Current state and potential development of Russian upper air, surface meteorological and climate monitoring networks.

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Outlines:

- New Climate Change Tendencies in Atmospheric Circulation Regimes in North-East Asia
- Current state of Russian RAOB network
- Suggestion to RAOB optimal design in Sub Arctic Siberia
- Current state of Russian SYNOP network
- Finding in key areas to be covered by new SYNOP stations

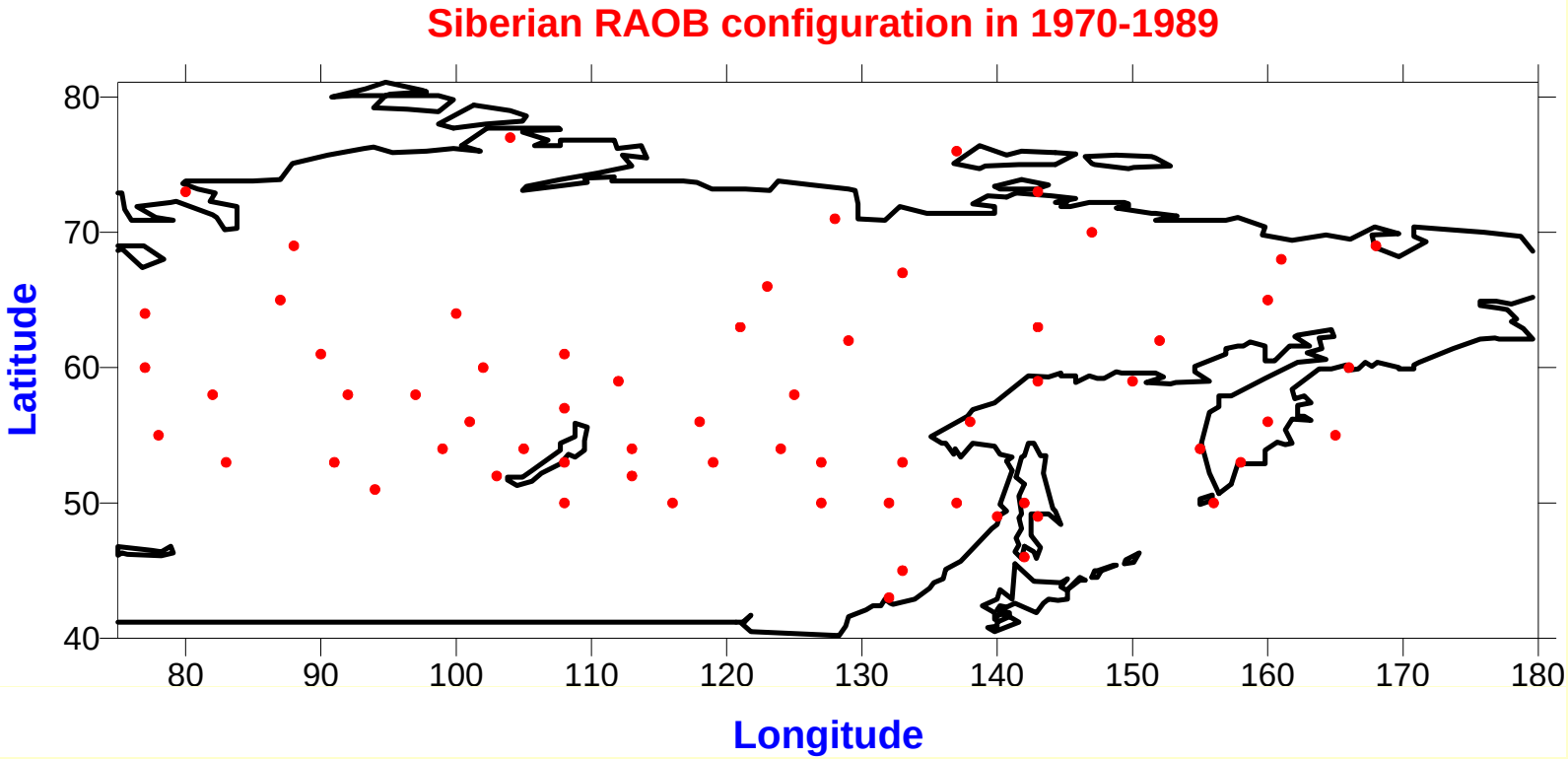
Latest Network Statistics

Surf met total	SYNOP (R)	SYNOP (IR)	RAOB (R)	RAOB (IR)	GUAN
1610	396	119	49	53	10

Closed stations -241

Short Historical Excursion

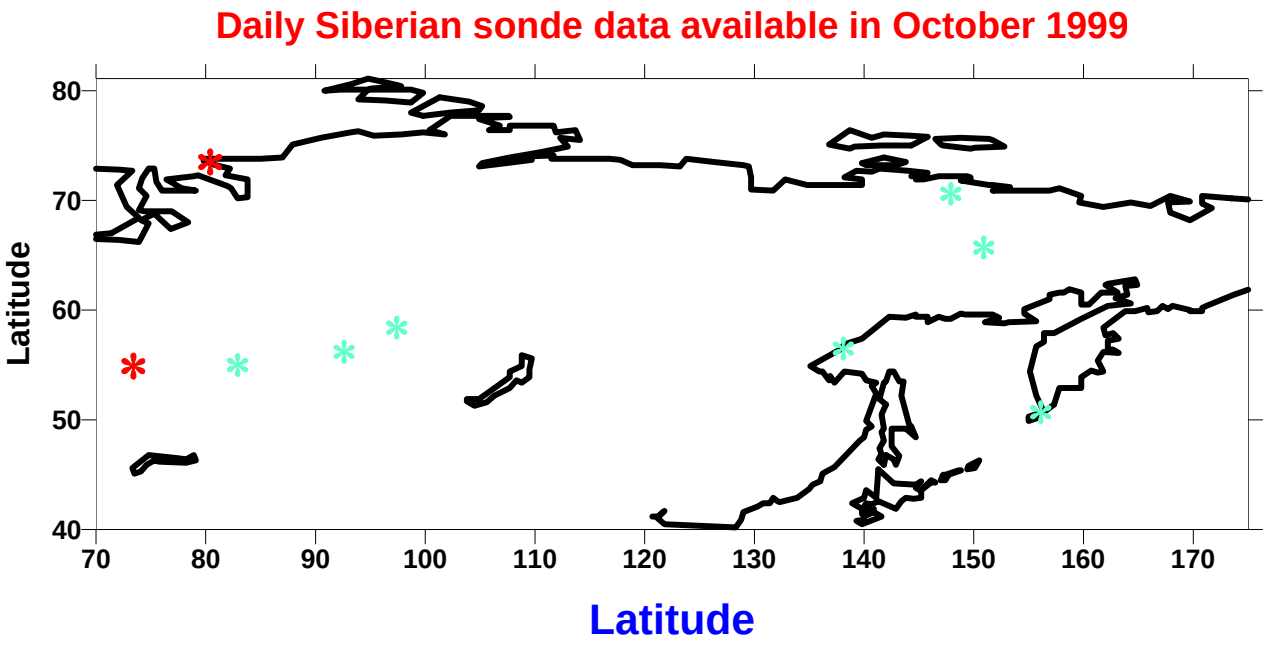
RAOB in Soviet Period



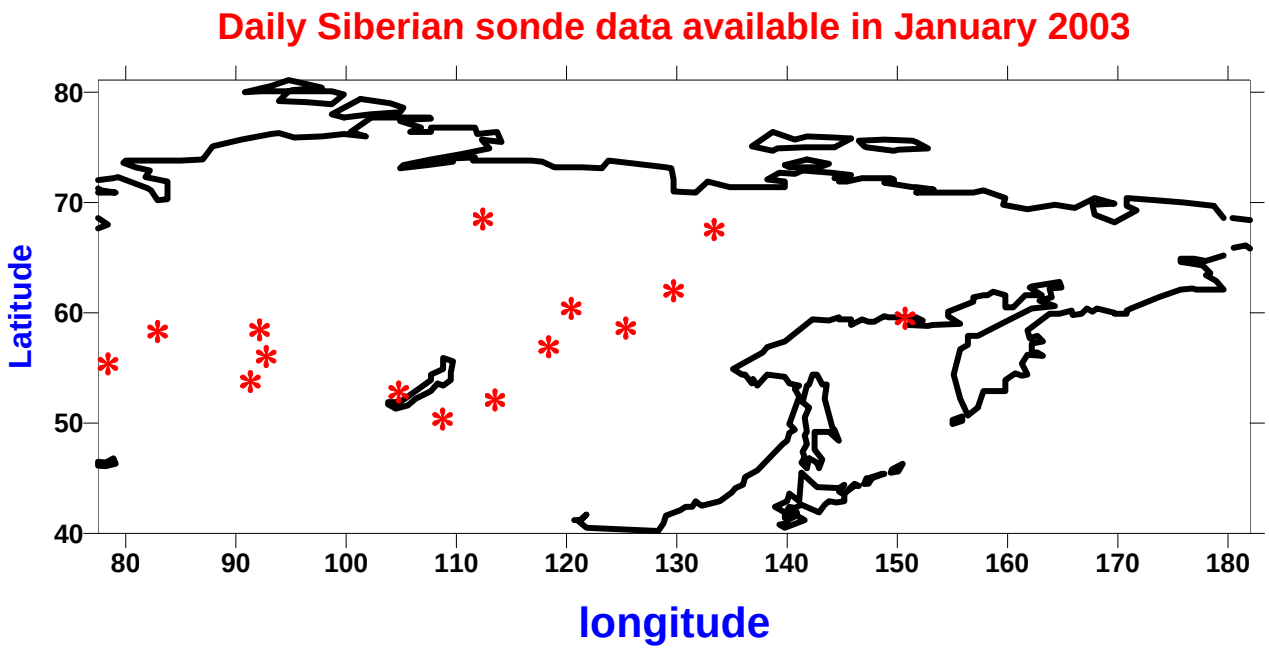
RAOB Problems After 1998

- Statistics: 1999: 4-7 sondes per day
- 2000: 10-12 sondes per day
- 2001: 16-19 sondes per day
- 2002: 22-24 sondes per day
- **BUT**: main problem is absence of regularity:
- **1999**: only **2 stations** provided daily **regular data**
- **2002**: only **15 stations** provided daily **regular data**

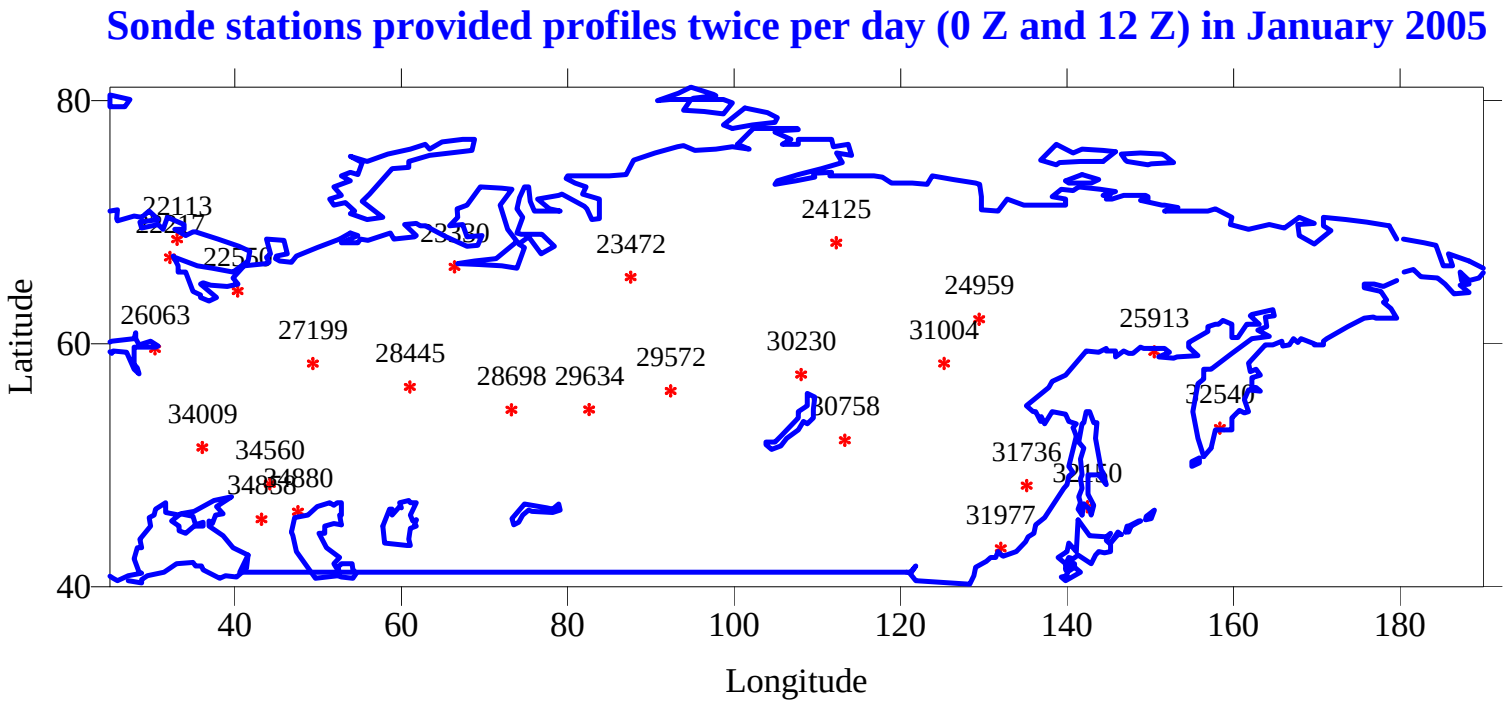
1999, October (Source: Meteo France database)



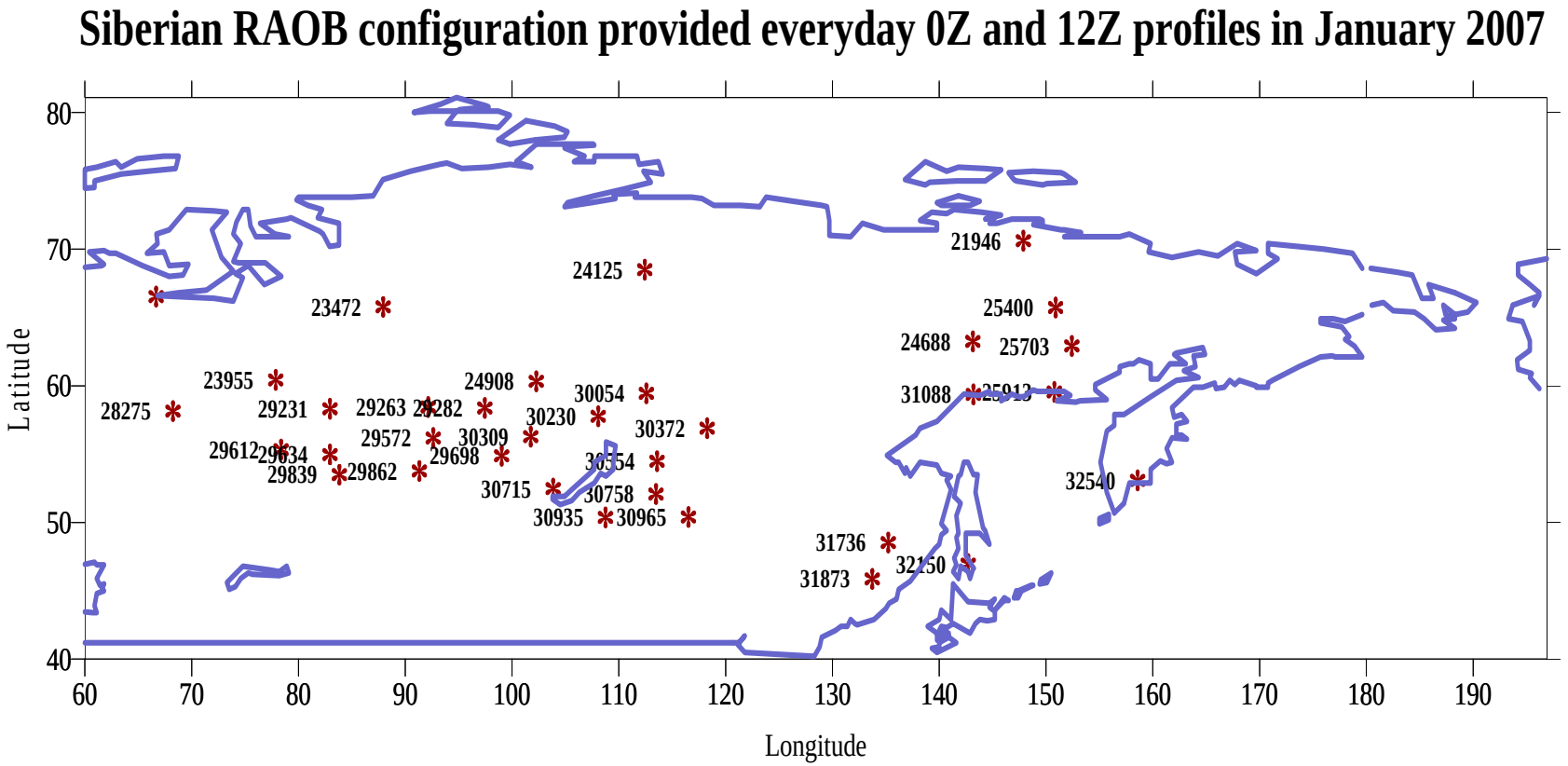
2003, January (Source: Meteo France database)



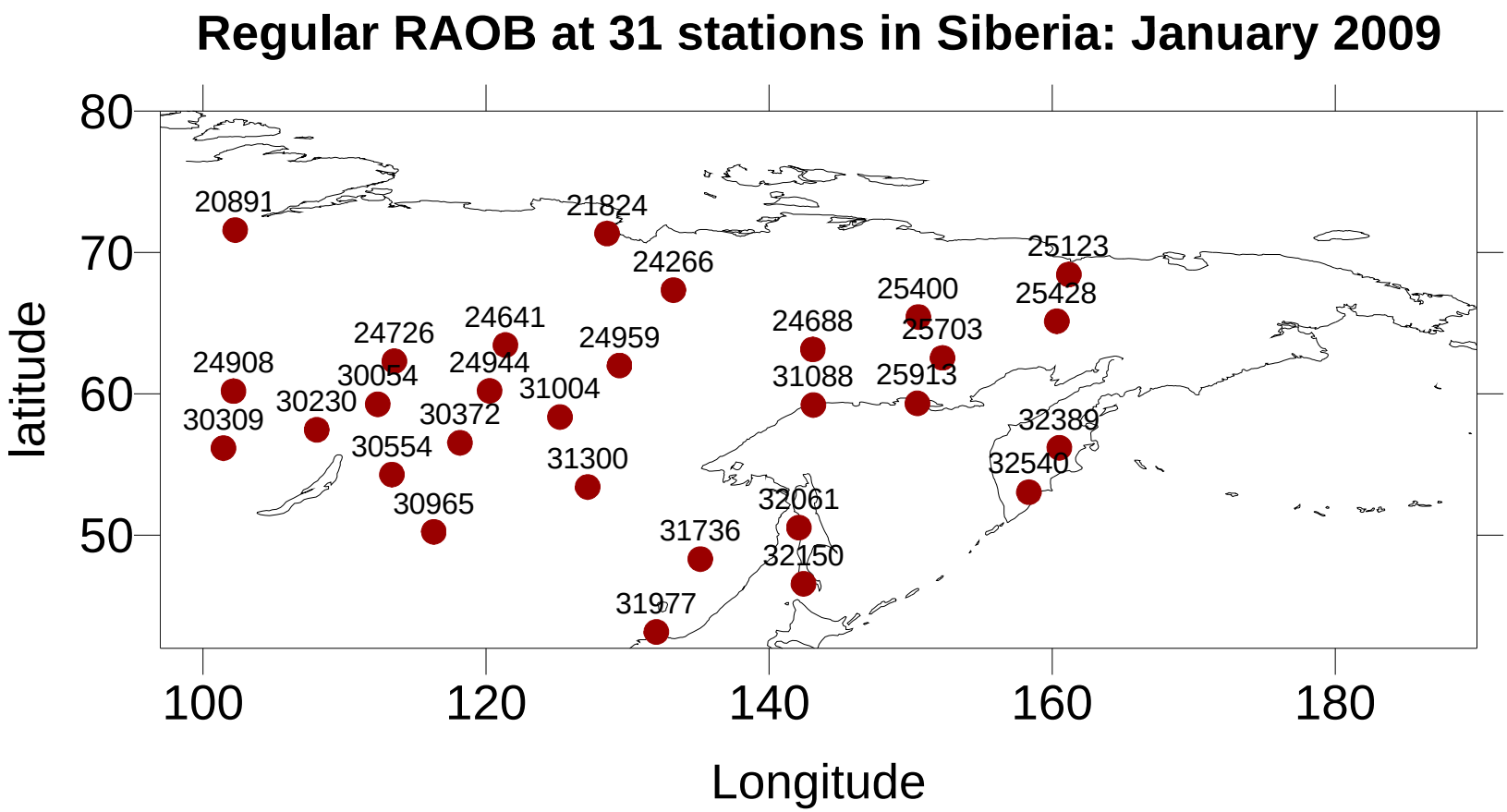
January 2005



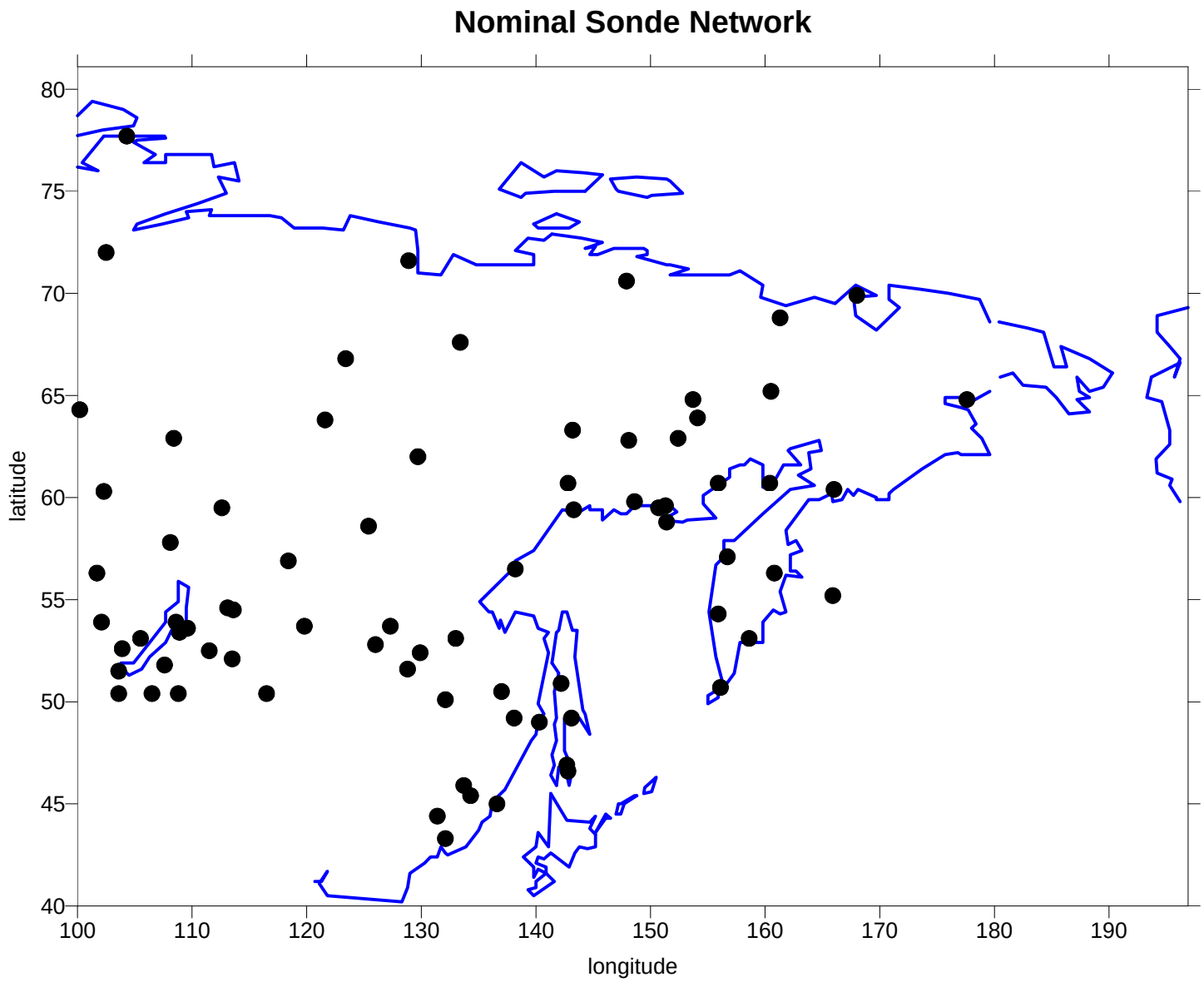
January 2007



January 2009



RAOB network configuration in Jan 2010


Nominal Sonde Network
latitude
longitude
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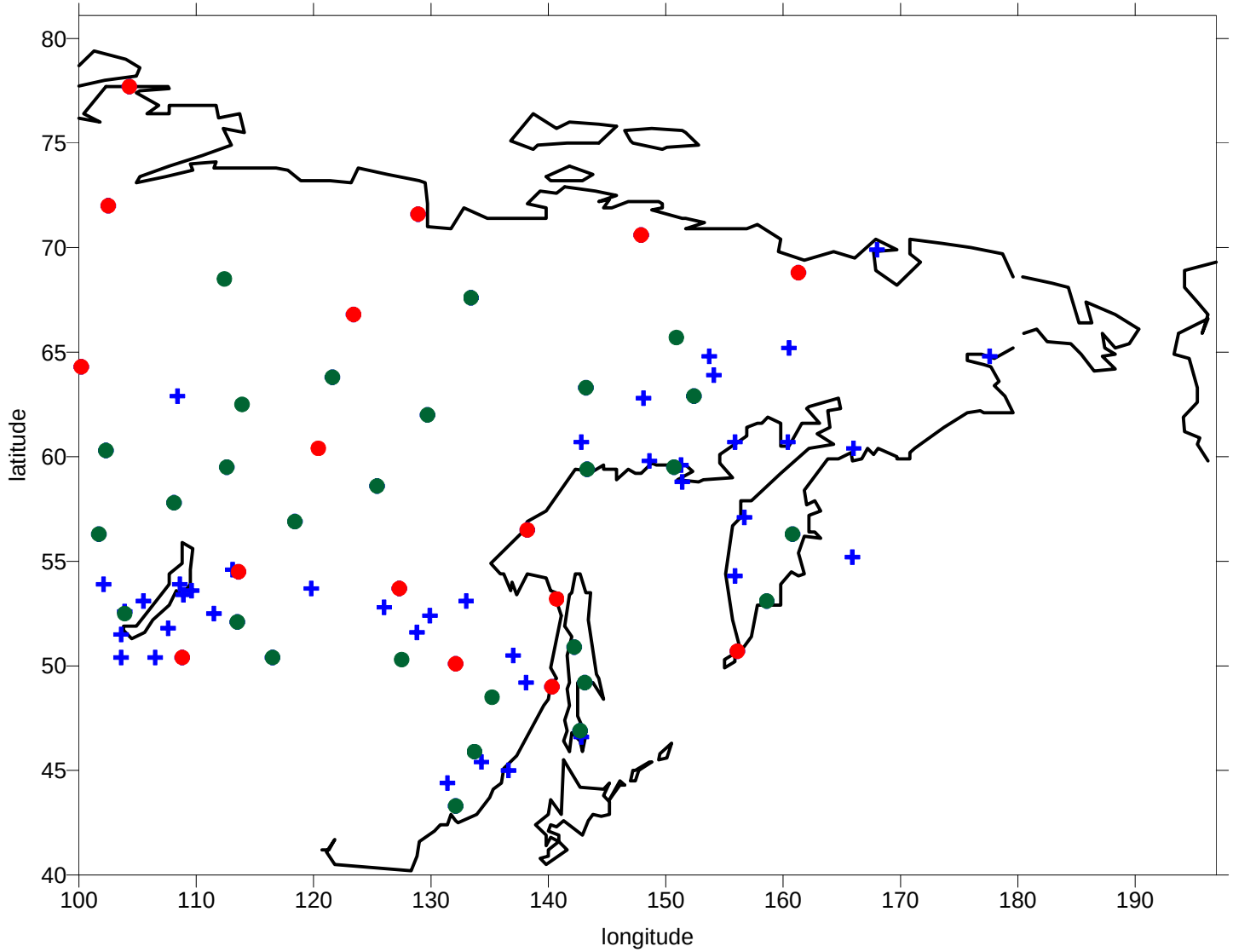
Complete in time (Green), Non-complete (Red) and Dead (Blue Crosses) Sonde reports for January, 2010



Problem of RAOB optimization

Sufficient RAOB network

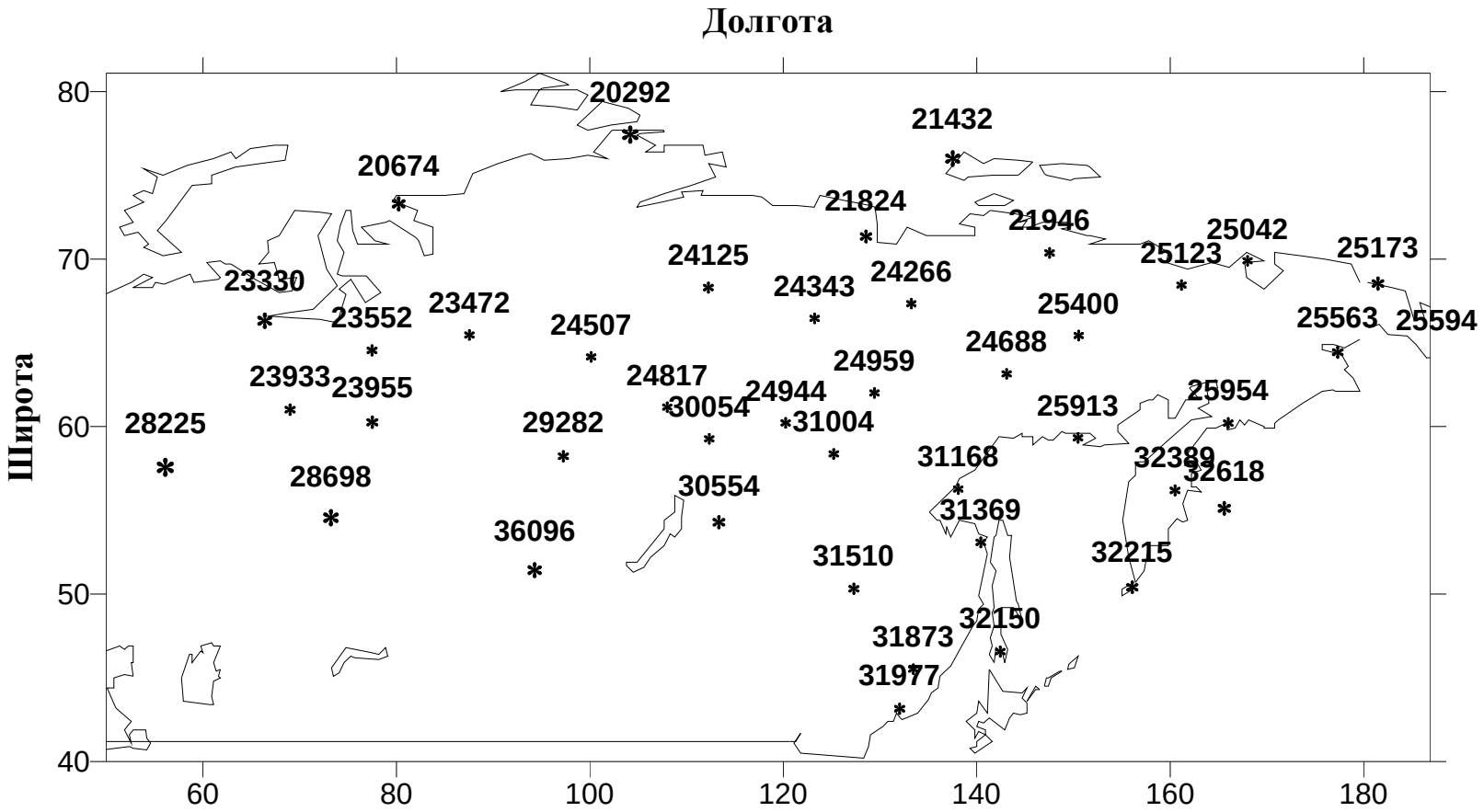


Рис. . Достаточная аэрологическая сеть на АТР: 42 станции (информативность пропорциональна размеру з

Optimal interpolation H500 RMS error field

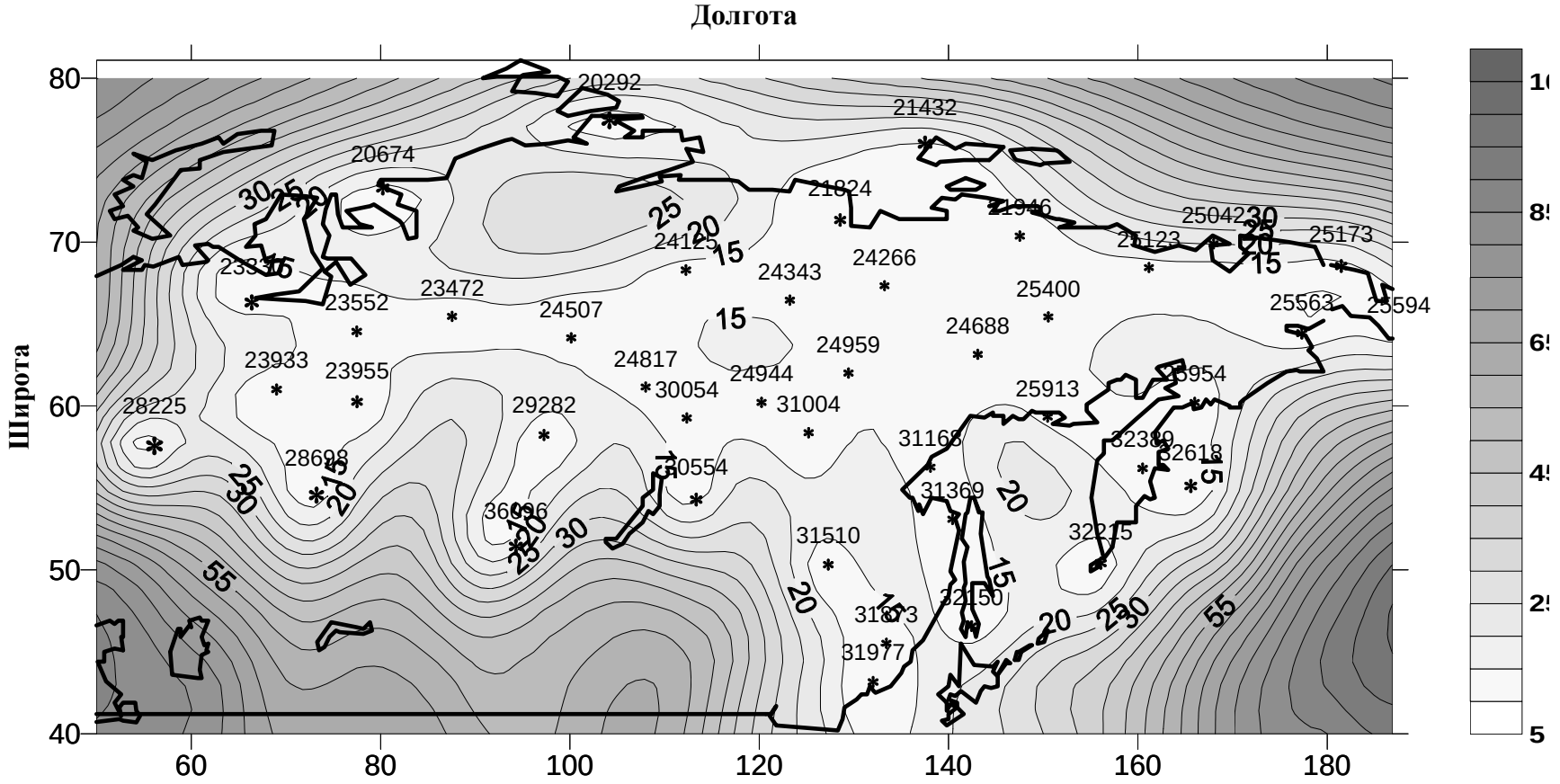


Рис. . Поле ошибок восстановления поля H500 (м) по данным достаточной аэрологической сети АТР из 42 с

Climate GUAN

RUSSIAN GUAN
in 2003

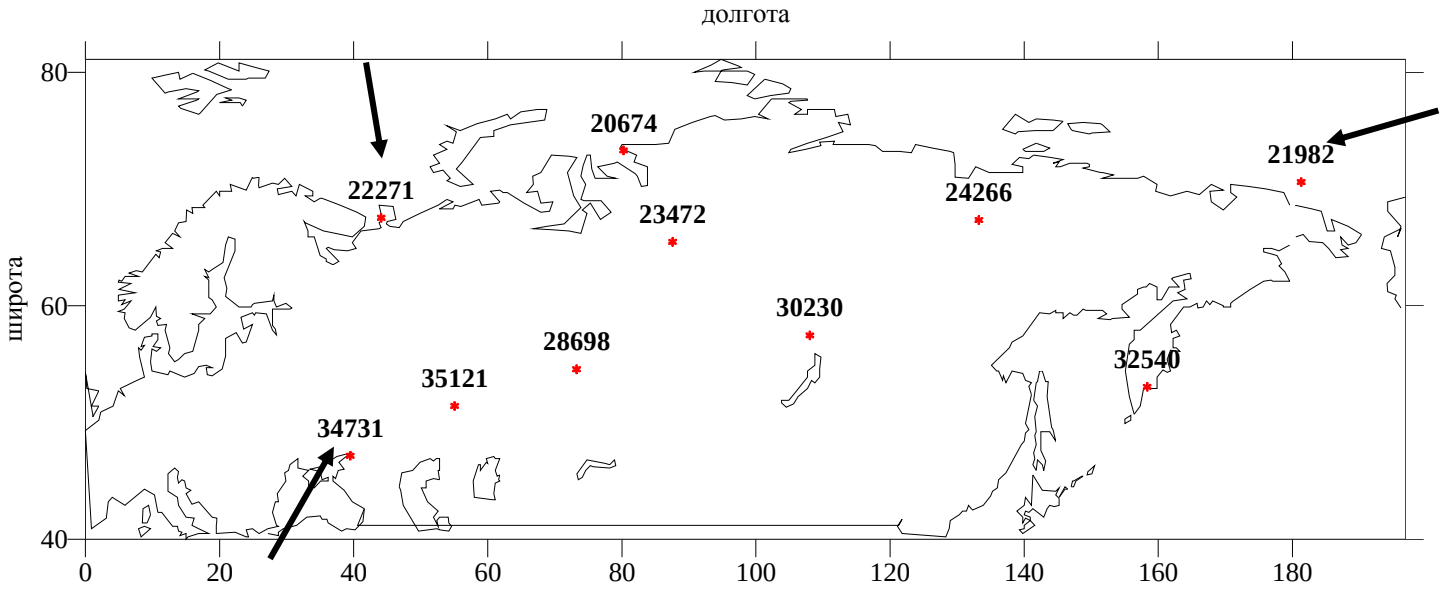
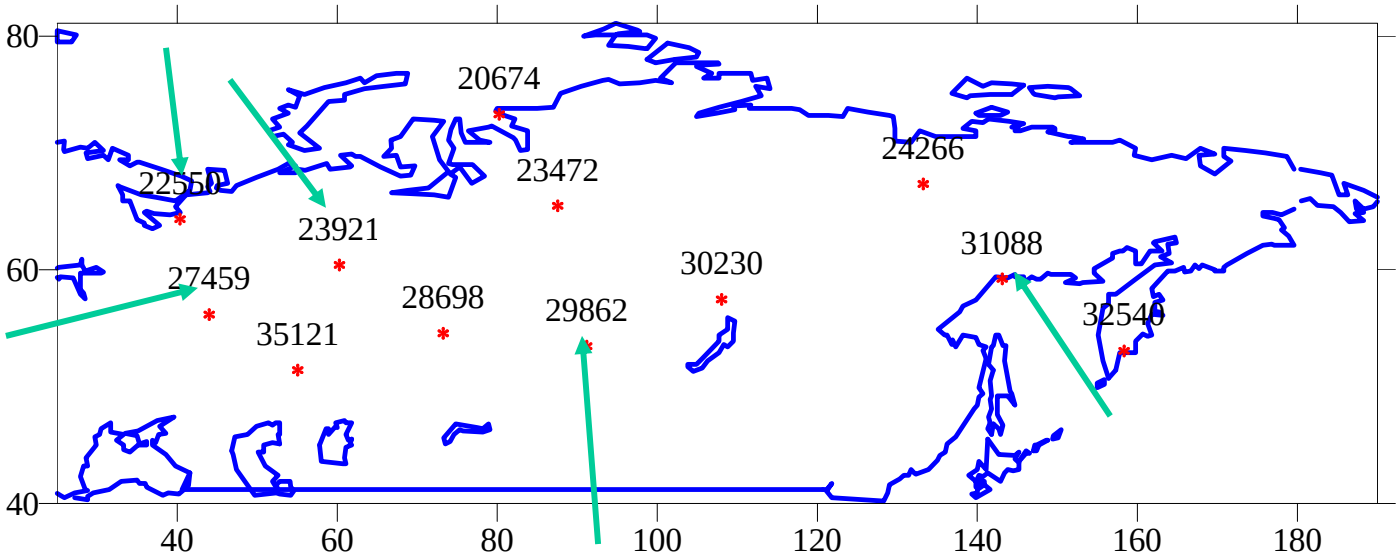


Рис. . Карта-схема сети ГУАН Росгидромета, включающей 10 станций

GUAN network in 2005



Russian GUAN Optimization

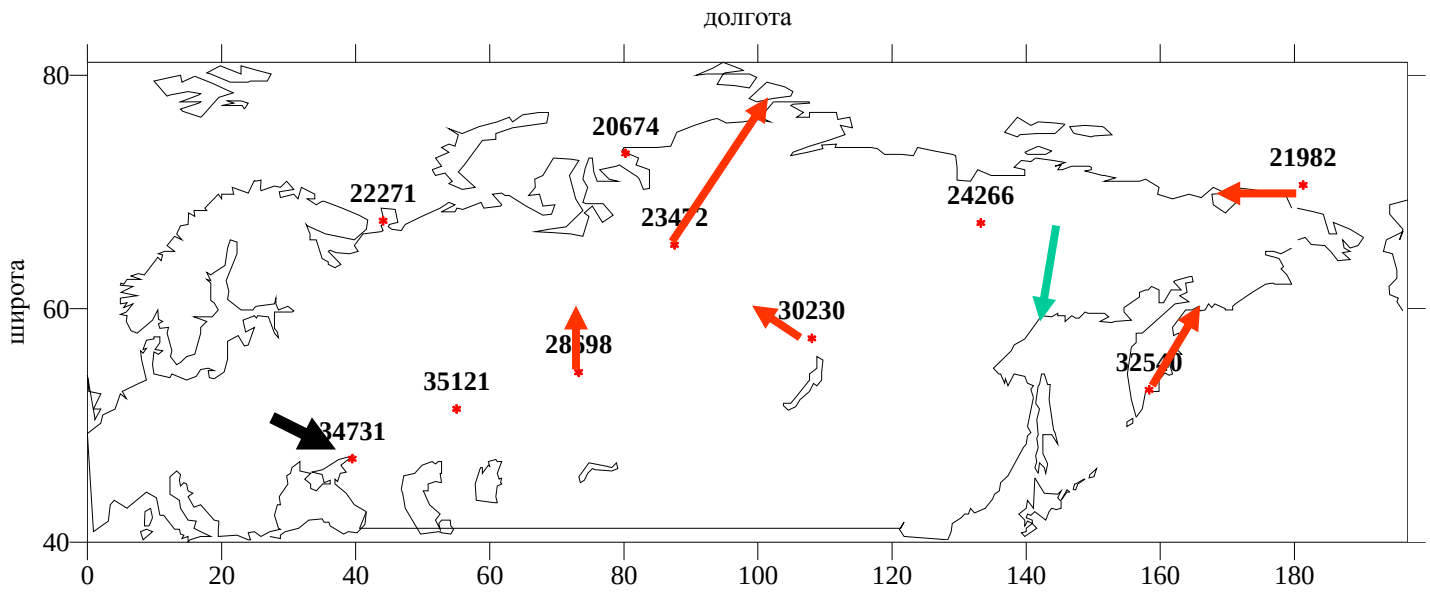


Рис. . Карта-схема сети ГУАН Росгидромета, включающей 10 станций

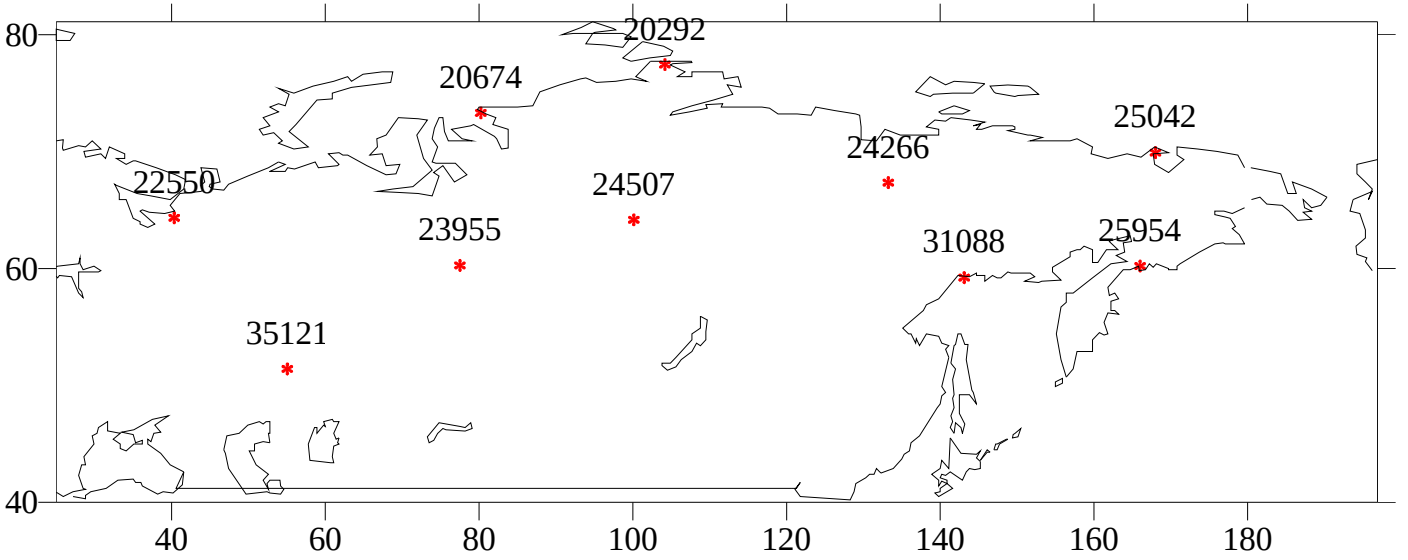
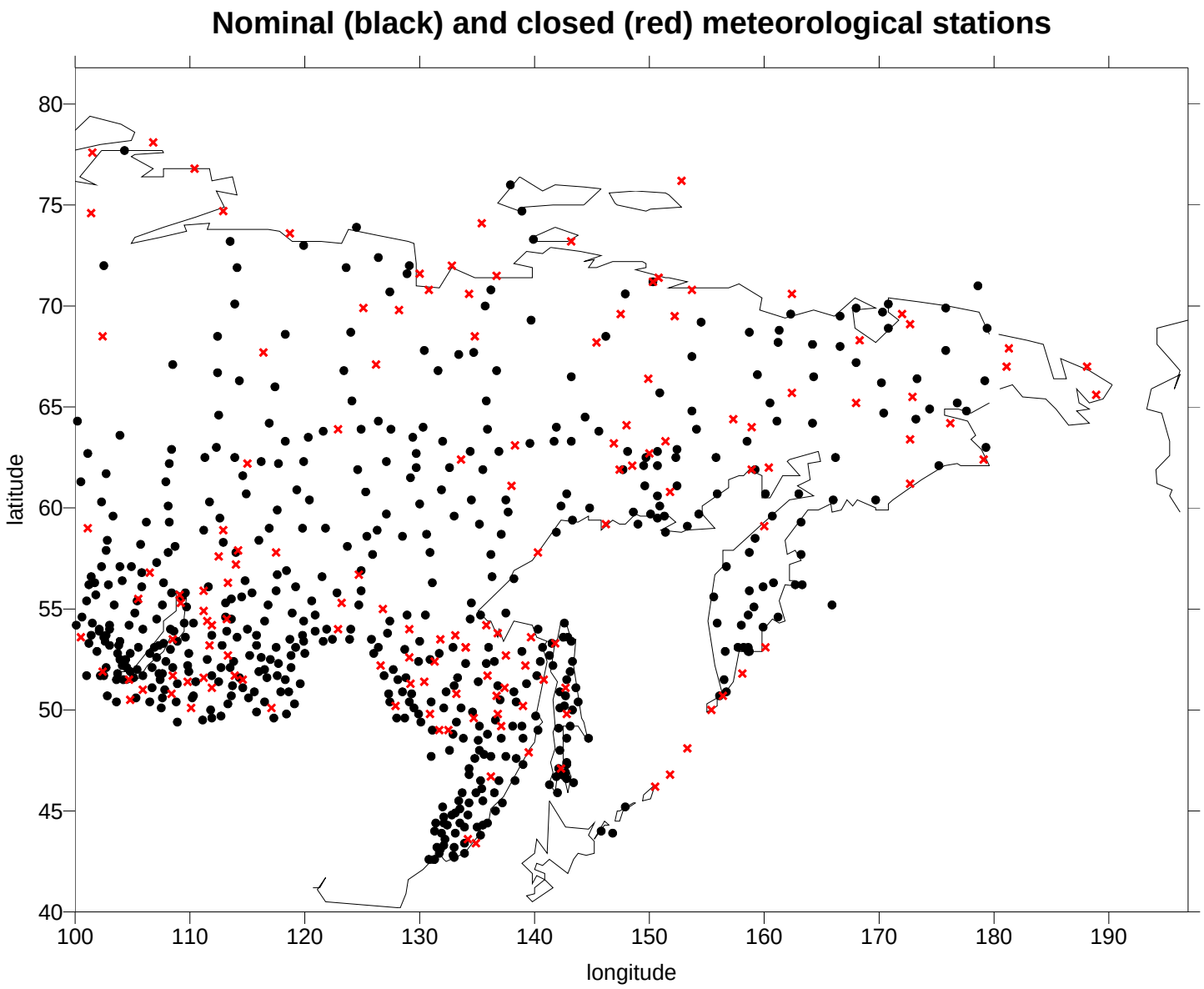


Рис. . Карта опимальной сети ГУАН Росгидромета, включающая 10 станций

Surface meteo network configuration (Jan 2010)


Nominal (black) and closed (red) meteorological stations
latitude
longitude
80
75
70
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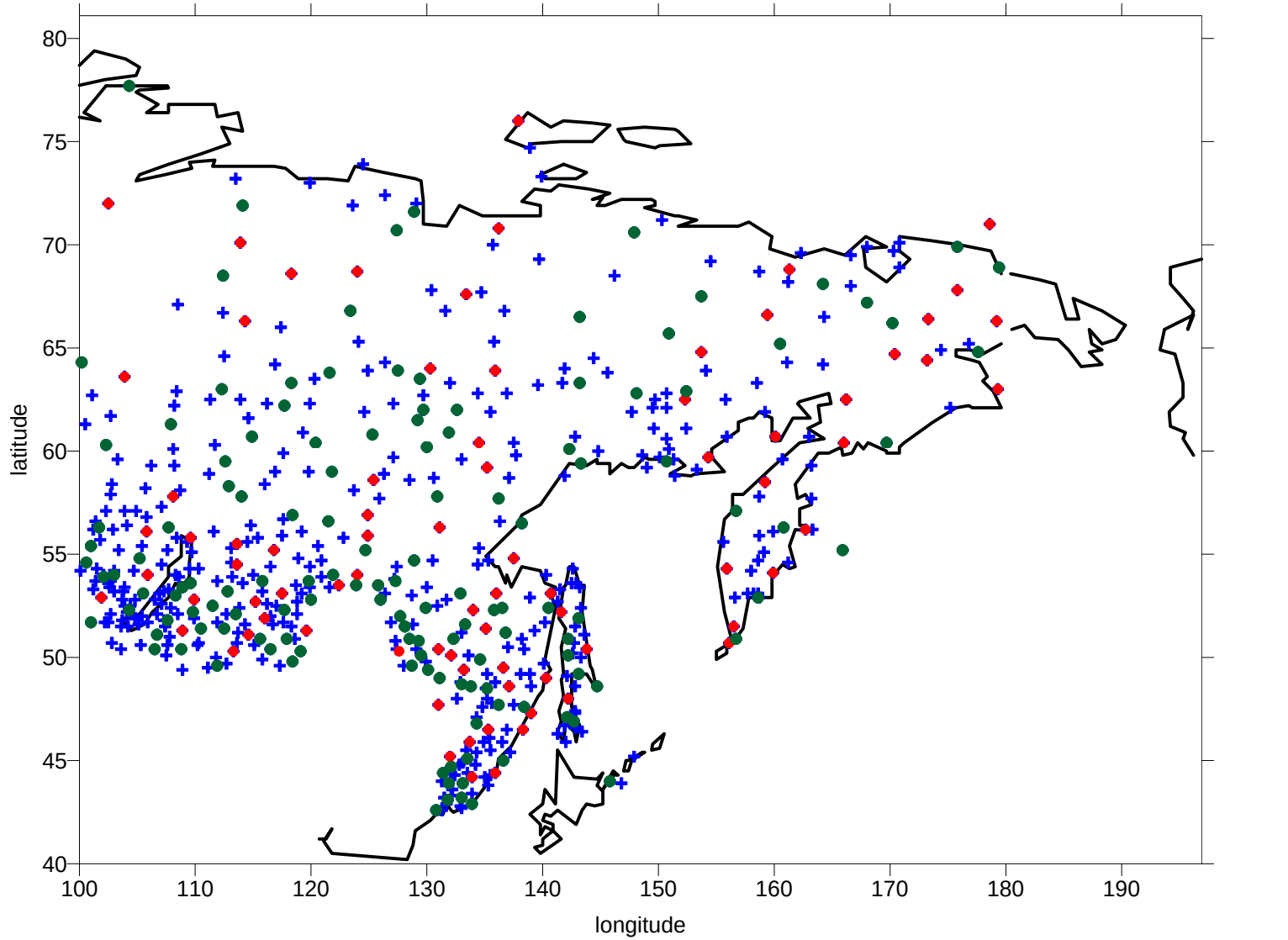
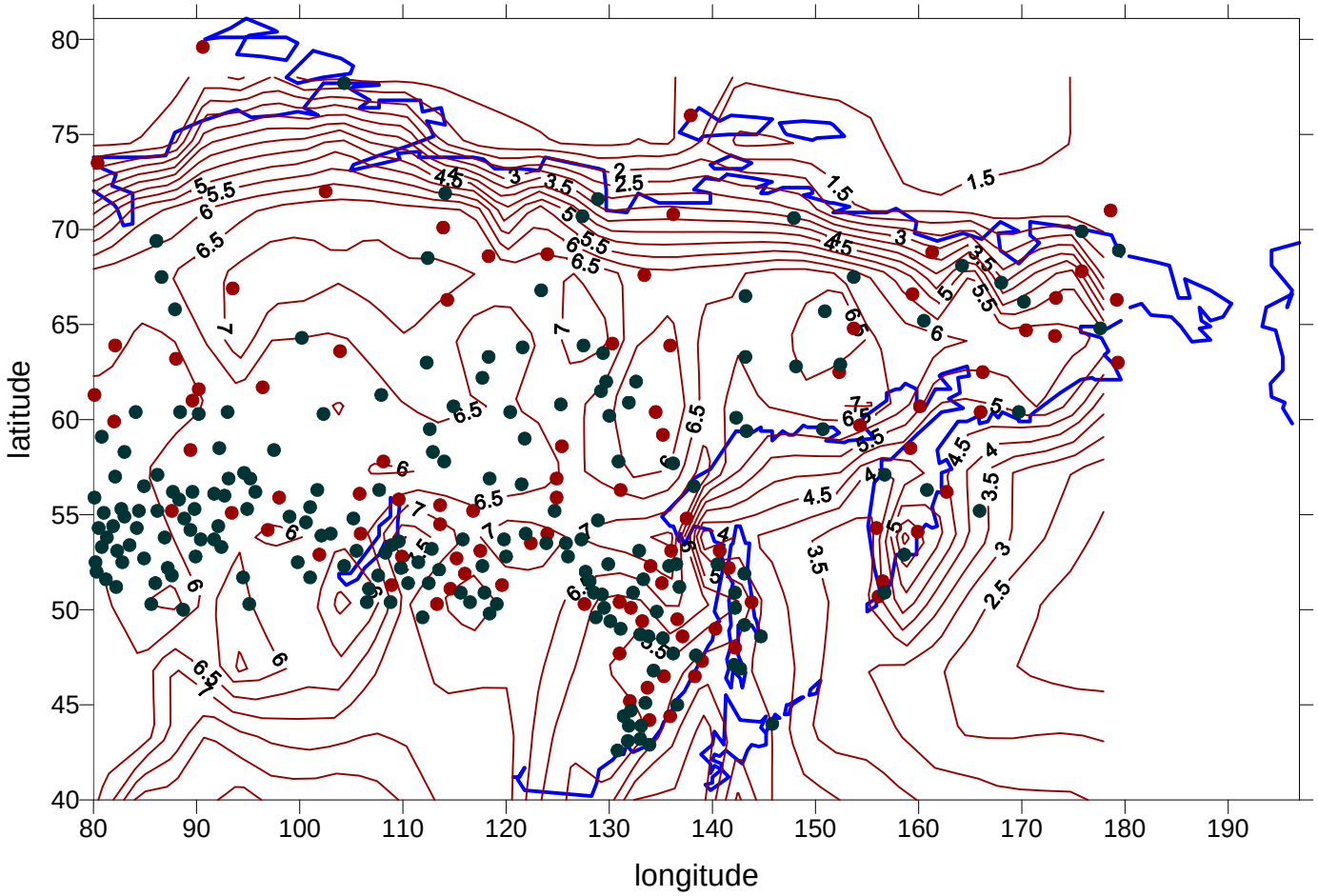
Meteo network: regular (green), irregular (red) reports and dead (blue crosses) stations for Jan, 2010

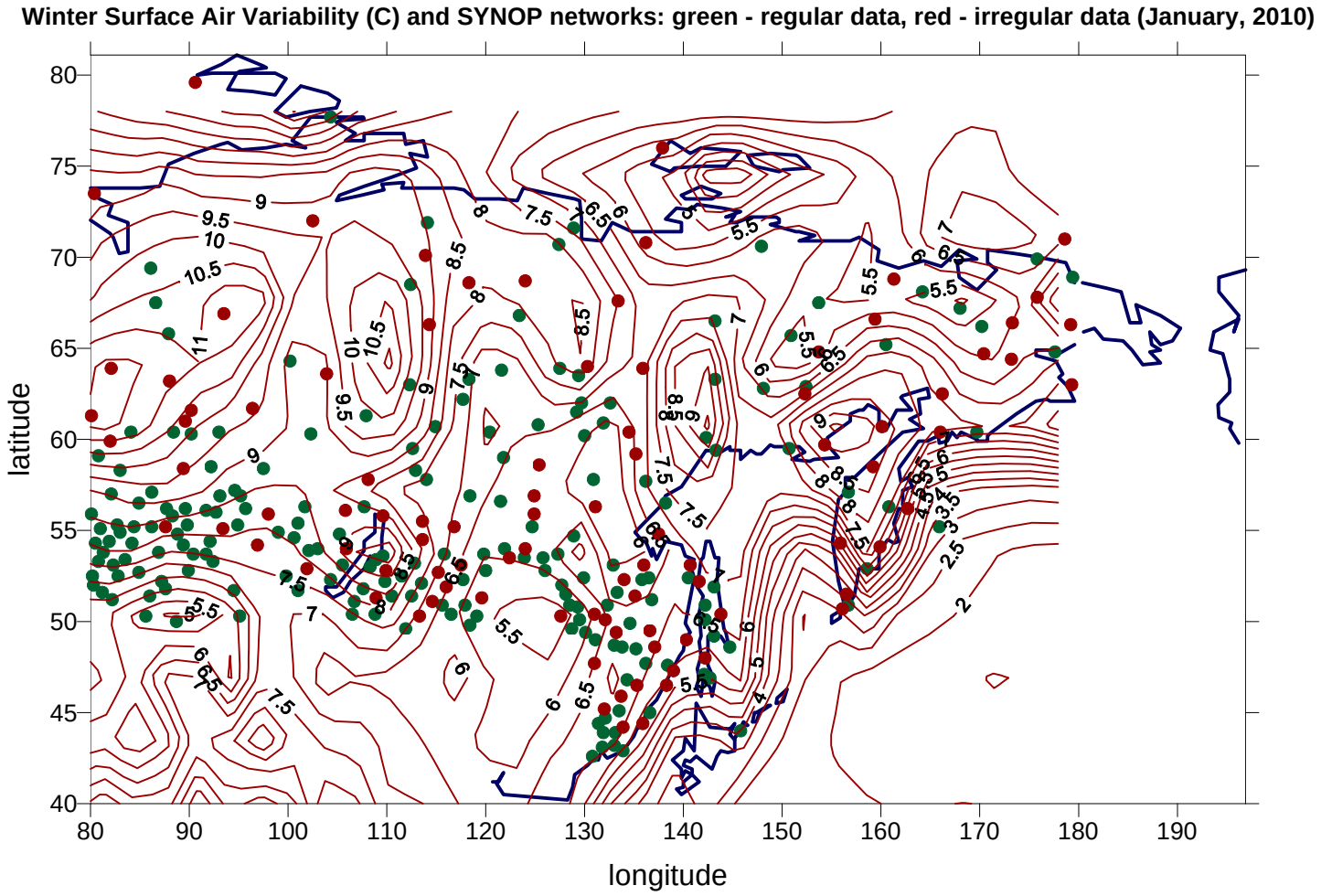


Analysis of information content of networks based on meteorological field variability

Surface SYNOP stations:
complete in time and non-complete observations

Summer Surface Air Variability (C) and SYNOP networks: green - regular data, red - irregular data (January, 2010)




Winter Surface Air Variability (C) and SYNOP networks: green - regular data, red - irregular data (January, 2010)
latitude
longitude
80
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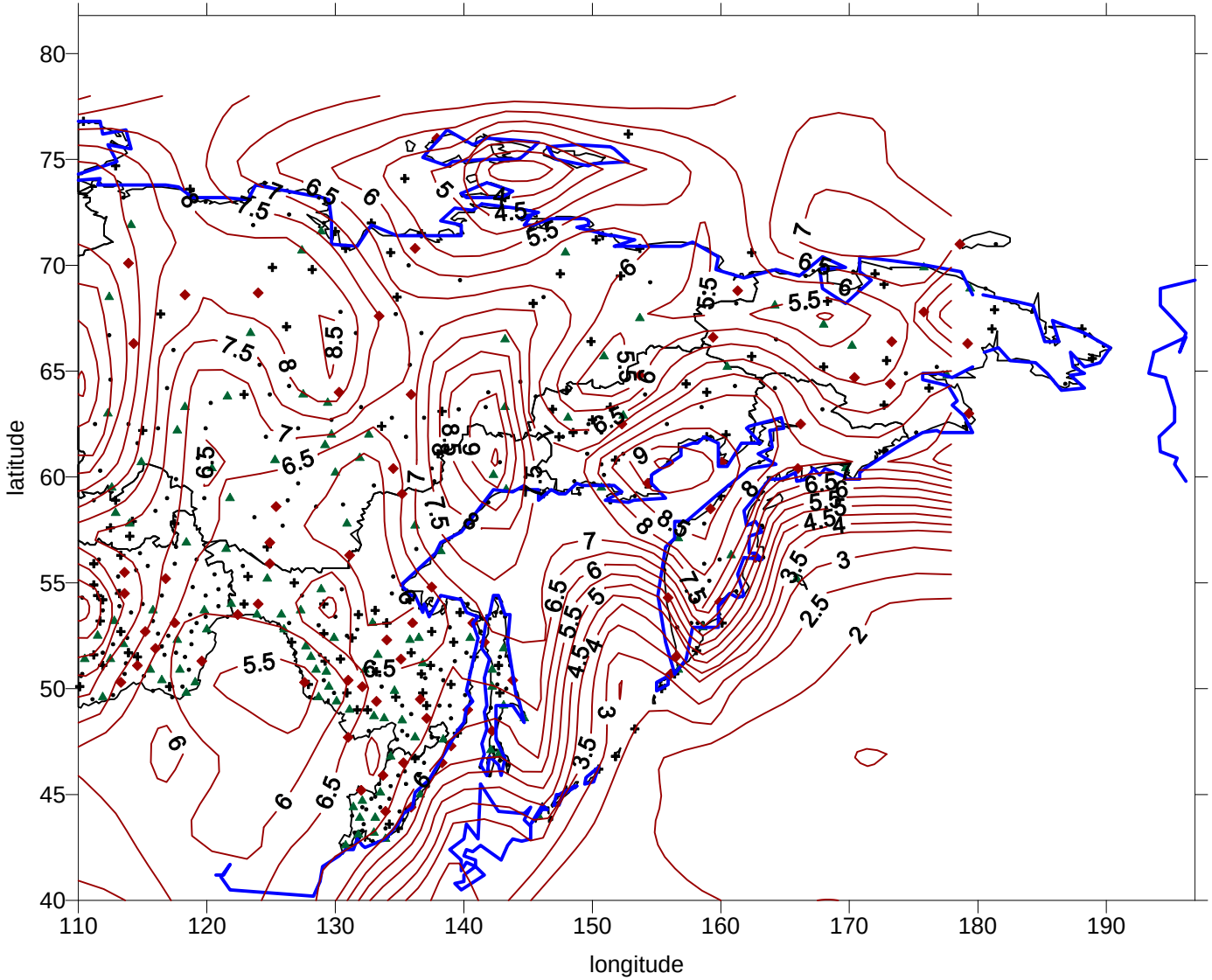
All available surface stations

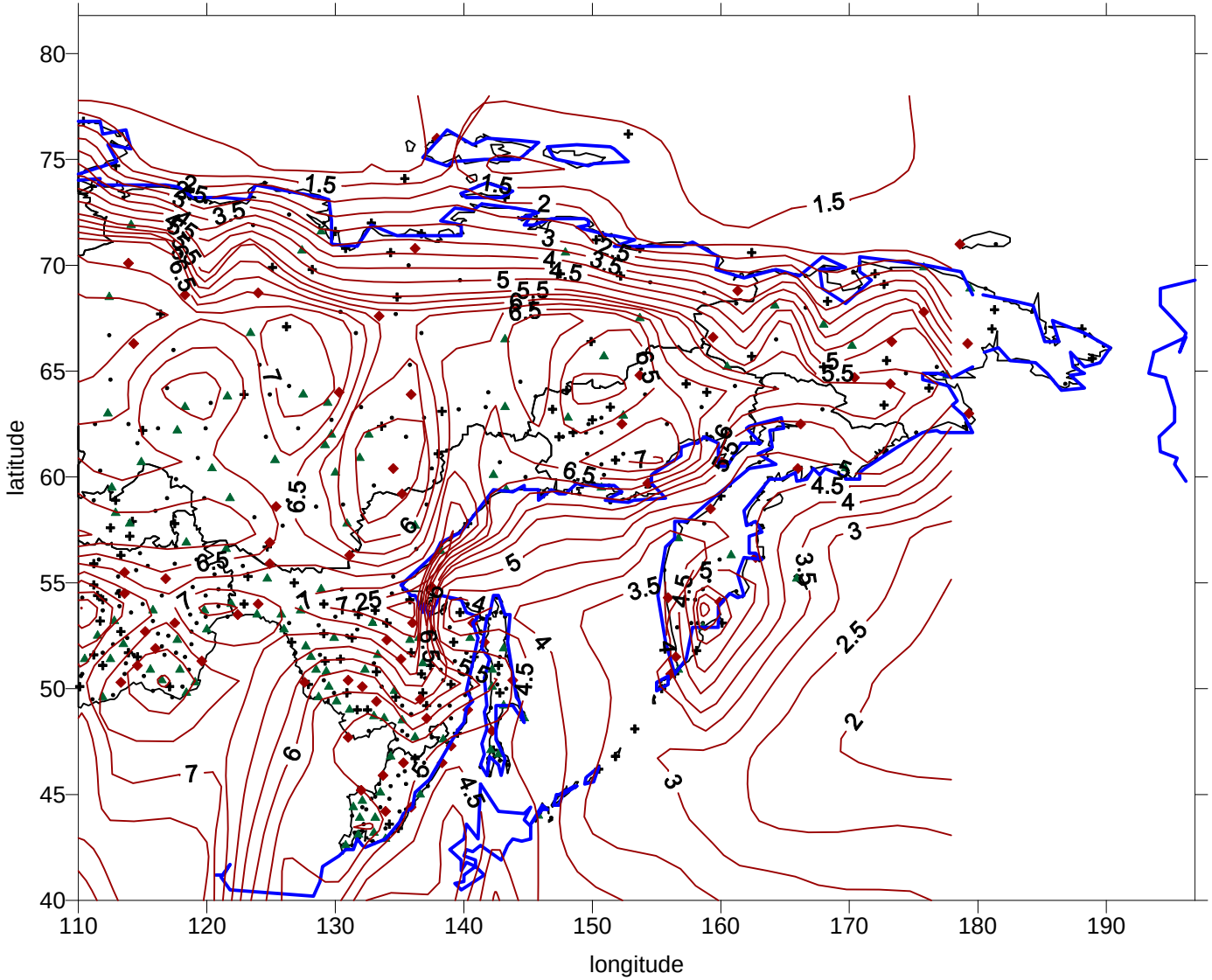
SAT Variability and surface network configuration (winter)

Surface meteo networks: green triangles-regular synop, red rombes - irregular synop, black crosses-closed, black circles-nominal existed



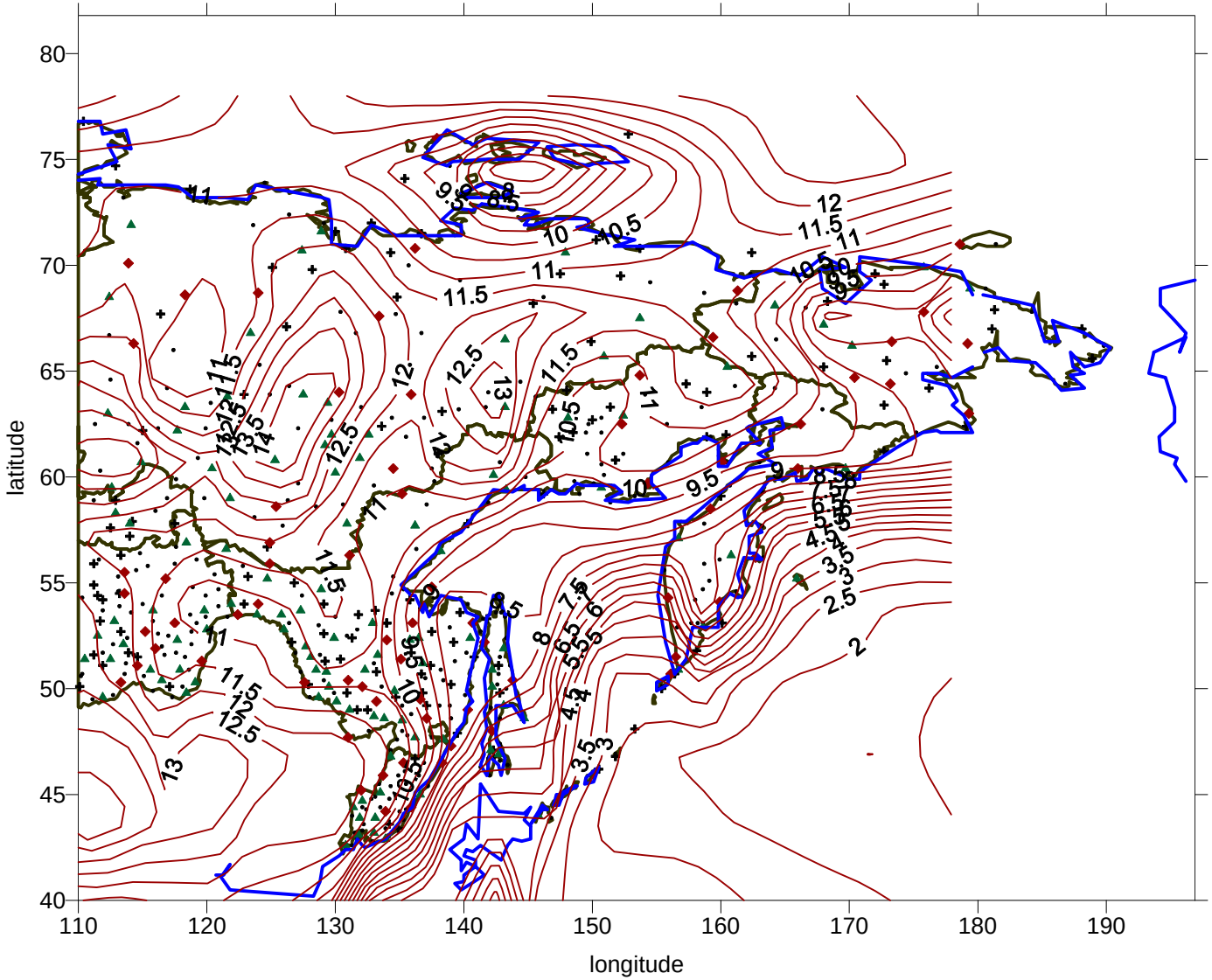
SAT Variability and surface network configuration (summer)

Surface meteo networks: green triangles-regular synop, red rombes - irregular synop, black crosses-closed, black circles-nominal existed



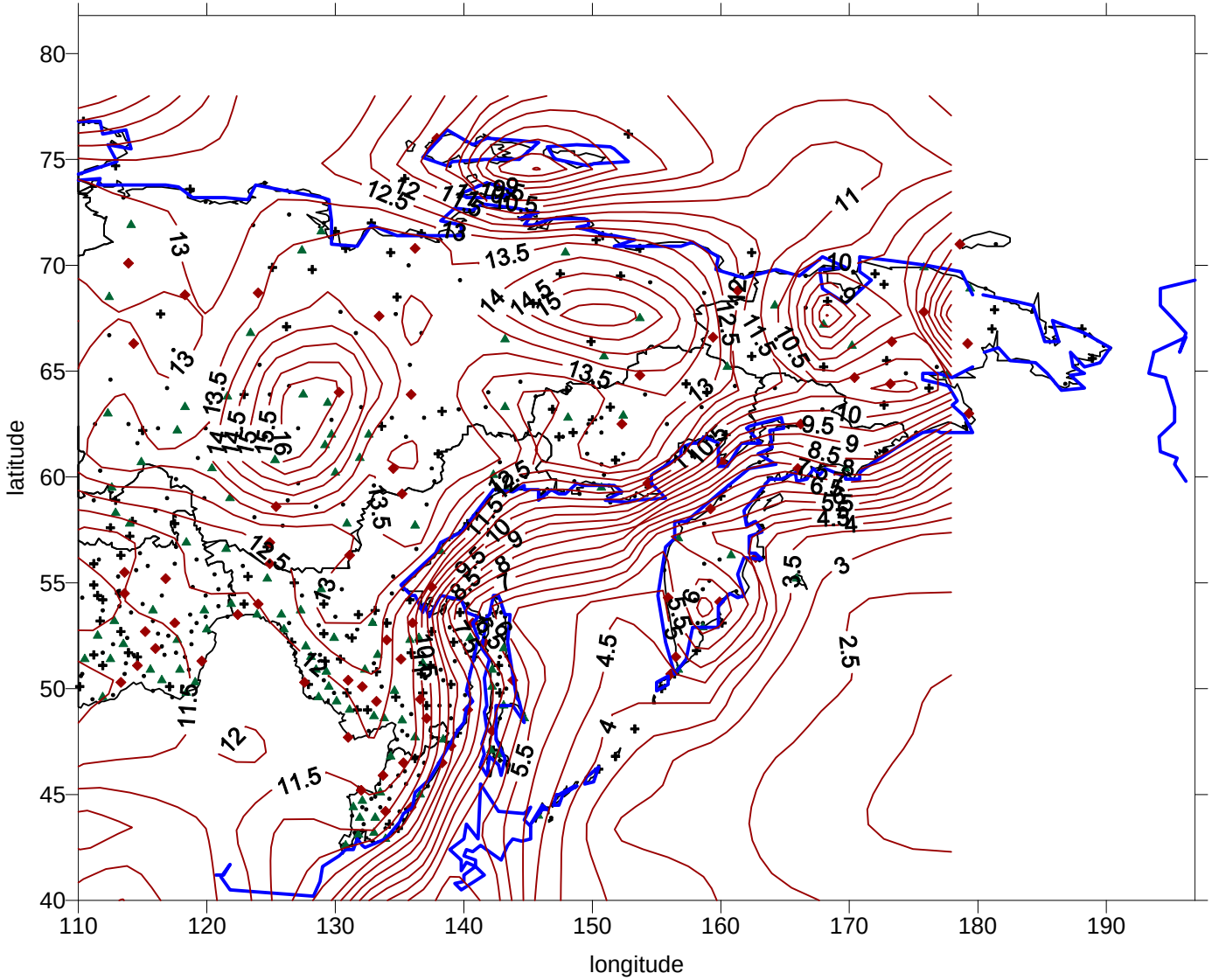
SAT Variability and surface network configuration (spring)

Surface meteo networks: green triangles-regular synop, red rombes - irregular synop, black crosses-closed, black circles-nominal existed

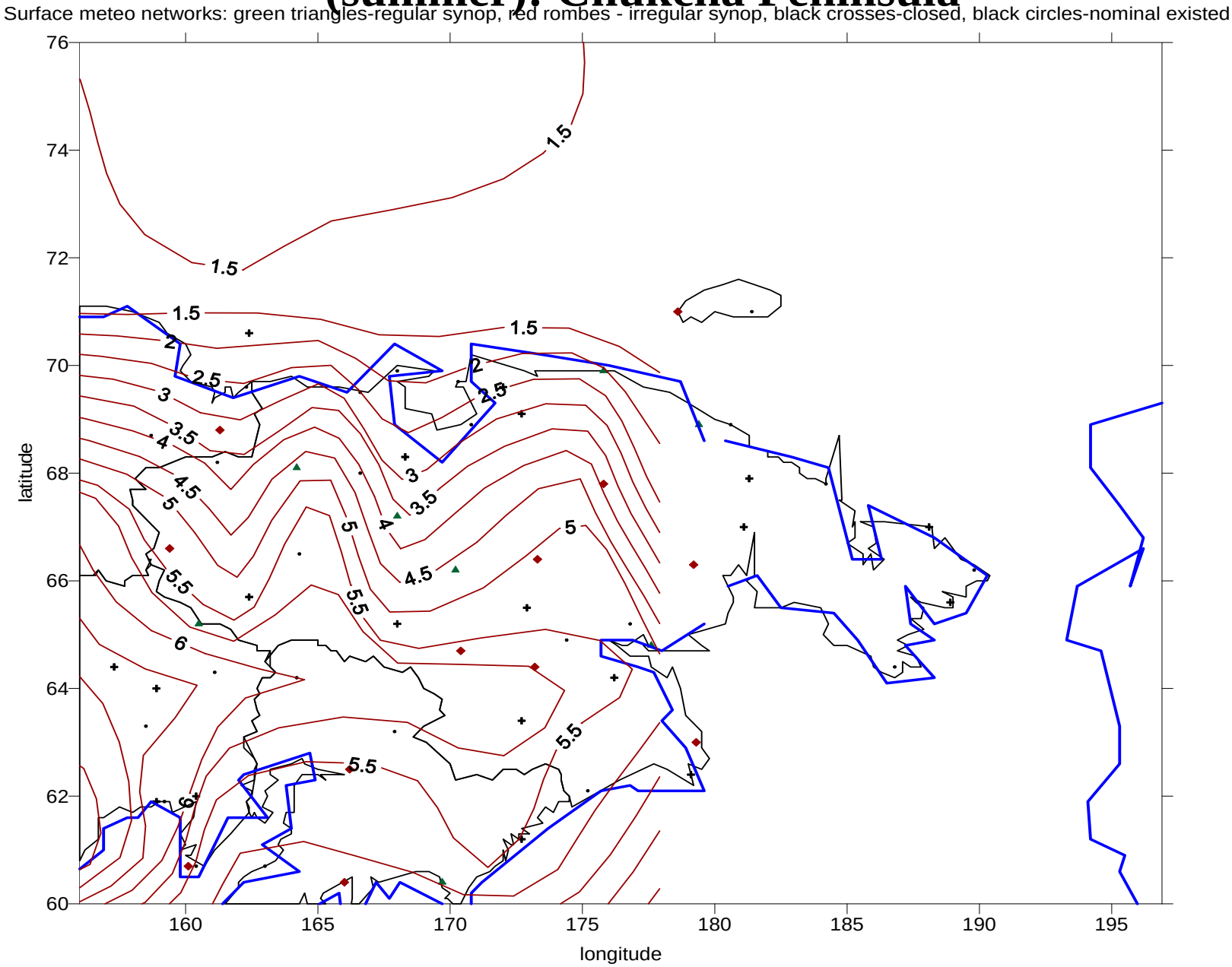


SAT Variability and surface network configuration (autumn)

Surface meteo networks: green triangles-regular synop, red rombes - irregular synop, black crosses-closed, black circles-nominal existed

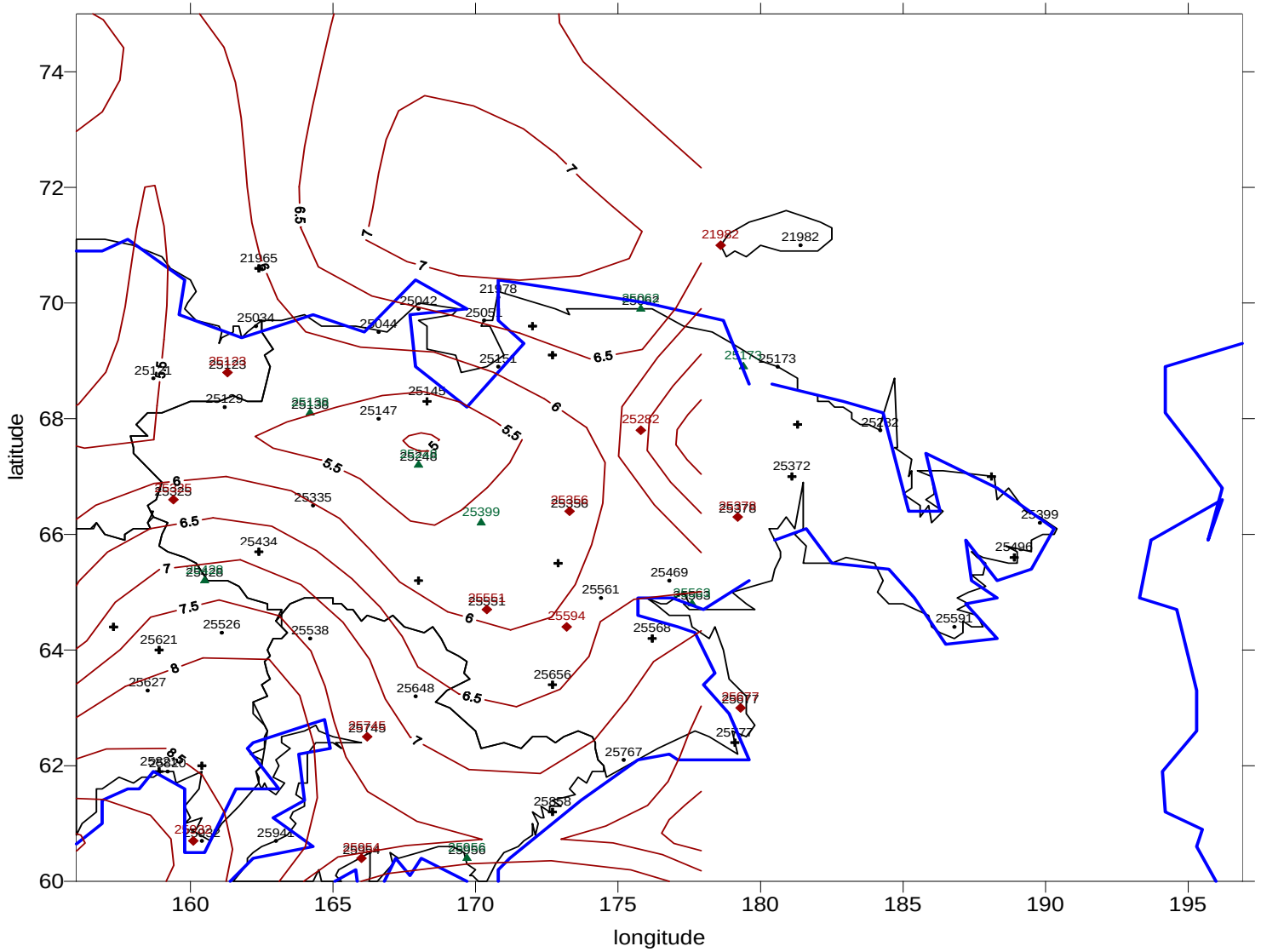


SAT Variability and surface network configuration (summer): Chukcha Peninsula

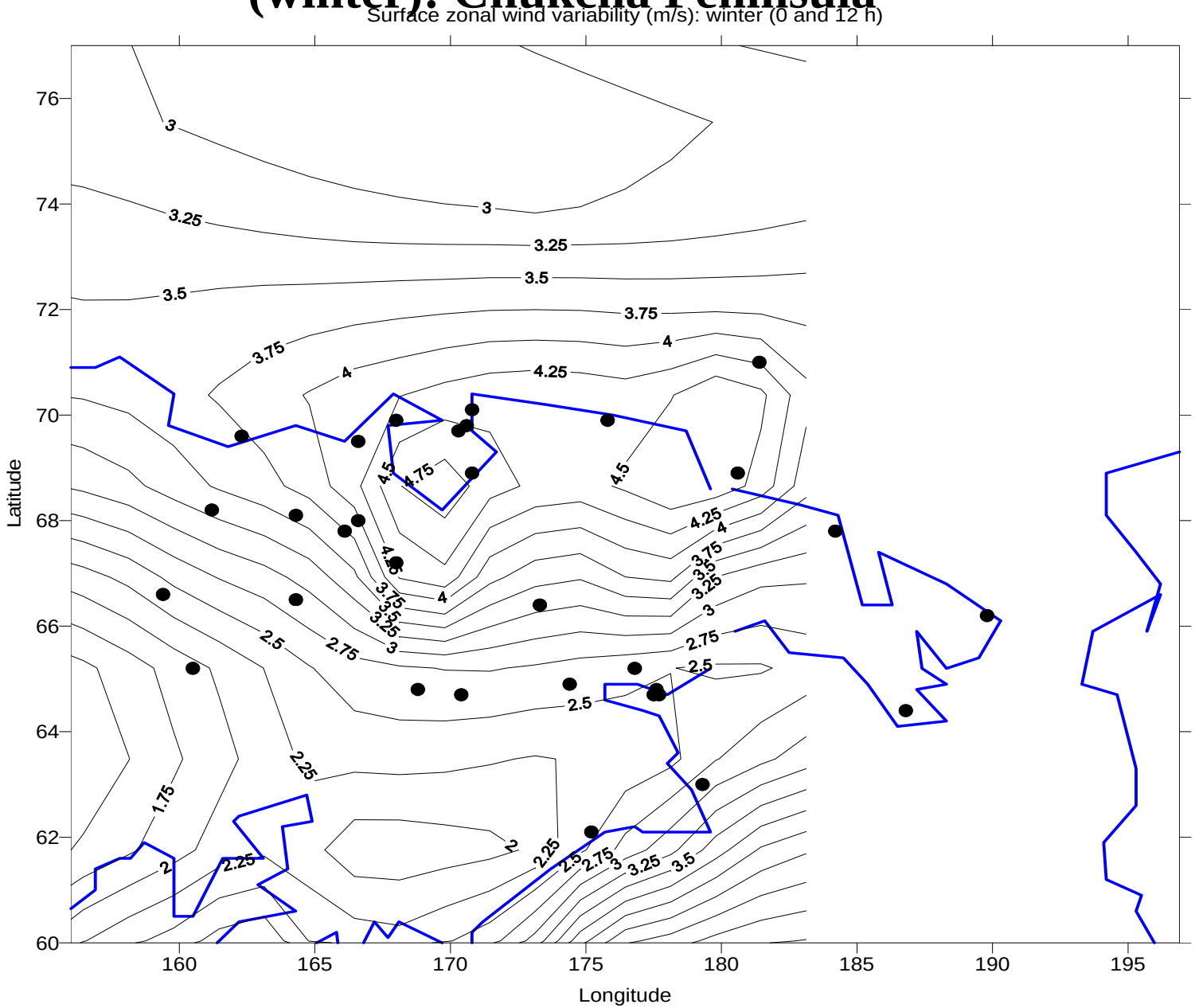


SAT Variability and surface network configuration (winter): Chukcha Peninsula

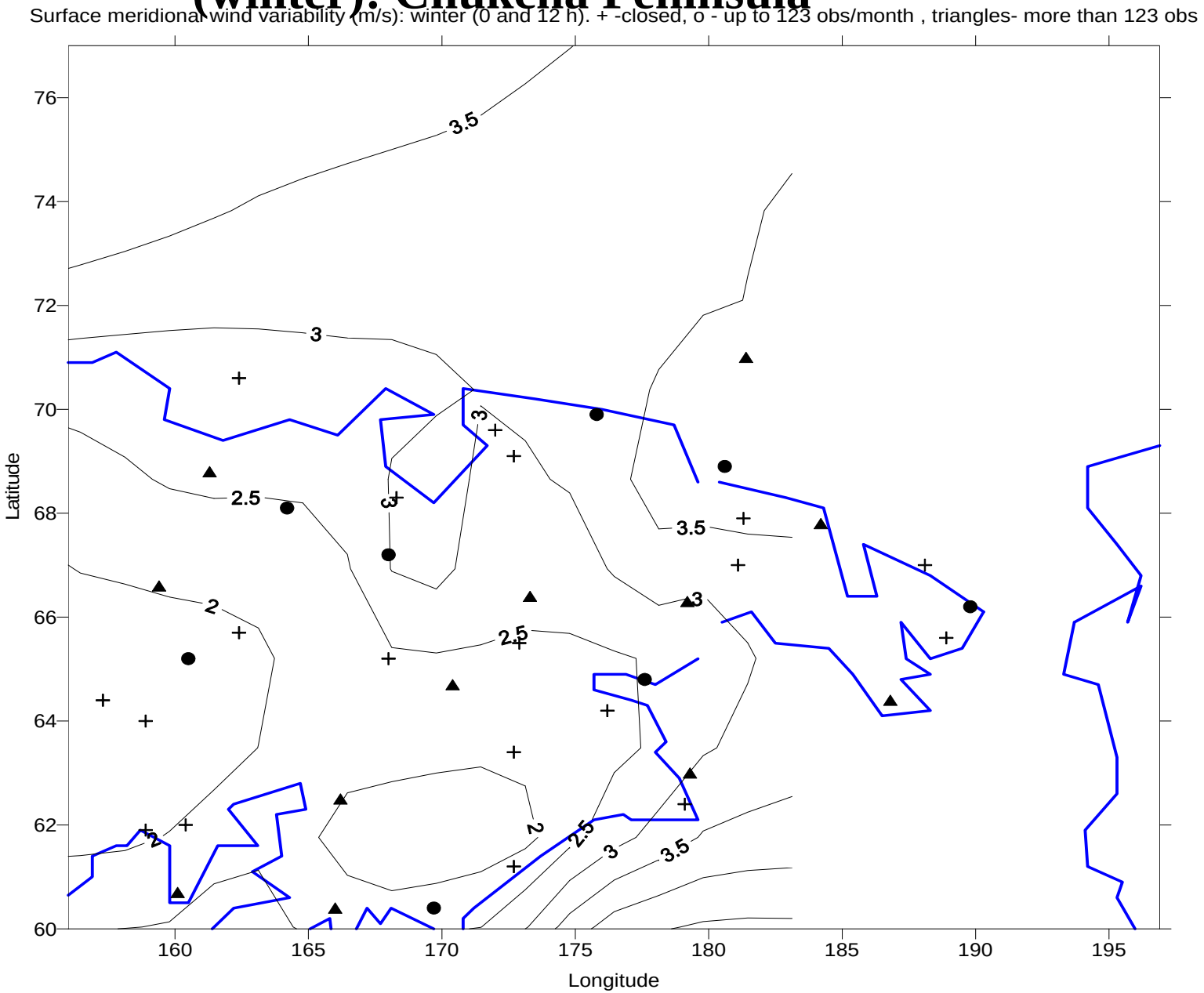
Surface meteo networks: green triangles-regular synop, red rombes - irregular synop, black crosses-closed, black circles-nominal existed



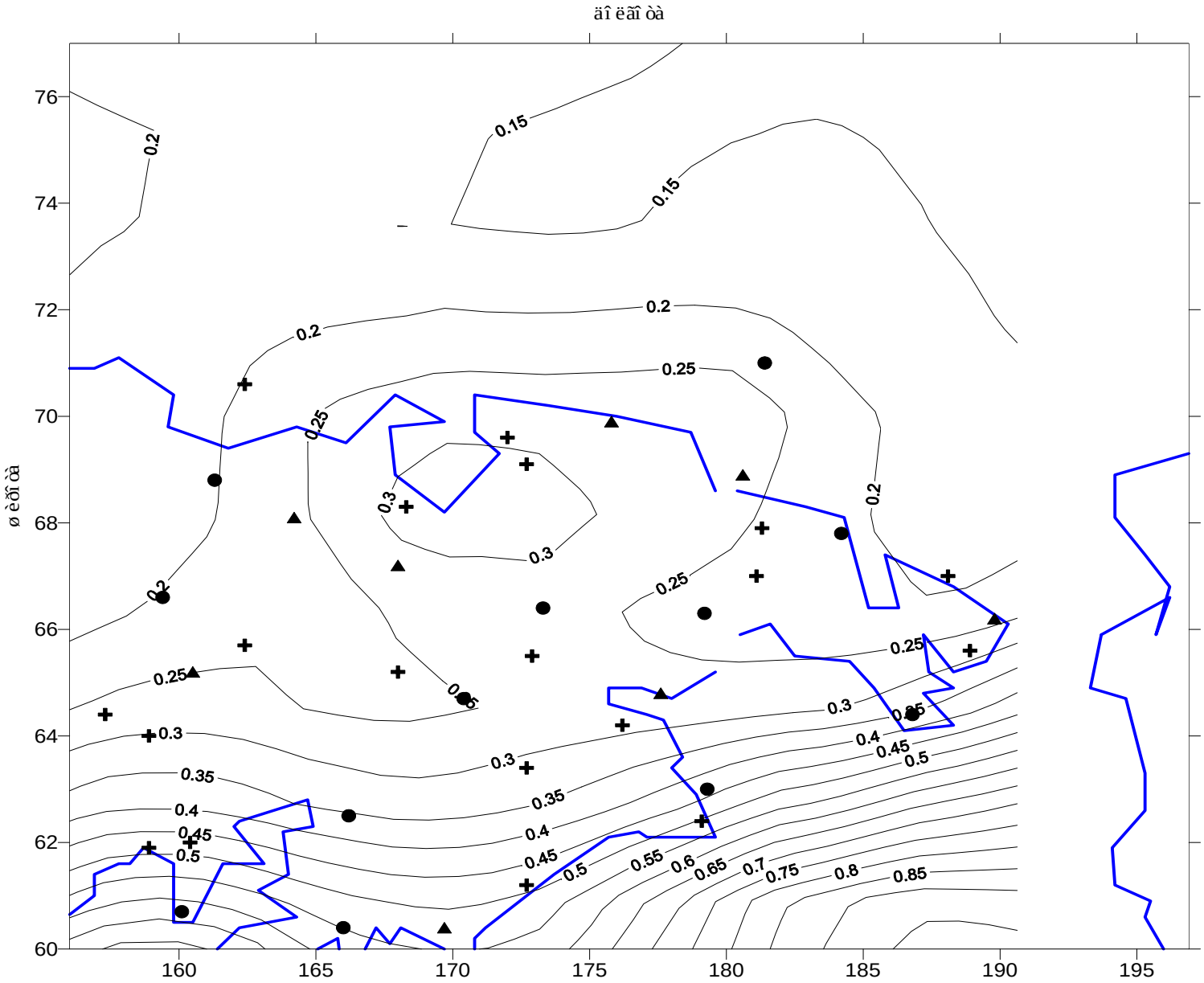
Zonal Wind Variability and surface network configuration (winter): Chukcha Peninsula



Meridional Wind Variability and surface network configuration (winter): Chukcha Peninsula



Air Humidity Variability and surface network configuration (summer): Chukcha Peninsula



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Conclusions

- Existed RAOB and SYNOP networks in Siberia is not uniformly distributed – there are several gaps in informatively important domains:

  Chukotka, Arctic coast, East Siberia (high latitudes)

- There is urgent necessity in additional observations, especially in North-Eastern part of Siberia.

THANK YOU
FOR YOUR ATTENTION

St. Petersburg