Bt=13.5 nT, Clock Angle=270, Tilt Angle=15
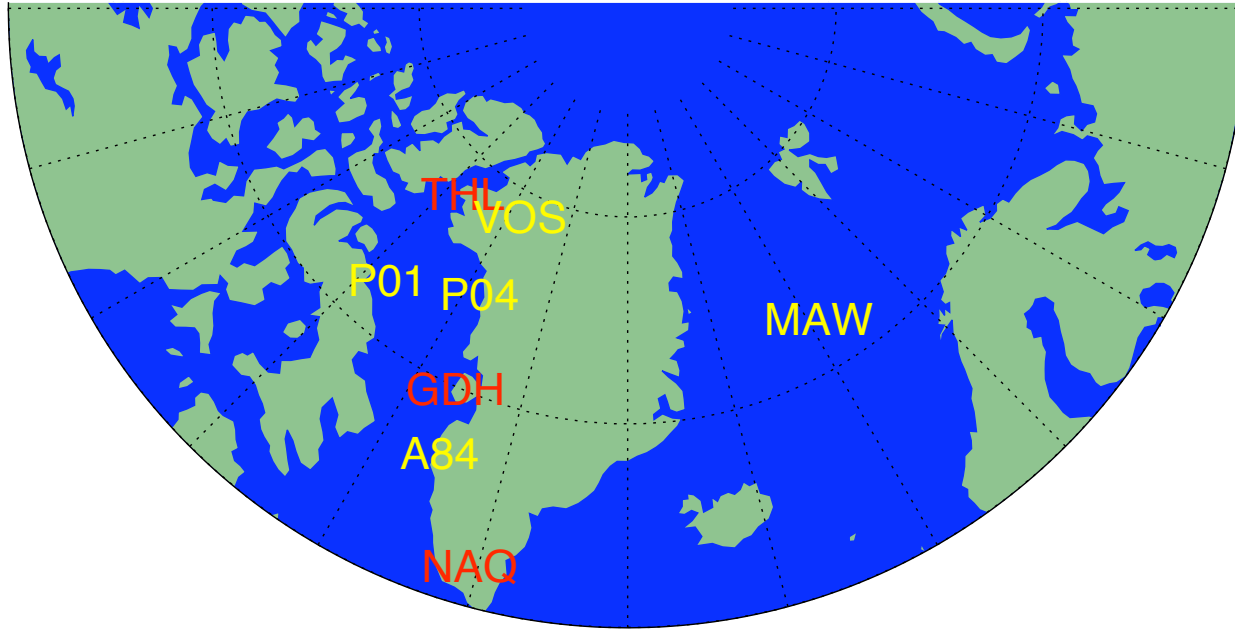
North

-354 nT   0 MLT   191 nT
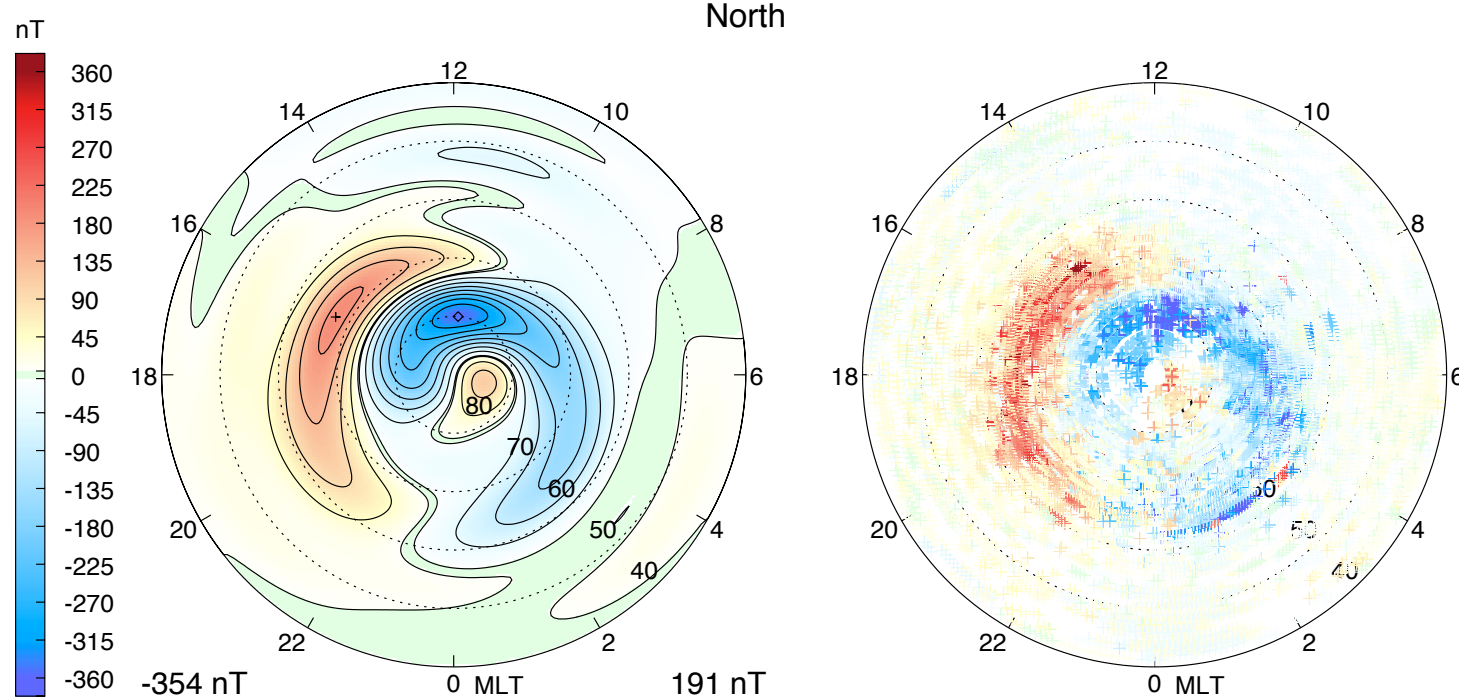
Delta-B North fit with Spherical
Cap Harmonic Analysis (SCHA):

Test data from 104
magnetometer stations at over
150 times (5-min. ave.) with
similar IMF conditions (from
four-year interval).

$$\psi(\theta,\varphi) = \sum_{k=0}^{15} \sum_{m=0}^{3<k} P_{n_k(m)}^m (\cos\theta)(g_k^m \cos m\varphi + h_k^m \sin m\varphi)$$

New model fit
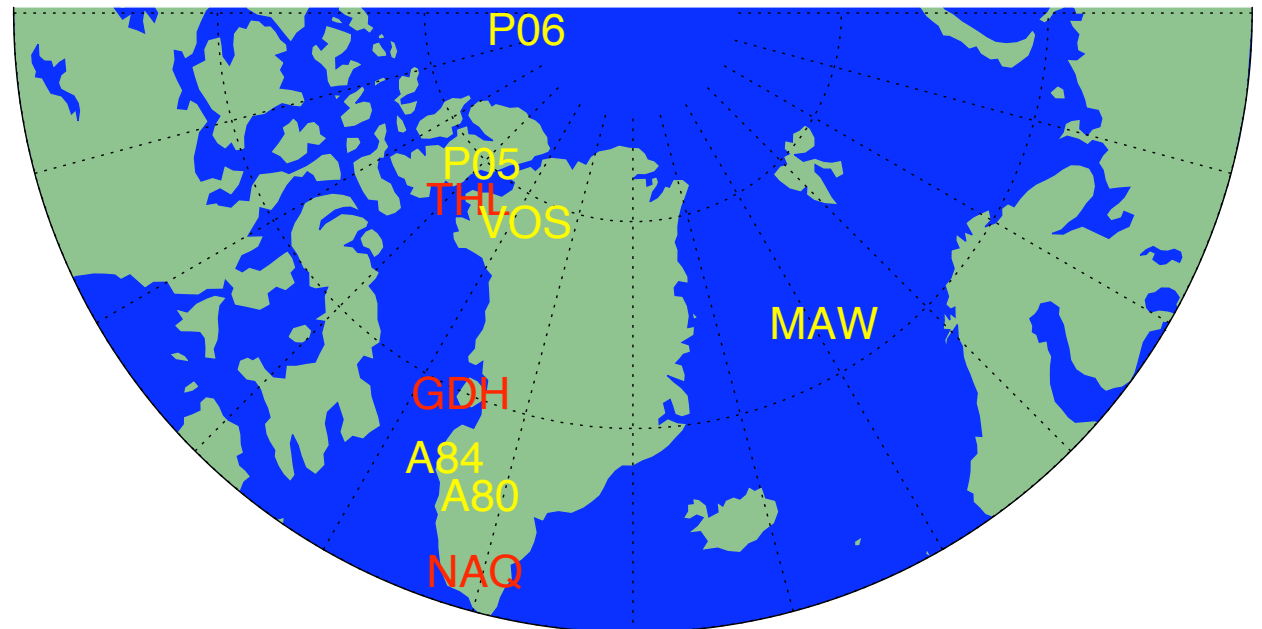from all data:

$$g_k^m = c_0 + c_1 B_T + c_2 V_{SW} + c_3 \sin(t) + c_4 P_{SW} +$$

$$c_5 B_T \cos(\varphi) + c_6 V_{SW} \cos(\varphi) + c_7 \sin(t)\cos(\varphi) + c_8 P_{SW} \cos(\varphi) + c_9 B_T \cos(2\varphi) +$$

$$c_{10} B_T \sin(\varphi) + c_{11} V_{SW} \sin(\varphi) + c_{12} \sin(t)\sin(\varphi) + c_{13} P_{SW} \sin(\varphi) + c_{14} B_T \sin(2\varphi)$$

Site locations for 1999 example. Additional site P03 only 3.5⁰ East from A84 at nearly same latitude.
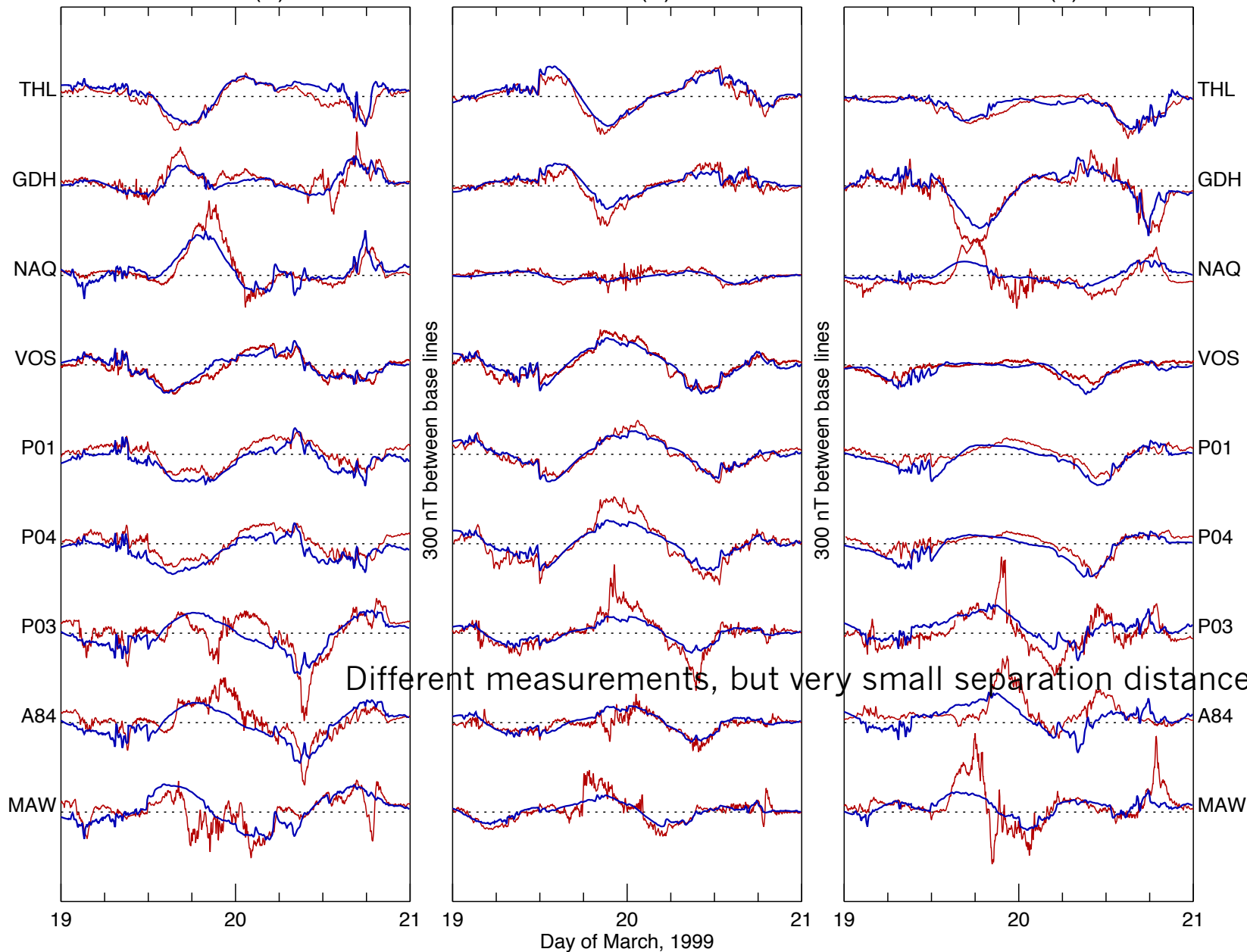
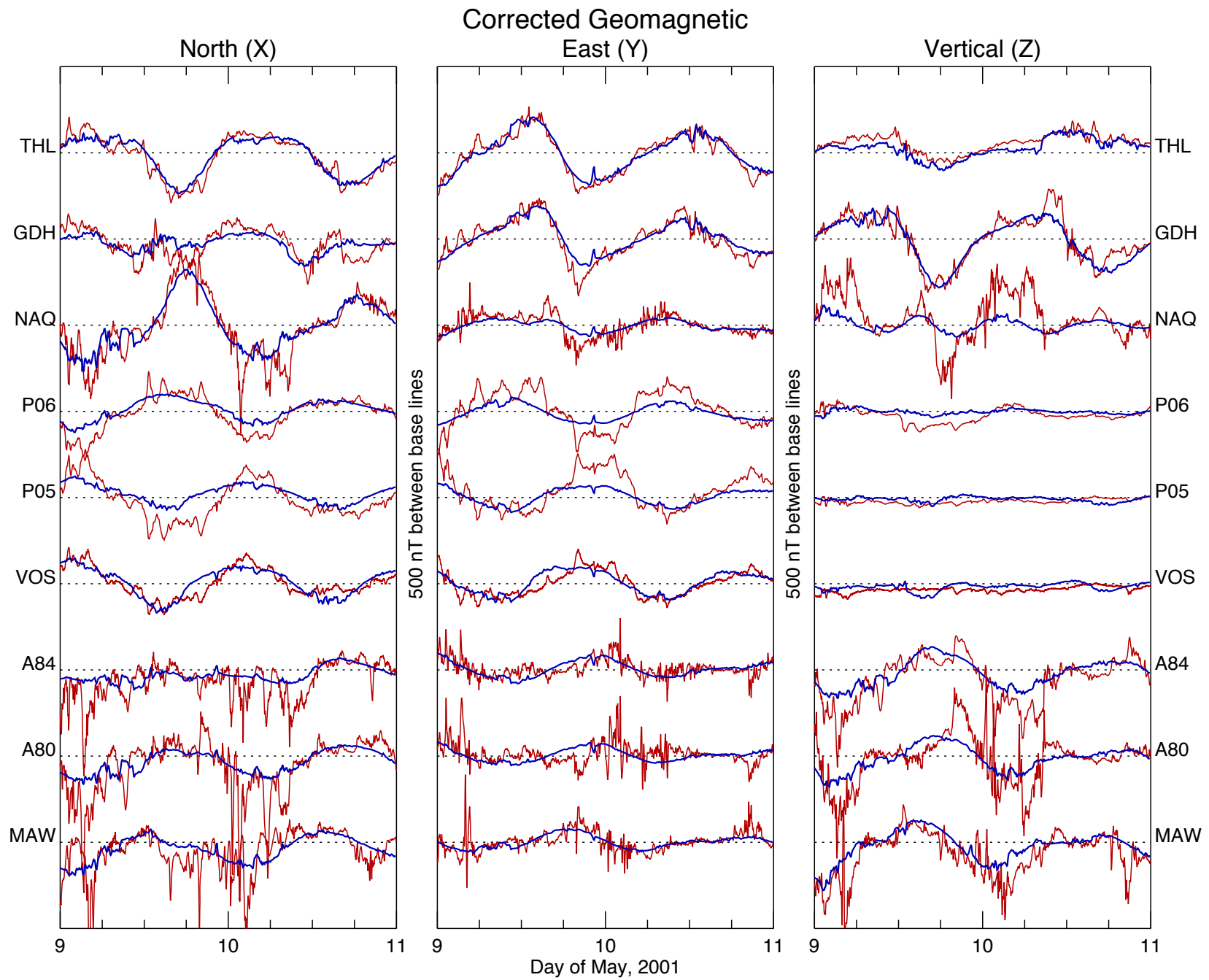Site locations for 2001 examples

Blue: model   Red: data

Corrected Geomagnetic

North (X)   East (Y)   Vertical (Z)

300 nT between base lines

Different measurements, but very small separation distance

Day of March, 1999

Corrected Geomagnetic

North (X)

East (Y)

Vertical (Z)

THL
GDH
NAQ
P06
P05
VOS
A84
A80
MAW

500 nT between base lines

500 nT between base lines

Day of May, 2001

9   10   11

9   10   11

9   10   11

◆ Chaotic, turbulent auroral currents cause significant, higher frequency variations that will be impossible to precisely predict.

◆ Any predictions that have right spectral characteristics likely will not exactly match the phase, resulting in an even worse prediction efficiency.

◆ One way to evaluate predictions is to see how well they match the overall, global pattern of magnetic variations, rather than just a few selected sites.

◆ Suggestion: use an AMIE-like fit of ground magnetometers to derive maps of magnetic perturbations. Compare with model prediction maps.