE-EB3/STAGE
811205	1110		1650	SP-FR-CPM3
811206	1450		1650	SP-GE/FR-PLH1
811207	1000		1730	SP-UK-SPITS
811208	0910		1354	SP-GE/FR-PLH1
	1500		1620	CP-M3-B
	1840	811209	0648	CP-M3-B
811209	1645		1842	SP-UK-EB3
	1900		2018	CP-M3-B
	2040		2300	SP-GE-EB3
811210	1300		1400	SP-GE/FR-PLH1
811211	1222		1413	SP-GE/FR-PLH1
811214	0930		1200	SP-UK-SPITS
	1213		1350	SP-GE/FR-PLH1
811215	1500	811216	1254	CP-M3-A
811216	1345		1444	SP-UK-EB3
	1500		1934	CP-M3-A
811217	0750		1000	SP-UK-SPITS
	1055		1156	SP-GE/FR-PLH2
	1500		2300	SP-UK-SKSP1
811218	0000		0115	SP-UK-SKSP1

1982 Observations

START-UT YYMMDD	HHMM	END-UT YYMMDD	HHMM	EXPERIMENT NAME
820119	1640		2400	CP-M3-A
820120	1500		2300	CP-M3-A
820125	1302		1522	SP-FR-EC
	2027	820126	0346	SP-FR-PLASMANIGHT
820126	1500	820127	2258	CP-3-A
820131	1000	820201	0100	CP-3-A
820414	1302		1332	CP-O-G
	1403		2301	CP-O-G
820415	0234		0305	CP-O-G
	0705		0835	CP-O-G
	1800		2400	SP-UK-DE/HA
820419	1800		2100	SP-UK-DE
	2130		2400	SP-UK-HA
820421	1000		1300	CP-M2-C
820425	1210	820426	1000	CP-3-A
820505	1220		2124	SP-FI-SPSU
820506	0000		0920	SP-FI-SPSU
820509	1018	820510	1003	CP-O-G
820512	1756		2356	CP-3-B
820518	0930		1430	SP-FR-MI
	1630	820519	2300	CP-M2-C
820520	0900		1400	SP-FR-MI
	1759		2359	CP-3-B
820526	1000	820527	1000	CP-3-B
820602	1000	820603	1000	CP-O-G
820603	1100		1300	SP-UK-SKSP1
820606	1000	820607	1200	CP-M2-C
820616	1100	820617	1100	CP-3-B
820707	1100	820708	1000	CP-M2-C
820714	1402	820715	0642	CP-M2-AURORA
820715	1410		1952	CP-M2-AURORA
820726	1200		1320	CP-3-B
	1345		1415	SP-UK-SPORE
	1500		2355	SP-FR/GE/SW/UK-CAMP
820727	0000		0133	CP-3-B
	1200		1342	CP-3-B
	1400		1827	SP-FR/GE/SE/UK-CAMP
	2206		2300	SP-FR/GE/SW/UK-CAMP
	2315	820728	0200	CP-3-B
820728	1200		1328	CP-3-B
	1548		1810	SP-FI/SW/UK-SPORE
	1835		2255	SP-FR/GE/SW/UK-CAMP
820729	1016		1135	SP-FR/GE/SW/UK-CAMP
	1230		1606	SP-UK-POL/NOR
	2100		2330	SP-FR/GE/SW/UK-CAMP
820730	0830		0945	SP-UK-POL
	1000		1115	SP-FR/GE/SW/UK-CAMP
	1230		2125	SP-FI/SW/UK-SPORE

820731	0000		0158	CP-3-B
	1016		1150	SP-FR/GE/SW/UK CAMP
	1200		1352	CP-3-B
	1405		2005	SP-FI/SW/UK-SPORE
	2130		2315	SP-FR/GE/SW/UK-CAMP
820801	1000		1145	SP FR/GE/SW/UK CAMP
	1200		1358	CP-3-B
	1410		1805	SP-FI/SW/UK-SPORE
	2105		2300	SP-FR/GE/SW/UK-CAMP
820802	1000		1140	SP-FR/GE/SW/UK-CAMP
820803	1004		1145	SP-FR/GE/SW/UK CAMP
820804	1000		1145	SP-FR/GE/SW/UK CAMP
	1200	820805	0945	CP-M2-C
820805	1000		1145	SP-FR/GE/SW/UK-CAMP
	1240		1947	SP-FI/SW/UK SPORE
820806	1410		1530	SP-FR/GE/SW/UK CAMP
	2100		2200	SP-FR/GE/SW/UK-CAMP
820807	1000		1140	SP-FR/GE/SW/UK-CAMP
	2100		2245	SP-FR/GE/SW/UK CAMP
820808	1000		1130	SP-FR/GE/SW/UK CAMP
	2100	820809	0100	SP-FR/GE/SW/UK CAMP
820809	0835		0940	CP-O-G
	1000		1130	SP-FR/GE/SW/UK CAMP
	2114		2254	SP-FR/GE/SW/UK CAMP
820810	0515		0654	SP-UK-POL
	1000		1132	SP-FR/GE/SW/UK CAMP
	1200		2100	SP-FI/SW/UK SPORE
	2115		2300	SP-FR/GE/SW/UK CAMP
820811	1000		2319	CP-O-G
	2325	820812	0100	SP-FR/GE/SW/UK CAMP
820812	0115		1000	CP-O-G
	1045		1357	SP-UK-RPL
	1413		1620	SP-FI/SW/UK SPORE
820813	1015		1400	SP-UK-RPL
820814	0500		1000	SP UK-POL
820817	1100		2130	CP-M2-C
	2330	820818	0857	CP-M2-C
820818	0930		1100	CP-M2-C
821121	1948		2028	SP GE/NO-HERO
821124	1421		1750	CP-O-H
821125	1000	821126	1000	CP-O-H
821126	2139		2300	SP-UK SKSP3
821127	1205		1235	SP-GE/NO-HERO
	1400		1522	SP-UK-POL
821128	0744		0832	SP-GE/NO-HERO
	1358		1503	SP-UK-POL
	1600		1800	CP-3-B
821129	1144		1220	SP-GE/NO-HERO
	1246		1353	CP-M2-C
	2059	821130	0036	SP-UK-SKSP3
821130	1039	821201	1000	CP-O-H
821202	0700		0758	SP-UK-NOR
821204	1702		1746	SP-SW-GEOS
821214	1300		1828	CP-3-B
	1932		2000	CP-3-B
	2030		2358	CP-3-B

1983 Observations

START-UT YYDDMM	HHMM	END-UT YYDDMM	HHMM	EXPERIMENT NAME
830107	1600		1921	SP-UK-POLA
830111	1000		2359	CP-O-H
830112	0040		2155	CP-O-H
830113	1942		2156	SP-UK-AUSL
	2322	830114	0457	SP-UK-AUSL/SOUT
830114	1815	830115	1414	SP-UK-AUSL/SPZ
830115	1642		2334	CP-O-H
	2350	830116	0059	SP-UK-POLA
830116	0855		1520	SP-UK-SPZ
	1527		1644	CP-O-H
	1704		1732	SP-FR-MP
	1735		1905	CP-O-H
830117	1737		1905	CP-O-H
830128	1200		1430	SP-FR/GE/NO-PLH/HEAT3
830622	1000		2029	CP-O-H
	2100	830623	1000	CP-O-H
830629	1000	830630	0831	CP-3-C
830713	1000	830714	0957	CP-3-C
830720	0800	830721	2400	CP-M2-D
830802	0836		0915	CP-O-H
	1037		1559	CP-O-H
	1636		2333	CP-O-H
830803	0634		1000	CP-O-H
830804	1352		1435	CP-O-H
	1754		1904	SP-FR-MP
830805	0751		0843	CP-O-H
	0939		1117	SP-FR-MP
830809	1024	830810	1057	CP-3-C
830811	0850		0909	SP-FI-EFOR
	1006		1138	SP-FI-ECFO
	1346		1802	SP-FI-ECFO/EFLA/EFOR
830812	1033		1138	SP-FI-ESLA/ECFO
	1159		1253	SP-FI-EFOR
	1331		1730	SP-FI-GRAV
830816	0920	830817	2257	CP-3-C
830825	1304		2316	CP-O-H
830826	0000		1006	CP-O-H
830830	1047	830831	1000	CP-O-H
830902	1034		1141	SP-GE-HERO
830920	1454		1539	SP-GE-HERO
	1541		1945	SP-GE-ARC/MAGC
	1949		2123	SP-UK-POLA/AGWL/SOUT
830921	1242		1335	SP-GE-HERO
830922	1100		1146	SP-GE-HERO
	1214		1508	SP-FR/GE/NO-PL4
	1559	830923	0412	SP-UK-SOUM
830923	1624		2035	SP-UK-AGWL

830924	1230		1235	SP-FR/GE/NO-PL4
	1252		1342	SP-GE-HERO
	1346		1357	SP-GE-ARCO
	1430		1443	SP-FI-ESLA
	1514		2200	SP-FI-EFOR
	2240		2302	SP-FI-UNICAL
830925	0552	830926	0203	SP-UK-POLA
830926	0710		1022	SP-UK-AGWW
	1734		2202	SP-UK-SUOM
830927	0733		0936	SP-UK-TOPS/AGWL
	1223		1404	SP-FR/GE/NO-PL5
	1520		1603	SP-FR/GE/NO-PL5
830928	1114		1302	SP-FR/GE/NO-PL5
	1304		1317	SP-GE-HERO
831003	1715		2154	SP-GE-ARCO
831004	1000		1856	CP-3-C
	1902		2008	SP-GE-ARCO
	2040	831005	2400	CP-3-C
831006	1913		2200	SP-GE-ARCS
831007	1257		1422	SP-GE-HERO
	1424		1455	SP-FR/GE/NO-PL5
	1650		2200	SP-GE-ARCO/CP3C
831008	1807		1939	SP-GE-HLAT
	1944		2152	SP-UK-PC182/PC4
831009	1557		2338	SP-GE-HLAT
831010	1533		2150	SP-GE-HLAT/ARC1
831011	1015	831012	0945	CP-3-C
831912	1205		1517	SP-NO-FACF/MUL5
	1701		2148	SP-NO-FACF/MUL5
831013	1018		1658	SP-NO-FACF/MUL5
	1702		2200	SP-GE-HLAT
831014	1052		1357	SP-NO-FACF/MUL5
	1501		2205	SP-GE-HLAT
831017	1652		2331	SP-NO-TANP/RESO
831018	1000	831019	0957	CP-O-H
831019	1030		2256	SP-NO-TANP/RESO/PSMO
831020	0800		2130	SP-NO-TANP
831021	1020		1530	SP-NO-TANP/RESO
831030	1803		2033	SP-NO-TANP
	2137		2400	SP-NO-POWM
831101	1000		1427	CP-3-C
831103	1845		2232	SP-SW-JOUL/IVEL/NWIN
	2256		2337	SP-SW-IONC
831104	0839		1453	SP-FR-FR17
	1500		2051	SP-SW-IVEL/NWIN
831105	1859		2025	SP-NO-LEAP
	2045		2132	SP-FR-ECSIM/CP3E
	2157		2212	SP-FR-MU12
831107	1530		1740	SP-SW-JOUL
	1900		2400	SP-FR-ECSIM
831108	0032		0112	SP-FR-ECSIM
	1000		1357	CP-M2-D
	1400		1429	CP-O-H
831109	0406		1000	CP-M2-D
	1000		1200	CP-O-H
	1210		1238	SP-FR-MU4
	1500	831110	0405	SP-SW-IVEL

831110	0800		1750	SP-FR-EDIA/CP3E/SRHL
	1800	831111	0402	SP-SW-JOUL
831111	0800		2055	SP-FR-ECSIM/SRHL
	2109		2200	SP-NO-LEAP
	2212	831112	0400	SP-FR-MU12
831112	1644		2059	SP-FR-SRHL
831114	1044	831115	1221	CP-3-C
831115	1335		1605	CP-3-C
	1854		2127	CP-3-C
831116	1538		2240	SP-FI-ESLA/MESO
831117	0807		1029	SP-EI-MVAD/EFOR
	1030		1112	CP-O-I
	1113		1149	SP-EI-MVAD/EFOR
	1604	831118	0622	SP-FI-ESLA/EFOR
831128	0946		1127	SP-FR-SRHL/MU1/MU12
	1512		2202	SP-FR-SRHL/MU1/MU12
	2208		2306	SP-GE-EFOR
831129	0000		0235	SP-FR-MU1
	1000	831130	1000	CP-O-H
831130	1006		1758	SP-FR-ECSIM
	1811		2231	SP-GE-EFOR
831201	0359		0414	SP-FR-CP3E
	0858		1106	SP-FR-ECSIM
	1548		2331	SP-FR-CP3E
831202	0000		0827	SP-FR-CP3E
	0957		1022	SP-FR-CP3E
	1157		1657	SP-FR-CP3E
	1708		2141	SP-GE-EFOR
831204	1558		2113	SP-UK-NORT
831205	1013		1018	SP-FR-ECSIM
	1043		1433	SP-FR-ECSIM
	1458		2400	SP-UK-FRQN/EFIR
831206	0058		0738	SP-UK-FRQN/NORT
	0928		1413	SP-FR-ECSIM
	1500	831207	1505	CP-O-H
831207	1630		2023	SP-EI/FI/FR/GE/NO/UK-MLTH1
	2028		2317	SP-GE-EFOR/STRT
831208	0813		0833	SP-FR-MESO/MUI5/MU2
	0836		0854	SP-EI-DREGSPEC/MESO1
	0856		1941	SP-FR-MESO/MU15/MU2
831209	0617		1346	SP-FR-MU2/SRHL
	1758		2145	SP-GE-EFOR
	2200	831210	1420	SP-FR-CP3E
831212	1258		1457	SP-UK-FRQ2
	1513		2201	SF-FR-MESO/MU2
831213	0315		0351	SP-FR-MESO/MU2
	0400		0834	SP-UK-FRQ2
	0900	831214	0900	CP-3-C
831214	1131		1155	SP-EI/FI/FR/GE/NO/UK-MLTH1
	1200		1500	SP-UK-FRQ2
	1558		1815	SP-UK-MESO/FRQ2
	1815		1911	SP-EI-DREGSPEC
	1913		2340	SP-UK-FRQ2/SRHL
831215	1027	831216	0652	SP-FR-EDIA/CP3E/SRHL
831216	1357		1915	SP-FR-EDIA
	2010	831217	0252	SP-FR-EDIA/MU4/CP3E

Appendix A

GUIDELINES FOR MANAGEMENT OF SCIENTIFIC PROGRAMMES, OBSERVING TIME AND USE OF DATA

1. PURPOSE AND OBJECTIVES

1.1. This document is based on those Statutes of the EISCAT Scientific Association relevant to EISCAT Scientific Programmes, Observing Time and Use of Data and should be read, when necessary, in conjunction with those Statutes.

1.2. The objective of the guidelines set out in this document is to ensure (a) that the best possible scientific returns are obtained and (b) that each Associate is assured of its equitable share of scientific results.

1.3. Article 13 of the EISCAT Statutes states that the observing time shall be made available for

(a) a programme common to all Associates
(b) particular programmes of each Associate
(c) such programmes of third parties that may be agreed ...

Type (b) are commonly termed "Special Programmes".

1.4. Scientific Co-operation Between EISCAT Associates

In many fields of study the best scientific return will result from co-operation between scientists within the Associate countries. In order to enable EISCAT staff and SAC to give advise on such co-operation it is hoped that scientists will inform the Director and SAC about ongoing studies involving EISCAT data even when the work proposed is based on Common Programme data. It is, of course, understood that there is no obligation to submit proposals for independent work based on Common Programme data.

2. COMMON PROGRAMME

2.1. Great importance is attached to the Common Programme and in particular to long term routine observations. The major contribution of incoherent scatter radar to upper atmosphere science has in the past to a large extent come from the analysis of data obtained from standard observations covering different times and seasons, varied geomagnetic conditions and different phases of a solar cycle. EISCAT will be no exception.

2.2. After an intial trial period to be closely supervised by SAC the observational procedures shall only be substantially modified when major changes in EISCAT facilities make it desirable. Examples of such major changes will be the commissioning of the VHF system and subsequent split beam operation.

2.3. Proposals for changes in the Common Programme shall be submitted to both the Director and the Chairman of SAC.

2.4. The choice of observations within the Common Programme and distribution of time allotted to each of these shall be made by the Director on the recommendation of SAC.

2.5. Common Programmes can be interrupted, for example in support of rocket campaigns, or at short notice during unexpected or unusual phenomena as described in Article 3.10. Such interruptions must be kept to a minimum and must be approved by the Director or, if not feasible, by the officer in charge of the programme. Data collected during these periods shall form part of the Common Programme. The Director shall report the circumstances of such interruptions at the next subsequent meeting of SAC.

3. PARTICULAR PROGRAMMES

3.1. Proposals for particular programmes should contain information as specified in the standard format available from EISCAT Headquarters. Proposers should consult the "Procedures for EISCAT Special Programme Experiments" issued by Headquarters. Proposers may request that their proposals are held in confidence.

3.2. Each Associate will set up an internal review system to deal with particular programmes according to rules which are of no concern to EISCAT.

3.3. Each Associate shall appoint a contact person with whom the EISCAT Director can discuss general matters concerning proposals submitted by that Associate.

3.4. Each Associate shall submit proposals to the EISCAT Director with the appropriate internal preferences and priorities indicated.

3.5. Associates may combine to propose to allocate a certain fraction of their particular programme time to scientific programmes of joint interest.

3.6. Upon review of the proposal for particular programmes the Director shall either schedule the programme forthwith, or he shall suggest modifications which will be discussed with the experimenter; the contact person will be kept informed.

3.7. Where proposals from two or more Associates are identical or nearly identical the Director shall suggest to the respective contact persons and experimenters - if the proposals so indicate - a pooling of efforts and a sharing of observing time. The amount of observing time allotted to such a shared effort by the participating Associates shall be a matter of mutual agreement.

3.8. The Associates are invited to involve members of the EISCAT staff (including the contract staff) as participating partners in some of their scientific programmes. Such partnerships must be approved by the Director.

3.9. The Director shall provide SAC with a schedule of actual and proposed observations and invite its comments. In particular SAC shall discuss whether the schedule arising from the proposed observations provides a reasonable coverage of the problem areas that ought to be examined.

3.10. If an unexpected or unusual phenomenon natural or otherwise occurs, observation of which would be so valuable as to warrant interruption scheduled programmes or starting up the system at short notice, the Director or other officer in charge may take the initiative. The data collected shall belong to the Common Programme and all Associates shall be notified as soon as possible of such observations. The SAC will discuss any such occurrence at its next subsequent meeting.

4. USE OF EISCAT BY COLLABORATING SCIENTISTS, THIRD PARTIES AND STAFF

4.1. Parties not belonging to the Association may take use of EISCAT on terms approved by the Council in each case. Scientific collaboration with scientists or scientific institutions from non-Associate countries is to be encouraged along the following guidelines.

4.2. Applications for observing time from third parties shall be submitted to the Director who shall seek the views of SAC before submitting them to the Council for decision.

4.3. Whenever collaborative work with scientists from non-Associate countries involving the use of EISCAT data is undertaken, the EISCAT Director shall be informed and he will at his discretion report to the next meetings of SAC and Council.

4.4. Any scientific paper resulting from such collaboration shall include as coauthor(s) the participating scientist(s) from the Associate country or the EISCAT staff, with appropriate acknowledgement of the support provided by EISCAT.

4.5. Summaries of data, such as microfiche surveys, may be supplied for the purpose of identifying specific periods when a combination of EISCAT data with data from some other facility (such as another incoherent scatter facility or a satellite) appears likely to produce significant results. However there shall be no bulk transfer of EISCAT data in raw or reduced form to scientists from non-Associate countries without the permission of the EISCAT Director who will act in consultation with the SAC, and who will report to the next Council.

4.6. "Bulk transfer" means the supply of sets of data sufficient to enable the recipient to carry out research principally based on EISCAT data.

4.7. Up to five percent of the observing time is available for EISCAT staff to be apportioned at the discretion of the Director.

5. OWNERSHIP AND USE OF DATA

5.1. Article 14 of the Statutes states:

"The Association shall encourage the publication of all scientific results obtained using its facilities. All data collected shall be the property of the Association and shall be made freely available to all the Associates and the Association's staff. However, in the case of data obtained from the programmes specified in paragraphs 1(b) and (c) of Article 13 those responsible for the programme shall have the right of first use of the data for the purpose of publication of scientific results for a maximum of twelve months from the date of collection, after which time the data must be made freely available to all the Associates and the Association's staff". (Paragraphs 1(b) and (c) of Article 13 refer to particular programmes and third-party programms, respectively.)

5.2. Published papers in which data from the EISCAT facility have been used shall always contain an acknowledgement of the support provided by EISCAT.

5.3. Authors are expected to send preprints of papers, as well as reprints after publication, to the EISCAT Headquarters where a file of EISCAT publications will be kept.

6. DISTRIBUTION OF EISCAT DATA

6.1. Common programme data will be processed by the EISCAT analysis programs yielding tabulations of ionospheric parameters.

6.2. Processed common programme data will be dispatched by EISCAT (or its contractor) to the Associates on magnetic tape, one set per country. Release of such data on a non-collaborate basis to third parties must be approved by the Director, who will act in consultation with SAC and report in retrospect to Council.

6.3. Magnetic tape copies of raw data from Common Programme experiments may be obtained from EISCAT's contractor for data distribution. Magnetic tape copies of particular programme data will be provided upon request to the particular Associate by EISCAT.

6.4. Particular programme data capable of being processed by the standard EISCAT programs will be thus processed with the minimum practicable delay if requested by the Associate(s) responsible for the programme.

6.5. Other particular programme data will be processed by EISCAT if the necessary analysis programs are devised by the experimenter assisted by EISCAT staff. Otherwise the experimenter will receive raw data on magnetic tape.

6.6. All particular programme data will become available on request from scientists in all EISCAT member countries one year after acquisition.

6.7. The Director shall have discretion to make available to any scientist a limited amount of common programme data needed to supplement other scientific investigations. Particular and third-party programme data may be made available during the first year after acquisition with the permission of the experimenter.

6.8. Brief descriptions of all common, particular and third-party programmes will be published by EISCAT. A summary of observations shall be published in the EISCAT Annual Reports.

6.9. EISCAT will securely archive one set of all EISCAT data. Experimenters may remove only copied data from EISCAT.

Appendix B

COMMON PROGRAM EVOLUTION

Common Program 0 (CP-0)

Version	Waveform	Tromsö	Remotes	
D,E,F,G,H	360 μs pulse	ACF	ACF	125 pps
	60 μs pulse	PP		125 pps
I	360 μs pulse		ACF	125 pps
	360 μs pulse	ACF	ACF	125 pps
	60 μs pulse	PP		125 pps
	20 μs pulse	PP		125 pps

Pointing

Version	Tromsö Az.	Tromsö El	Remote heights	cycle time (min)
D,E,F	179.8	77.16	300 km	--
G	179.7	76.5	300 km	--
H	179.7	76.5	312 km	--
I	179.7	76.5	312 km	--

ACF - indicated pulse used for autocorrelation function measurement

pp - indicated pulse used for power profile measurement.

Common Programs -1 and 1 (CP-M1 and CP-1)

Version	Waveform	Tromsö	Remote	Repetition freq.
M1-B	500 µs	ACF	ACF	71.4 pps
M1-C	500 µs	ACF	ACF	
				100 pps
1-C	360 µs		ACF	80 pps
	360 µs	ACF	ACF	80 pps
	5x15 µs	multipulse ACF		80 pps
	5x15 µs	multipulse ACF		80 pps
	60 µs	PP		80 pps
	15 µs	PP		80 pps

Pointing

Version	Tromsö		Remote	cycle time
	Az	El	height(s)	
M1-B,C	180.5	77.6	110,120,130,140,300,700	10 min
1-C	181.6	76.5	110, 312	10 min

Common Program -2 (CP-M2)

Version	Waveform	Tromsö	Remote	Repetition freq.
B,C,D	360 μs	ACF	ACF	125 pps
	60 μs	PP		125 pps

Pointing

Version	Tromsö LAT	Tromsö LONG	Remote height	cycle time
B,C	69.2	19.2	300	6 minutes
	68.4	19.2	300	
	68.4	21.1	300	
D	as above		312	6 minutes

Common Programs -3 and 3 (CP-M3 and CP-3)

Version	Waveform	Tromsö	Remote	Repetition freq.
M3-A	360 μs	ACF	ACF	125 pps
	60 μs	PP		125 pps
M3-B	1000 μs		ACF	80 pps
	320 μs	ACF		80 pps
	60 μs	PP		80 pps
3-A, 3-B, 3-C	1000 μs		ACF	80 pps
	360 μs	ACF		80 pps
	60 μs	PP		80 pps

Pointing

Version	Tromsö Az	Tromsö El	Remote height	cycle freq.
M3-A	180	93.0	300	6 minutes
(3 pos.)	180	77.2	300	
	180	61.4	300	
M3-B	LAT	LONG	height	
(11 pos.)	72.25	20.00	325	20 minutes
	71.75	20.27		
	71.25	20.55		
	70.75	20.84		
	70.25	21.14		
	69.75	21.44		
	69.25	21.74		
	68.75	22.05		
	68.25	22.36		
	67.75	22.67		
	67.25	22.98		
3-A, 3-B				
(16 pos.)	74.25	18.92	325	30 minutes
	73.25	19.46		
	72.25	20.00		
	71.75	20.27		
	71.25	20.55		
	70.75	20.84		
	70.25	21.44		
	69.75	21.44		
	69.25	21.74		
	68.75	22.05		
	68.25	22.36		
	67.75	22.67		
	67.25	22.98		
	66.25	23.60		
	65.25	24.22		
	64.25	24.84		

3-C (15 pos.)	74.2	14.6	325	30 minutes
	73.2	15.8		
	72.3	16.8		
	71.5	17.6		
	70.8	18.2		
	70.2	18.7		
	69.6	19.2		
	69.0	19.6		
	68.4	20.0		
	67.9	20.4		
	67.3	20.8		
	66.7	21.2		
	66.0	21.6		
	65.2	22.0		
	64.2	22.5		

Appendix C

National Coordinators and Scientific Advisory Committee members for EISCAT Associate Countries.

France	P. Bauer CNET-RPE 3, Ave. de la Republique F-92131 Issy-les-Moulineux
Finland	T. Turunen Geophysical Obs. SF-99600 Sodankylä
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