* preliminaries

$ lab
$ mkdir SCM
$ cd SCM
$ cp ../*.SCM/pbl_*. *
$ cp ../*.SCM/plotsounding.gs

launch GrADS and open pbl_ysu.ctl. These are all GrADS commands

* look at SWDOWN to get bearings (sunrise~18Z, sunset~6Z, noon~00Z, mid~12Z)

clear
set t 2 60
set z 1
d swdown

* look at 2-m temperature

clear
d t2 - 273.15

* without clearing, superimpose PBL height

d pblh

* observe evolution of potential temperature in PBL

clear
set z 1 26
d theta

* without clearing, superimpose eddy mixing for momentum (Km, in m^2/s)

d dku3d

* look at dkt3d (Kh, eddy mixing for heat and moisture)

clear
d dkt3d

* look at vertical structure of Km during daytime. Note where Km goes to zero

clear
set t 25
d dku3d

* observe PBL height at this time

set z 1
d pblh
* look at wind speed

clear

set z 1 26
d mag(u,v)

* compare wind speed to initial time

clear

set t 1

define wind0=mag(u,v)

set t 2 60
d mag(u,v)-wind0

* take a closer look at day vs. night winds

c

set t 13

d mag(u,v)

set t 25
d mag(u,v)

* observe superadiabatic layer develops near surface during day

c

set t 25
d theta
d theta*(1.0+0.61*qvapor)

* the wind near the surface: compare wind at lowest model level to 10-m wind

c

set z 1

set t 2 60

set vrange 0 8
d mag(u,v)
d mag(u10,v10)

* compare model 10-m wind to wind reconstructed using log profile equation (only
valid for neutral conditions)

c

set vrange 0 8
d mag(u10,v10)
define windneutral=mag(u,v)*log(10.0/z0)/log(z/z0)
d windneutral
* confirm that neutral log wind profile overpredicts 10-m wind when stable
* stable is when tsk-t2 < 0
c
set vrange -3 8
d mag(u10,v10)-windneutral
d tsk-t2

* Now compare non-local (YSU) with local (MYJ) simulations
open pbl_myj.ctl
*pbl depth comparison
c
set z 1
set t 2 60
d pblh.1
d pblh.2

* eddy mixing comparison (m^2/s)
c
set z 1 26
d dkt3d.1
d exch_h.2

* potential temperature evolution comparison
c
d theta.1
d theta.2

* potential temperature profile during daytime; compare to Hong and Pan Fig. 3
c
set t 25
d theta.1
d theta.2

* water vapor mixing ratio during daytime; compare to Hong and Pan Fig. 4
c
set vrange 0 4
d 1000*qvapor.1
d 1000*qvapor.2

* compare surface sensible heat flux (W/m^2)
c
set z 1
set t 2 60
d hfx.1
d hfx.2
* compare surface latent heat fluxes (W/m^2)
c
d lh.1
d lh.2

* compare soundings – open pressure-level files
reinit
open pbl_ysu_p.ctl
open pbl_myj_p.ctl

* plot daytime sounding for YSU. Note CAPE and CIN
set t 24
plotsounding.gs

* make pbl_myj_p the default file, plot daytime sounding
set dfile 2
plotsounding.gs