

# **Some Challenges for GNSS Users at High Latitudes / in the Nordic Countries**

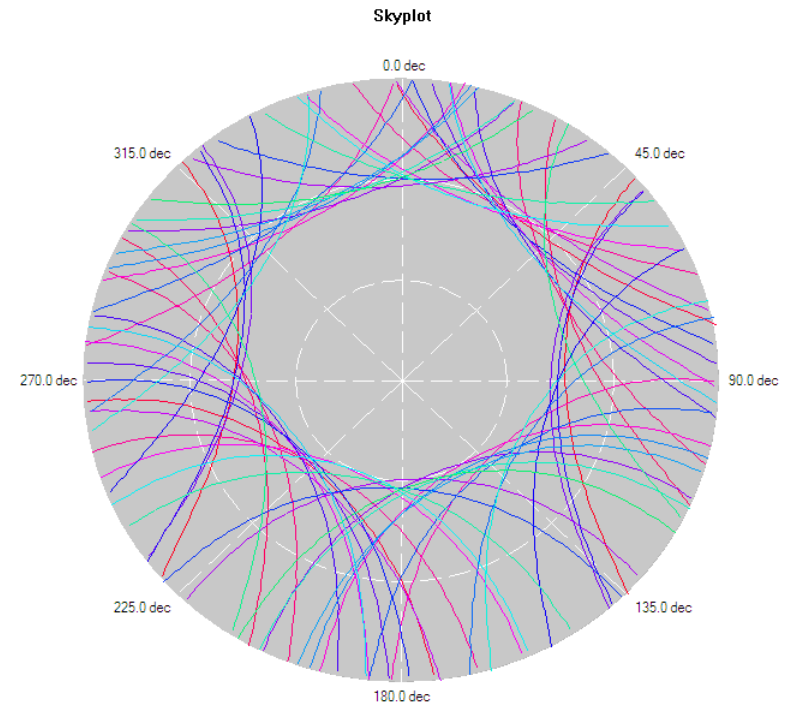
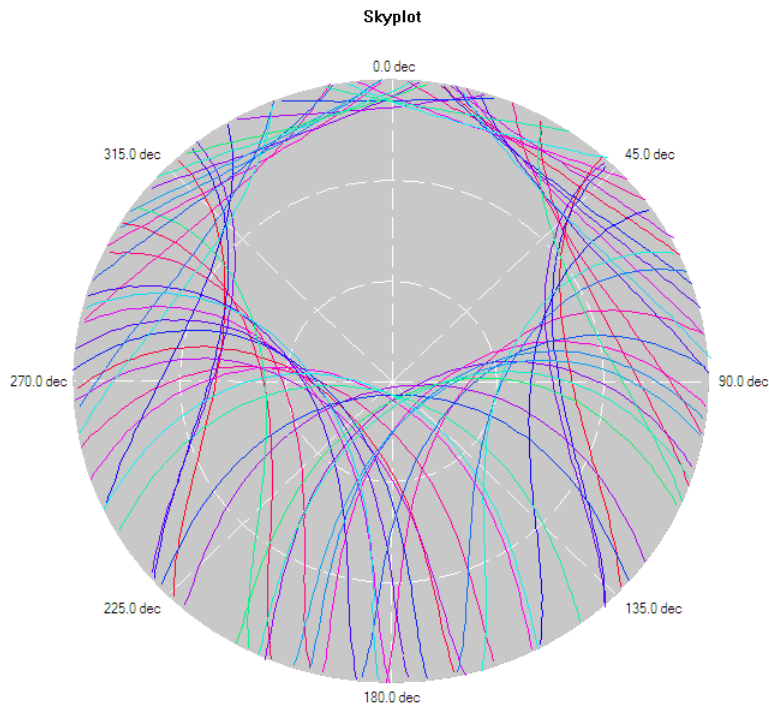
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# Challenges at high latitudes

- Example: Land surveying with GNSS in Greenland
  - No PPP services available (within reasonable price)
  - No network based real time kinematic (RTK) service available, users must establish own reference stations
  - Satellite geometry - some GNSS receivers (GPS only) fail when too many satellites are in view
  - Ionospheric variability sometimes affect signal tracking, not only in the auroral zone



GPS only

Copenhagen (56° N)

Longyearbyen (78° N)

From: "Challenges for positioning and navigation in the Arctic", A.B.O. Jensen and J.-P. Sicard, Coordinates, Vol. 6, 2010