Surface flux scaling:

Data characteristics:

Reanalyses: ~ 0.5 degree (50 km), hourly to 6-hourly
Satellite based products: 0.25 degree, daily
VOS: 6-hourly to several days
Buoys: tens minutes

Requirements and problems:

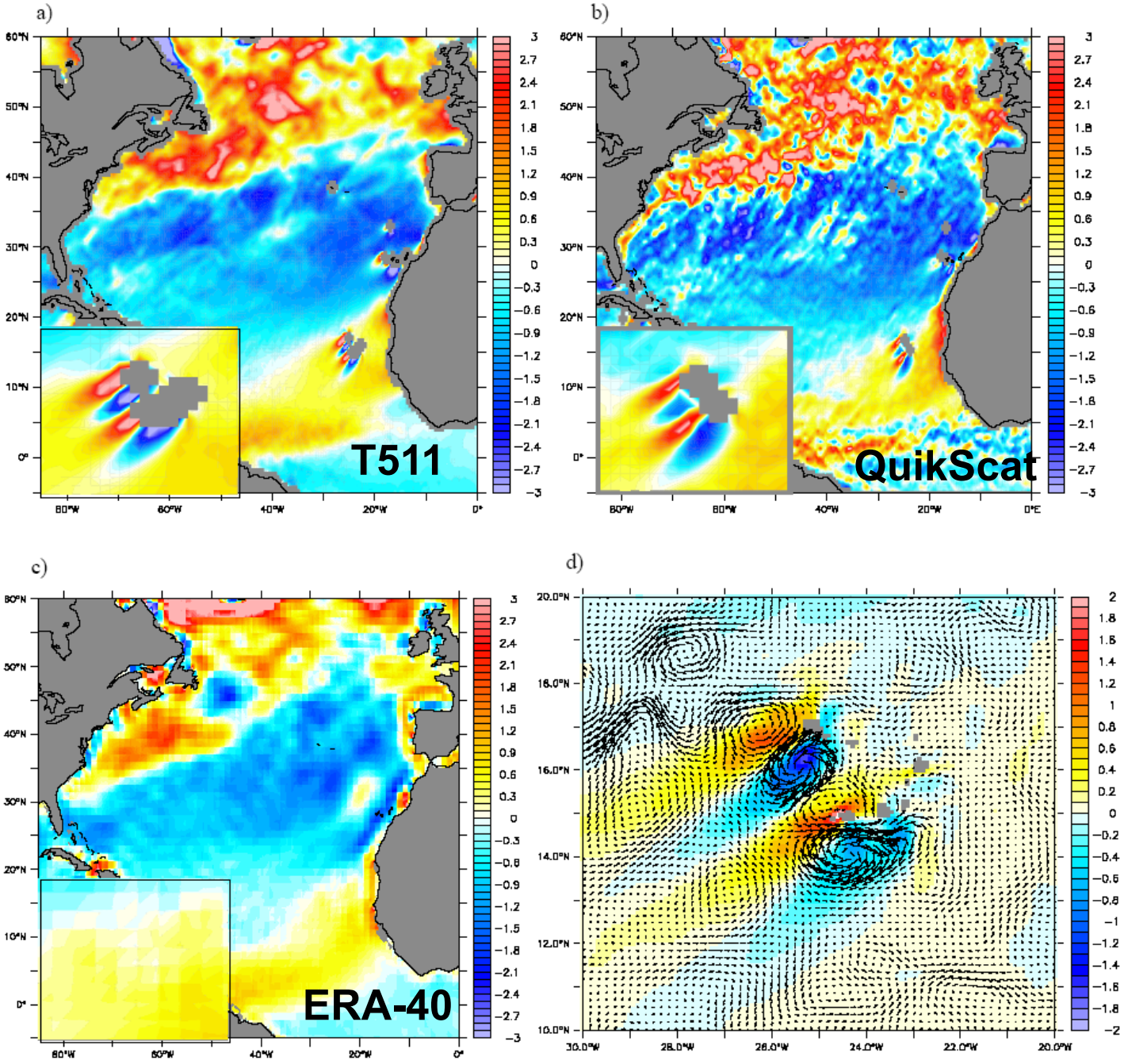
Ocean models: 1/24 – 1/12 – 1/4 degree
Comparisons and validation: Grid cell vs point measurement, co-location
Large region energy balances: sampling

Q?: Is there any significant contribution to surface flux at mesoscale and sub-mesoscale?

Wind stress, Turbulent Heat flux, Radiation
Where? Under which conditions?

High resolution forcing for ocean GCMs from NWP

Eden & Jung 2006



How to account for scaling effects?

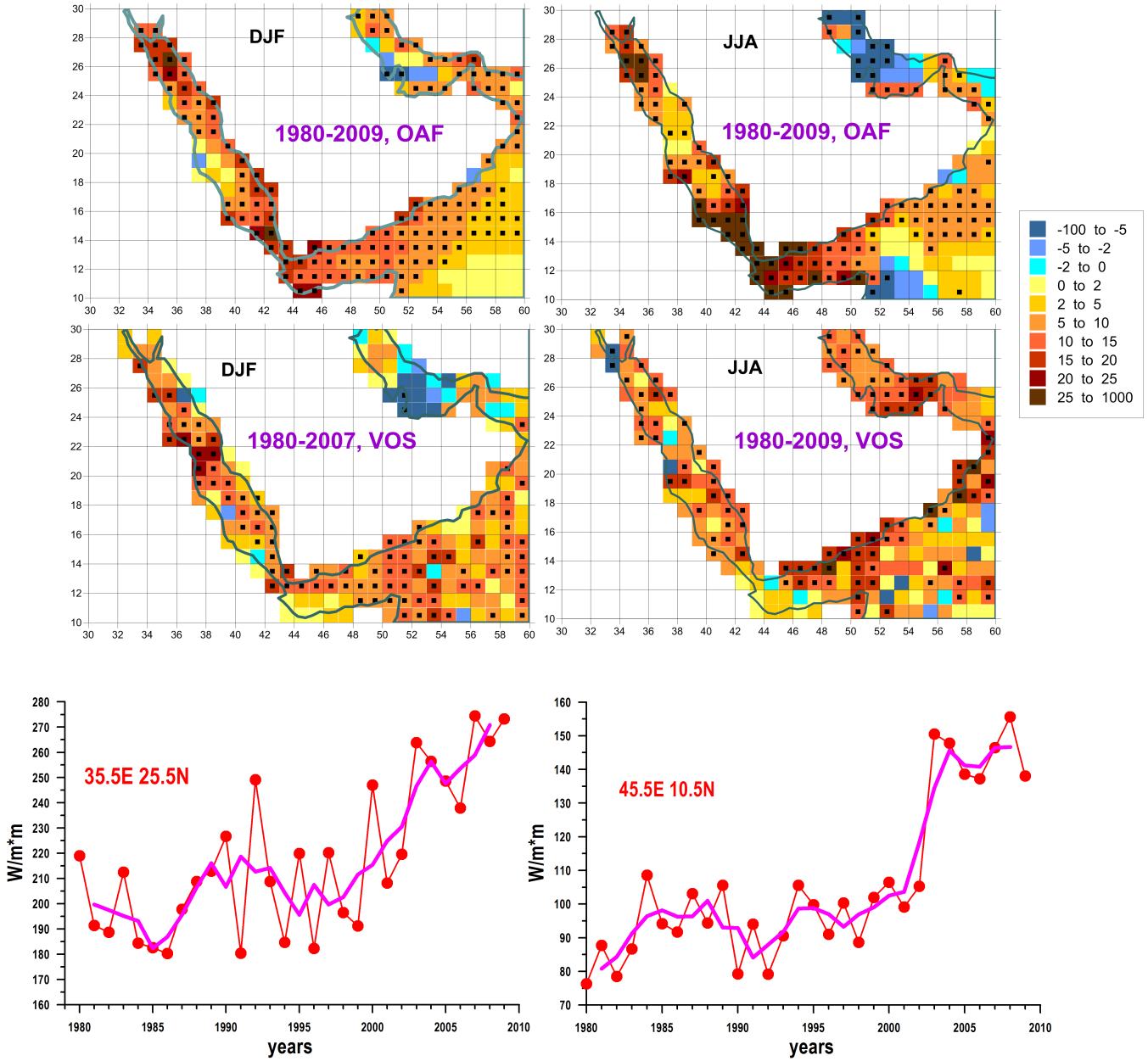
1. Analysis of at least few years of very high resolution NWP output (5-10 km resolution, potentially from non-hydrostatic configurations)
2. Fluxes computed from reanalysis state variables
3. Analyse data from buoys and RVs (along with direct flux estimates) and compare with NWP output
3. Same as (2) for satellite data
5. Co-location of VOS with buoys and NWP products

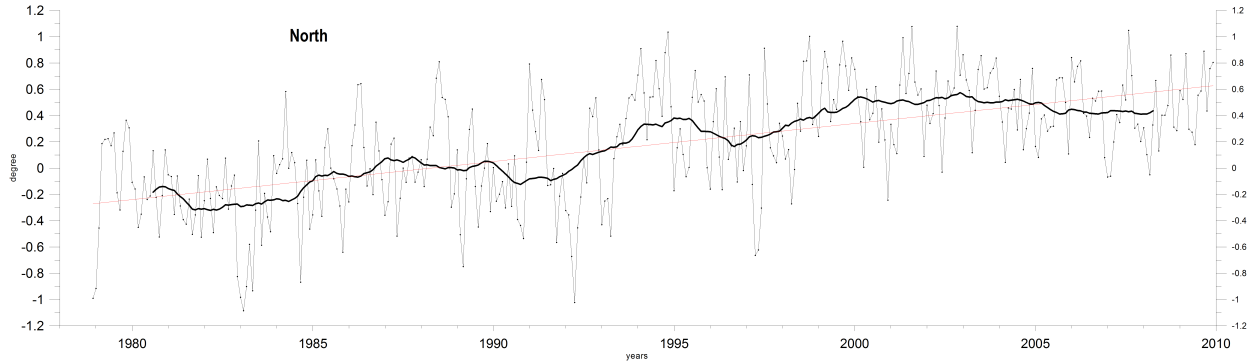
Suggested concept for the analysis:

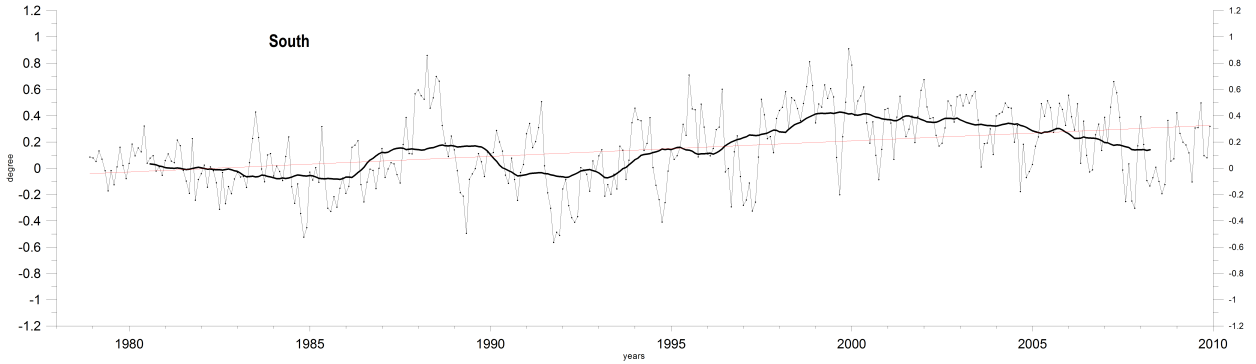
PDFs of surface fluxes

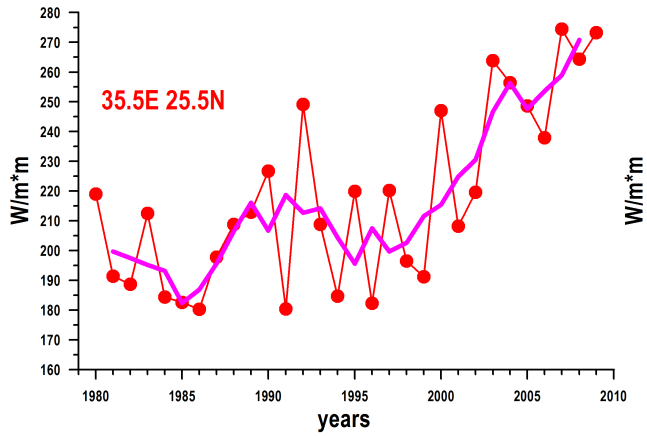
???? – parameterizations which are essentially local – to use them for grid cell/pixel/time averaged variables is not only a question of averaging parameterizations – we already do not have a physics behind cell-averaged data.

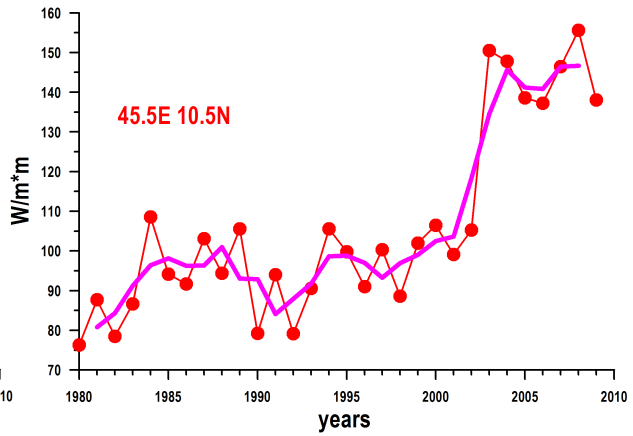
Latent heat trends

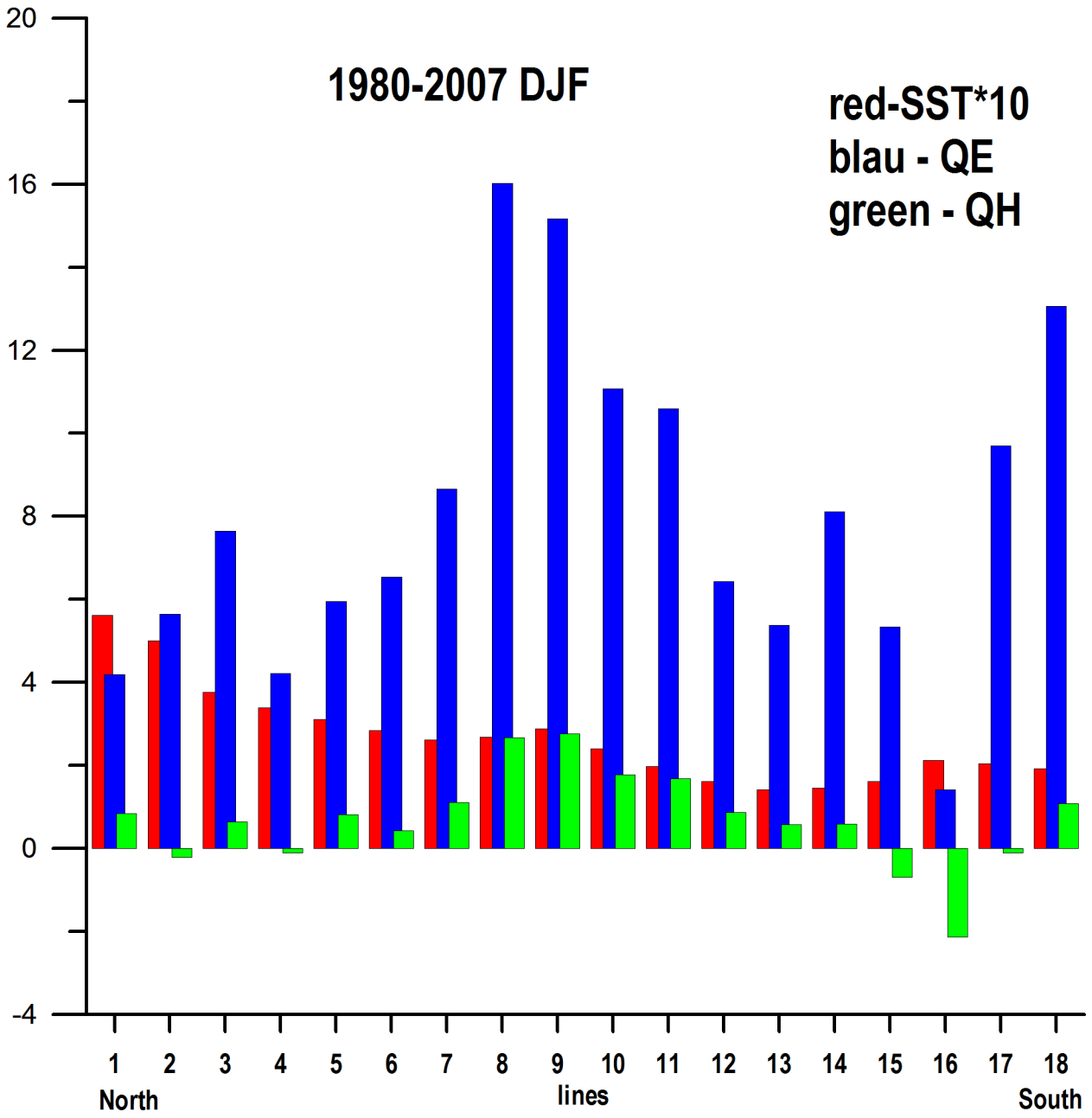



North
degree
years
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
1980
1985
1990
1995
2000
2005
2010


South
degree
years
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
1980
1985
1990
1995
2000
2005
2010


35.5E 25.5N
W/m*m
years
280
270
260
250
240
230
220
210
200
190
180
170
160
1980
1985
1990
1995
2000
2005
2010


45.5E 10.5N
W/m*m
years
160
150
140
130
120
110
100
90
80
70
1980
1985
1990
1995
2000
2005
2010


1980-2007 DJF
red-SST*10
blau - QE
green - QH
20
16
12
8
4
0
-4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
North
lines
South