7. WINTER IN NORTHERN EUROPE (WINE)

7.1 THE PROJECT "WINTER IN NORTHERN EUROPE" (MAP/WINE): INTRODUCTION AND OUTLOOK

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The project "Winter in Northern Europe (WINE)" of the international Middle Atmosphere Program (MAP) comprised a multinational study of the structure, dynamics and composition of the middle atmosphere in winter at high latitudes. Coordinated field measurements were performed during the winter 1983/84 by a large number of ground-based, air-borne, rocket-borne and satellite-borne instruments. Many of the individual experiments were performed in the European sector of the high latitude and polar atmosphere. Studies of the stratosphere, were, in addition, expanded to hemispheric scales by the use of data obtained from remotely sensing satellites. Beyond its direct scientific results, which will be reviewed in the following presentations, MAP/WINE has stimulated quite a number of follow-on experiments and projects which address the aeronomy of the middle atmosphere at high and polar latitudes.

What is special in the winter high latitude middle atmosphere?

1. Strong wave mean flow interactions drive the mesosphere way out of radiative equilibrium. This implies:
1.1 Strong dynamical coupling of the mesosphere to lower atmosphere
1.2 Time scales for transport become smaller than those for many photochemical reactions -- minor constituent distribution depends strongly on horizontal transport (e.g., H_2O; O; ...)
2. Neutral and ionized component of the atmosphere affected by geomagnetic and auroral activity (e.g., NO, N_e)
3. Paucity of data

Scientific objectives of the project MAP/WINE

(a) To study the large scale dynamics of the stratosphere and, in particular, sudden stratospheric warmings (minor and major), their causes, the time evolution of large scale spatial structures and their effects on the mesosphere temperature structure and dynamics.

(b) To measure the morphology of small scale dynamic features, such as turbulent structures, gravity waves and tides in the winter middle atmosphere, to study the control exerted b y gravity waves and tides on the mean flow in the mesosphere and to develop improved parameterizations of the interactions of small scale dynamic processes with mesospheric temperature, structure and mean flow.

(c) To study the effects of dynamics and temperature structure on the distribution of minor constituents, including ionospheric plasma, in the middle atmosphere.

(d) To intercompare established and recently developed remote sensing and *in situ* techniques for measuring important mesospheric parameters, such as temperature, wind velocity and direction, turbulence and the water mixing ratio.

Schedule

Intensive field measurements from approximately

December 1, 1983 until February 23, 1984

with supporting measurements extending this period on either side by 1 month.

x-x-x-x-x-x-x-x

continous measurements:	meteor winds, spaced antenna drifts radar, many ground-based techniques
near-continous measurements:	satellite remote sensing
regularly spaced measurements:	metrocket soundings, radiosondes
irregularly spaced measurements:	MST radar, PRE radar, lidar
Scandinavia salvos:	sounding rockets, metrockets, chaff, PRE radar, EISCAT, all other methods as available
USSR salvos:	M-100B rockets with various payloads, ionosondes, PRE radar

Location(s)

(a) local phenomena studied most intensely in northern Scandinavia, including the sites of
ARR, Kiruna, PRE radar, MST radar, EISCAT, 2 lidar stations, 2 OH*-spectrometers and additional supporting ground-based observations

(b) continental scale:
UK, France, Scandinavia, FRG, GDR, Czechoslovakia, USSR

(c) hemispheric scale:
USA, Canada, northern Europe (plus satellites and metrockets)
("NOAA" + "SME")

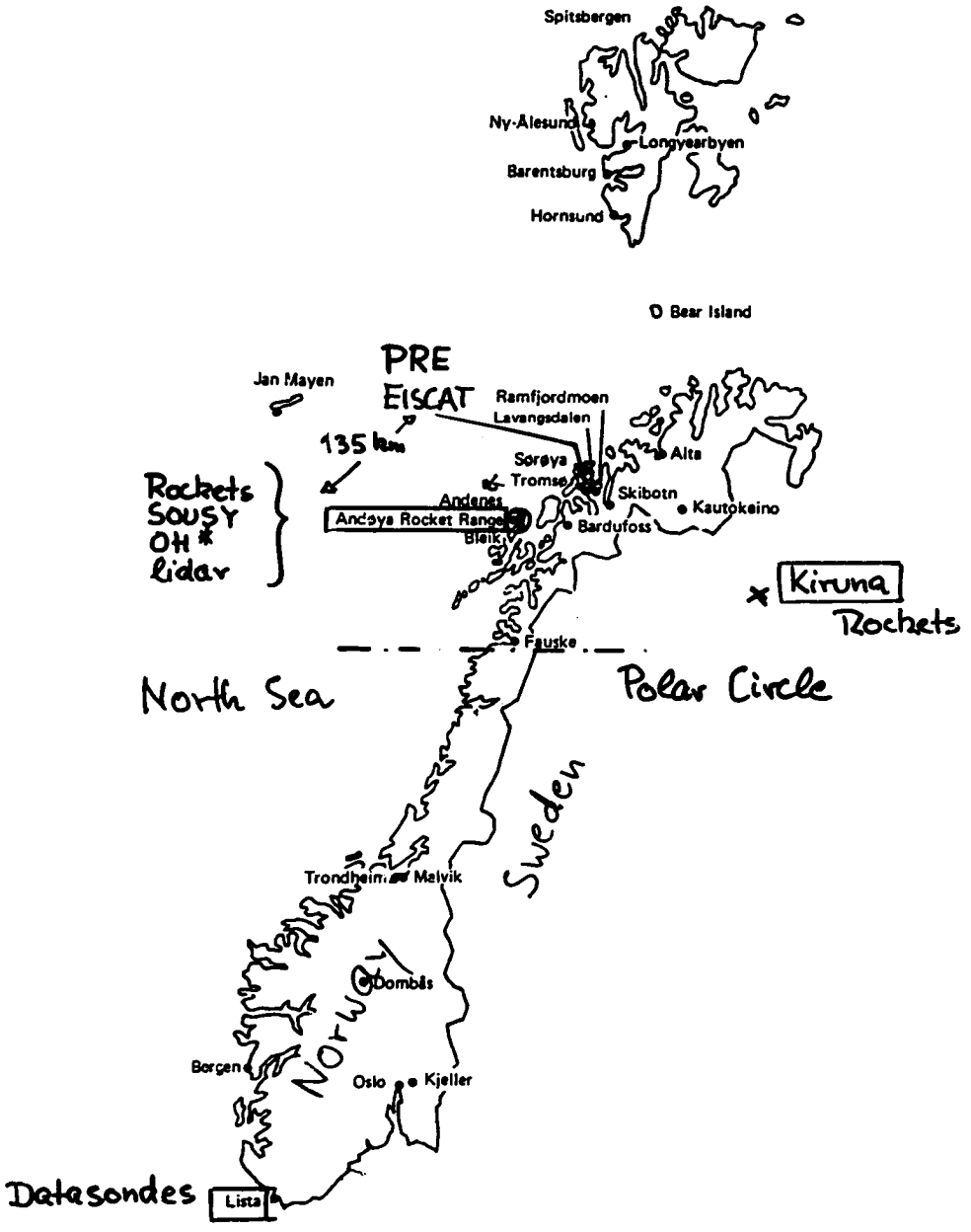

Figure 1. Partial reflection radars (PRE) 2.75 MHz,109 m; VHF radar (SOUSY), 53.5 MHz, 5.6 m; European Incoherent Scatter Facility (EISCAT) 933 MHz, 0.3 m.

Figure 2. Geographical distribution of the main sites for ground-based observations and rocket launches of the project MAP/WINE.

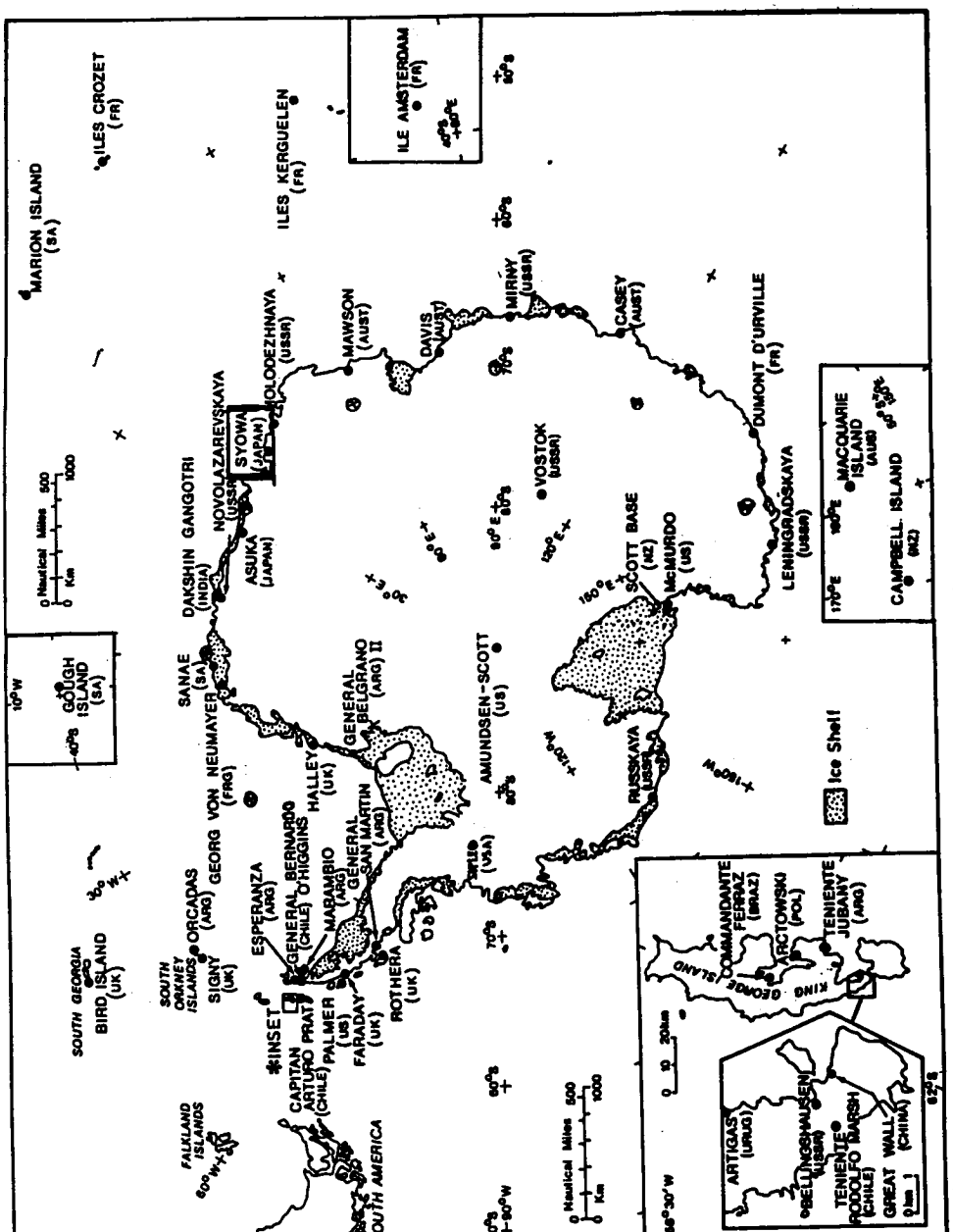

Figure 3.

Salvo Launchings from the Andøya and Kiruna Rocket Ranges

Reg. winter conditions	7. Dec. 1983	(M-T1)	4 metrockets
Special M-T2 salvo	6. Jan. 1984	M-T2,	4 metrockets
Gravity wave salvo	13. Jan. 1984	M-T3,	8 metrockets
Metrocket salvo 1 (daylight)	21. Jan. 1984		10 metrockets
D-CMET salvo	25. Jan. 1984	M-T4,	3 metrockets
Salvo D regular polar vortex	31. Jan. 1984	M-M1, M-T5, M-W1, M-S1.	5 metrockets
Salvo R 1 peak of minor st. warming	10. Feb. 1984	M-M2, M-T6, M-W2, M-I1.	6 metrockets
Salvo R 2	16. Feb. 1984	M-T7,	3 metrockets
Salvo R 3	18. Feb. 1984	M-T8,	7 metrockets
Metrocket salvo 2	19. Feb. 1984		5 metrockets

REVIEWS OF MAP/WINE RESULTS

The Project "Winter in Northern Europe" (MAP/WINE): Introduction and Outlook.
U. von Zahn (FRG)

Small-Scale Structure and Turbulence Observed in MAP/WINE.
T.A. Blix (Norway)

Middle Atmosphere Thermal Structure during MAP/WINE.
D. Offermann (FRG)

The Soviet Contributions towards MAP/WINE.
Z.T. Rapoport and E.S. Kazimirovsky (USSR)

Mean, Tidal and Fluctuating Winds in the Middle Atmosphere and Lower Thermosphere Observed during MAP/WINE in Northern Scandinavia.
J. Röttger (Sweden)

Large-Scale Dynamics of the Stratosphere and Mesosphere during the MAP/WINE Campaign Winter 1983/84 in Comparison with Other Winters.
K. Petzoldt (FRG)

Middle Atmosphere Minor Species during MAP/WINE.
J.C. Ulwick (USA)

Plasma Phenomena Observed in the MAP/WINE Campaign.
M. Friedrich (Austria)