

View
Model
Output
Version 2.1

VMO COMMANDS

VALID COMMANDS

Command	Optional	Description			
			sy		slice y-dir (XZ)
			sz		slice z-dir (XY)
bt		backward trajectories	ti	time	new analysis time
cc		color contour toggle	tl		time series location
ci	cint	contour interval	tr		time series range
cj		calculate trajectory	vd		vector derivative
co	color	set line color	vi		vector increment
cr		contour range	wh		windows horizontal
ct		define color table	wi	window	set plot window
ey	eye	select eye position	wv		windows vertical
fi	file	new work file	xt	xtic	set x-axis tick interval
fc		use file compression	xw	xwd	dump X window file
fr	free	free frame	xy		plot XY slices
ft		forward trajectories	xz		plot XZ slices
gr		graph range	yt	ytic	set y-axis tick interval
he	help	help listing	yz		plot YZ slices
hl		high/low box toggle	zt	ztic	set z-axis tick interval
lb		label plots manually			
lf		list analysis files			
lj		list trajectories			
ls		list current settings			
lt		list analysis times			
lw		line width			
m2		multiple plot 2 frame			
m3		multiple plot 3 frame			
m4		multiple plot 4 frame			
ml		mark selected line			
mp		mark selected point			
ms		multiple soundings			
mt		mesh type			
nf		no fill toggle			
nl		no labels			
nz		no zero contour			
ov	overlay	overlay grid template			
pa		plot average field			
pb		plot basic contour			
pc		plot color contour			
pg		plot gray scale contour			
ph		plot Hovmuller diagram			
pi		plot 3-D isosurface			
pj		plot trajectory			
pp		plot 3-D projection			
pr	print	print current plot			
ps		plot sounding			
pt		plot time series			
px		plot perturbations in X			
py		plot perturbations in Y			
qu	quit	quit session			
rb		red/blue toggle			
rj		read trajectory file			
sa	save	save frame			
sc	script	run script file			
si		set isosurf contour			
sl		sounding location			
sp		single plot (1 frame)			
st	stop	stop script file			
sv		special value			
sx		slice x-dir (YZ)			

VALID FIELDS

Field	Description
u	horizontal wind velocity (x-direction)
v	horizontal wind velocity (y-direction)
w	vertical wind velocity (z-direction)
pp	pressure perturbation
t	potential temperature
qv	water vapor mixing ratio
qc	cloud water mixing ratio
qr	rain water mixing ratio
km	prognostic diffusion term
u/v	u/v wind vector (available in XY slices)
u/w	u/w wind vector (available in XZ slices)
v/w	v/w wind vector (available in YZ slices)

CALCULATED FIELDS (2-D and 3-D)

p	full pressure
tp	temperature perturbation
divh	horizontal divergence
vorv	vertical vorticity
dse	dry static energy
mse	moist static energy
rh	relative humidity

Field	Description
te	equivalent potential temperature
tv	virtual potential temperature
dtdz	d(theta)/d(z)
wsv	vertical wind shear
ri	Richardson number
rib	bulk Richardson number
T	temperature
TV	virtual temperature
dtdx	d(theta)/dx
nsq	N-squared (Brunt-Vaisala frequency)
scorer	Scorer parameter
up	perturbation U
vp	perturbation V
qvp	perturbation water vapor
tpwp	vertical transport of potential temperature
upwp	vertical transport of u momentum
vpwp	vertical transport of v momentum
qpwp	vertical transport of water vapor
V	scalar horizontal (u/v) velocity
u*	friction velocity
lmo	Mokin-Obukov length
zil	boundary layer convective scale
Td	dew point

QUICK REFERENCE

PLOTTING

1-D PLOTTING

pa plots horizontally averaged field in current vertical window see also **wi**
ps plots single or multiple sounding(s) see also **ms, gr**
pt plots time series see also **tr, gr**

2-D PLOTTING

pb plots 2-D contours
pc plots 2-D color contours
pg plots 2-D gray scale contours
ph plots space versus time for selected time interval
pj plots 3-D trajectory projected onto current 2-D window see also **cj, lj, rj**

3-D PLOTTING

pi plots 3-D isosurface see also **si**
pp plots 3-D projection

DATA MANAGEMENT

fc toggle automatic file (de)compression
fi switch to new analysis file
lf list available analysis files
lt list available analysis times (for current working file)
sc run script file
ti switch to new analysis time (current working file)

DISPLAY OPTIONS

cc color contour plotting toggle
ct select color table settings
fr free current frame (disable save frame) see also **sa**
m2 select 2-frame multiple plotting see also **wh, wv**
m3 select 3-frame multiple plotting see also **wh, wv**
m4 select 4-frame multiple plotting see also **wh, wv**
lb choose manual plot labeling
nf no fill (applies to grayscale and color plotting)
nl choose no plot labeling
px plots deviation from horizontal mean in X-direction
py plots deviation from horizontal mean in Y-direction
sa save current frame see also **fr**
sp select single frame plotting see also **wh, wv**
vi choose vector increment
wh plot windows with a horizontal orientation
wv plot windows with a vertical orientation

QUICK REFERENCE (cont.)

1- AND 2-D PLOT OPTIONS

ci	select contour interval	see also cr
co	select contour color	
cr	select contour range	see also ci
gr	select 1-D graph range	
hl	toggle hi-lo label boxes	
mp	mark selected point	
ms	choose multiple soundings	see also tr
nz	no zero contour toggle	
ov	overlay grid at minor tick locations	
rb	plot red (high) and blue (low) contours	
sl	select sounding location	see also ms, ps
sv	select special value contour	
tl	select time series plot location	see also pt
tr	select time range	
wi	select plot window	
xt	choose major/minor tick interval on x-axis	
yt	choose major/minor tick interval on y-axis	
zt	choose major/minor tick interval on z-axis	

3-D PLOT OPTIONS

ey	select eye location	
mt	select isosurface mesh type	
si	select isosurface contour	
sx	slice through YZ plot at location X or through line (X1,Y1)-(X2,Y2)	
sy	slice through XZ plot at location Y or through line (X1,Y1)-(X2,Y2)	
sz	slice through XY plot at height Z or through line (X1,Z1)-(X2,Z2)	
xy	take slices through an XY plane	see also wi
xz	take slices through an XZ plane	see also wi
yz	take slices through a YZ plane	see also wi

TRAJECTORIES

bt	calculate backward trajectories
cj	calculate trajectory
ft	calculate forward trajectories
lj	list currently loaded/calculated trajectories
pj	plot trajectory
rj	read external trajectory file

MISCELLANEOUS

he	help
ls	list current file, plot and display settings
pr	print current frame
qu	quit session
xw	produce X-window dump of current plot frame

VMO COMMAND REFERENCE

Command: **bt**
Optional:
Description: calculate **backward** trajectories

Restrictions: see **cj** command
Comments:

bt sets all trajectory calculations to be *backward* in time

Command: **cc**
Optional:
Description: **color** contour toggle

Restrictions: must be sure to reset contour range and interval if necessary
Comments:

ci toggles between full color and contour only plotting (color plotting only - **pc**)

Command: **ci**
Optional: **cint**
Description: contour **interval**

Restrictions: **_ 0**
Comments:

ci=1.0 sets contour interval to 1.0

Command: **cj**
Optional:
Description: calculate **trajectory**

Restrictions:
Comments: be sure to set a time range using **tr** command; working with all uncompressed files speeds up calculations considerably; up to 20 trajectories can be held for printing; vmo automatically saves trajectory data in file TRAJ.VMO for later use (rename if desired)

cj=150/5/1 calculates forward trajectory for currently time range from location (X,Y,Z) = (150.,5.,1.)

Command: **co**
Optional: **color**
Description: line **color**

Restrictions: **red,blue,green,orange,black,purple**
Comments: valid for one plot only

co=red sets contour lines to red

Command: **cr**
Optional:
Description: contour **range**

Restrictions: unreasonable ranges may result in *segmentation fault*, requires contour interval (**ci**) be set
Comments: must define min and max; useful for animation

cr=-10./10 sets contour range from -10.0 (min) to 10.0 (max)

Command: ct
Optional:
Description: define color **table**

Sample color wheels are displayed.
User is prompted for color table parameters.

Command: ey
Optional: eye
Description: select **eye** position

Restrictions:
Comments:

eye=300/300/10 sets eye position to (X,Y,Z)=(300m, 300m, 10m)
eye>//100 sets new Z eye position to 100m

Command: fc
Optional:
Description: use (ignore) **file** compression

Restrictions:
Comments:

fc turns on file compression when opening and closing files (default)
fc turns off file compression action when on (use only when all working files are already uncompressed)

Command: fi
Optional: file
Description: new work **file**

User is prompted for work file information.

Command: fr
Optional: free
Description: **free** frame

Restrictions:
Comments: only necessary if **sa** command previously used

fr frees current frame

Command: ft
Optional:
Description: calculate **f**orward trajectories

Restrictions: see **cj** command
Comments:

ft sets all trajectory calculations to be *f*orward in time

Command: gr
Optional:
Description: **g**raph **r**ange

Restrictions:
Comments: applies to the x-axis only

gr=-10./10 sets graphing range on x-axis from -10.0 (min) to 10.0 (max)

Command: he
Optional: help
Description: **h**elp listing

Restrictions:
Comments:

he displays valid commands and fields available

Command: hl
Optional:
Description: high/low box toggle

Restrictions:
Comments:

hl turns on high/low boxes on 2-D contour plots if currently off
hl turns off high/low boxes on 2-D contour plots if currently on

Command: lb
Optional:
Description: **l**abel plots manually

Restrictions: labels are restricted to 80 characters
Comments: user is prompted for plot label whenever any plot requiring a label is produced

ml toggles manual labeling on or off on current setting

Command: lf
Optional:
Description: **l**ist analysis **f**iles

Restrictions:
Comments: option to switch working directory

lf displays data files available to VMO in working directory

Command: lj

Optional:

Description: list currently calculated/loaded trajectories

Restrictions:

Comments: trajectory 1 is overwritten after 20 trajectories are performed

lj lists up to 20 trajectories in table form including start position and time range

Command: ls

Optional:

Description: list current settings

Restrictions:

Comments:

ls displays current file, plot, and color table settings

Command: lt

Optional:

Description: list analysis times

Restrictions:

Comments:

lt displays available analysis times for working data file

Command: lw

Optional:

Description: line width

Restrictions:

Comments:

lw=2 doubles line width

lw=3.1 line width is triple (only integer value)

Command: m2

Optional:

Description: multiple plotting (2 frame)

Restrictions:

Comments: frames are horizontally oriented

m2 turns on multiple plotting with 2 frames per window

Command: m3
Optional:
Description: **multiple plotting (3 frame)**

Restrictions:
Comments: frames are horizontally oriented

m3 turns on multiple plotting with 3 frames per window

Command: m4
Optional:
Description: **multiple plotting (4 frame)**

Restrictions:
Comments: frames are plotted 2 x 2 (square frames)

m4 turns on multiple plotting with 4 frames per window

Command: ml
Optional:
Description: **mark selected line toggle**

Restrictions: line must be in plot window to view
Comments: valid in monochrome plotting only

ml=10./1./5./7. marks point (X1,Y1)-(X2,Y2) = (10.,1.)-(5.,7.)
ml turns off point marker when set

Command: mp
Optional:
Description: **mark selected point toggle**

Restrictions: point must be in plot window; ascii characters limited to range (32,125)
Comments: valid in monochrome and color plotting (**pb**, **pc**, and **pg**)

mp=10./1./1. marks point (X,Y,Z)=(10.0,1.0,1.0) (valid on all slices)
mp=10./10. marks point at (X,Z)=(10.0.,10.0) (only valid in XZ slices)
mp=//5. changes point marker Z value to 5.0
mp turns off point marker when set
mp=///4 marks point with special character (2=plus, 3=circle, 4=X, 5=star)
mp=///65 marks point with ASCII character = 65 (the letter "A")

Command: ms
Optional:
Description: **multiple sounding plot toggle**

Restrictions:
Comments: soundings plotted by the *ps* command will include all times available for current working file or be restricted to the range of times set by the *tr* command

ms turns on plotting of multiple soundings(when off)
ms turns off plotting of multiple soundings (when on)

Command: mt

Optional:
Description: select **mesh type**

Restrictions: integer value from 1 to 7
Comments: 1 = x-mesh, 2 = y-mesh, 3 = z-mesh

mt=1 sets mesh on 3-D isocontour plots to mesh parallel to X-axis only
mt=7 3-D isocontours will have mesh in all directions (additive 1 + 2 + 4 = 7)

Command: nl
Optional:
Description: **no plot labels**

Restrictions:
Comments: all plots requiring a label are produced without a label

nl toggles no label option on or off depending on current setting

Command: nf
Optional:
Description: **no fill**

Restrictions:
Comments:

nf toggles the supression of grayscale and color area fill

Command: nz
Optional:
Description: **no zero contour toggle**

Restrictions:
Comments:

nz turns on no zero contour flag (when off)
nz turns off no zero contour flag (when on)

Command: ov
Optional: overlay
Description: **o**verlay grid template

Restrictions:
Comments: points are plotted at all *minor* tick locations

ov overlays template onto plot (monochrome, color, and gray scale)

Command: pa
Optional:
Description: **p**lot vertically **a**veraged field

Restrictions: available fields; not available in multiple plotting
Comments: vertically averaged field in current plot window

pa plots average of last field plotted
pa=u plots average of horizontal wind speed U in current plot window

Command: pb
Optional:
Description: **plot basic 2-D contour**
Restrictions: available fields
Comments:

pb plots standard 2-D contour of last field plotted
pb=u/w plots U/W wind speed vectors in current plot window

Command: pc
Optional:
Description: **plot color 2-D contour**
Restrictions: available fields
Comments: contour interval, min/max contour range, and color table determine range of colors used

pc plots color contour of last field plotted
pc=tp plots color contours of potential temperature perturbation in current window
cint=0.1,pb=u plots color contours with a contour interval of 0.1
cr=-10/10,pb=u plots contours in a range -10 to 10 according to current contour interval

Command: ph
Optional:
Description: **plot Hovmuller (time vs space) diagram**
Restrictions: available fields (no vectors allowed)
Comments: must set time range; restricted to a line through current plot window; working with uncompressed files greatly increases speed of calculation (can be quite lengthy)
ph=w calculates Hovmuller diagram through specified line (used is prompted for necessary information)
x-axis is always time; y-axis is always the specified spatial array

Command: pi
Optional:
Description: **plot 3-D isosurface**
Restrictions: available fields
Comments: **si** sets contour, window setting in Z direction restricts vertical extent of isocontour

pi plots isosurface of last field plotted
pi=t plots isosurface of temperature over entire domain up to current window max in Z direction
si=1,pi=u plots isosurface of 1.0 m s^{-1} contour
wi=///4,pi=u plots U wind speed only up to grid points nearest 4 km in height

Command: pj
Optional:
Description: **plot trajectory**
Restrictions: only currently loaded and or calculated trajectories are available (use **rj** or **cj** first)

Comments: use **lj** to list available trajectories; + is placed in original position; x is placed in final position; line segments connect calculated positions; trajectory data is displayed in text window for reference

pj=1 plots all points in trajectory #1
pj=5/10 plots only first 10 trajectory positions for trajectory #5

Command: **pp**
Optional:
Description: **p**lot 3-D **p**rojection

Restrictions: fields available
Comments: 3-D projection onto "unused" axis

pp plots projection of last field plotted
xz,pb=u plots XY slice of U field, where the Z axis (height) represents the field requested

Command: **pr**
Optional: **print**
Description: **p**rint current plot

Restrictions: only current plot window
Comments: use **idt** (on **gmeta** file) to print other plots produced during session

pr sends current plot to print spooler

Command: **ps**
Optional:
Description: **p**lot sounding

Restrictions:
Comments: vertical extent of sounding is restricted to current vertical window setting -- turning on multiple soundings (using **ms** command) will plot a sounding at each time available in current working file

ps=u plots sounding of u for currently sounding location (set using **sl** command)

Command: **pt**
Optional:
Description: **p**lot time series

Restrictions:
Comments: time series location selected using **tl** command

pt=t plots time series of theta at selected time series location for all available times in current working file

Command: **px**
Optional:
Description: **p**lot deviation from horizontal mean (**p**erturbation) in X-direction

Restrictions:
Comments: variables with a zero mean state will be indistinguishable with this option

px toggles between active and inactive perturbation plotting

Command: py
Optional:
Description: **p**lot deviation from horizontal mean (**p**erturbation) in Y-direction

Restrictions:
Comments: variables with a zero mean state will be indistinguishable with this option

py toggles between active and inactive perturbation plotting

Command: qu
Optional: quit
Description: **q**uit session

Restrictions:
Comments:

qu quits VMO session

Command: rb
Optional:
Description: **r**ed/**b**lue toggle

Restrictions:
Comments: high contours are red, low contours are blue, zero contour is white

rb turns on red/blue 2-D standard contour (if currently off)
rb turns off red/blue 2-D standard contour (if currently on)

Command: rj
Optional:
Description: **p**lot deviation from horizontal mean (**p**erturbation) in X-direction

Restrictions: file must be in *vmo* format
Comments: system saves trajectory data in TRAJ.VMO automatically at end of session

rj reads trajectory file from disk (user is prompted for necessary file information); use to list

Command: sa
Optional: save
Description: **s**ave frame

Restrictions:
Comments: will not turn off until **f**ree command is used; available in all plot settings (multiple/single)
not available in color contour plots or averaged plots

sa turns on save frame feature

Command: sc
Optional: script
Description: run **s**cript file

Restrictions: file must reside in working directory

Comments: script file must end with **stop** command

sc runs script file called *scriptvmo*

Command: si

Optional:

Description: set isosurface contour

Restrictions: _0

Comments:

si=1 sets cut-off on 3-D isosurface plots to 1.0

Command: sl

Optional:

Description: sounding location

Restrictions: x and y location must fall within the bounds (0,nx*dx) and (0,ny*dy) respectively

Comments: locations are in kilometers

sl=40/60 sets location of plotted soundings to (X,Y) = (40 km, 60 km)

sl=/20 changes sounding location Y value to 20 km

Command: sp

Optional:

Description: single plotting (1 frame)

Restrictions:

Comments: only necessary if multiple plotting is activated

sp turns off multiple plotting (2, 3, and 4 frame)

Command: st

Optional: stop

Description: stop script file

Restrictions:

Comments:

st necessary command at end of script file, terminates running of script commands

Command: sv

Optional:

Description: special value

Restrictions:

Comments: valid for one plot only

sv=0 only zero contour line is plotted

sv=1.1 only 1.1 contour line is plotted

Command: sx
Optional:
Description: slice **x**-direction (YZ slice)

Restrictions: slice must fall entirely within domain
Comments: one value specifies uniform slice; four values designate line to slice through

sx=10. slices vertically through X = 10.0 km for producing YZ slices
sx=10/10/1/5 slices vertically through the points (X,Y)=(10.0,10.0) and (1.0,5.0)

Command: sy
Optional:
Description: slice **y**-direction (XZ slice)

Restrictions: slice must fall entirely within domain
Comments: one value specifies uniform slice; four values designate line to slice through

sy=10. slices vertically through Y = 10.0 km for producing XZ slices
sy=10/10/1/5 slices vertically through the points (X,Y)=(10.0,10.0) and (1.0,5.0)

Command: sx
Optional:
Description: slice **z**-direction (XY slice)

Restrictions: slice must fall entirely within domain
Comments: one value specifies uniform slice; four values designate line to slice through

sz=10. slices horizontally through Z = 10.0 km for producing XY slices
sz=10/1/1/5 slices horizontally through the points (X,Z)=(10.0,1.0) and (1.0,5.0)

Command: ti
Optional: time
Description: new analysis **time**

Restrictions: available times
Comments: error message if time does not exist; use **lt** to list times available

ti=14400 changes working analysis file to current data file at t = 14400 seconds

Command: tl
Optional:
Description: **time series location**

Restrictions: x, y, and z locations must fall within the bounds (0,nx*dx), (0,ny*dy), and (0,ztop) respectively
Comments: locations are in kilometers

tl=40/0/10 sets location of plotted time series to (X,Y,Z) = (40 km, 0 km, 10 km)
tl=//2 changes sounding location Z value to 2 km

Command: tr
Optional:

Description: **time series range**

Restrictions:

Comments: VMO checks for the range *inclusive* of range boundaries

tr=1000/2000 sets range for time series plots from t=1000 sec to t=2000 s
tr=/50000 includes all times from t=0 to t=50000 sec on time series plots

Command: **vd**

Optional:

Description: plot spatial **vector derivatives**

Restrictions:

Comments: horizontal flow vectors are converted to a spatial derivative (some measure of acceleration over short time scale)

vd toggles between active and inactive vector derivative plotting

Command: **vi**

Optional:

Description: **vector increment**

Restrictions: **_1; _ min(nx,ny,nz)**

Comments: valid for u/v, u/w, and v/w vector plots

vi=3 Plots every 3 vectors on abscissa (could be X or Y coordinate depending on slice taken)

Command: **wh**

Optional:

Description: **window plots horizontally**

Restrictions:

Comments: single frame plotting unaffected; used in conjunction with m2, m3, and m4 options

wh turns on horizontal plot windows

Command: **wi**

Optional: **window**

Description: set plot **window**

Restrictions: **must fall within domain**

Comments: only valid on current window slice, but retained even if slice type changes

wi=1/10/1/10 sets window to 1 to 10 km and 1 to km respectively on current slice
xz,wi=/0/3 sets vertical window between 0 and 3 km for all XZ slices (also retained for YZ slices)

Command: **wv**

Optional:

Description: **window plots vertically**

Restrictions:

Comments: single frame plotting unaffected; used in conjunction with m2, m3, and m4 options (note:

when m4 is active, frames are plotted in a 2 x 2 matrix rather than 4 vertical slabs)

wv turns on vertical plot windows

Command: xt
Optional: xtic
Description: set **x**-axis tick mark interval

Restrictions: 0
Comments: first entry for major ticks; second entry for minor ticks; retained as slice types change

xt=10/1 sets major ticks every 10 km, minor ticks every 1 km
xt=/5 resets minor ticks to be every 5 km

Command: xw
Optional: xwd
Description: create **X** window dump

Restrictions:
Comments: file created is <field name>.<analysis time>

pb=u,xwd creates X window dump of 2-D contour plot of u called u.<time>

Command: xy
Optional:
Description: plot **XY** slices

Restrictions:
Comments:

xy turns on plotting of XY slices

Command: xz
Optional:
Description: plot **XZ** slices

Restrictions:
Comments:

xz turns on plotting of XZ slices

Command: yt
Optional: ytic
Description: set **y**-axis tick mark interval

Restrictions: 0
Comments: first entry for major ticks; second entry for minor ticks; retained as slice types change

yt=10/1 sets major ticks every 10 km, minor ticks every 1 km
yt=/5 resets minor ticks to be every 5 km

Command: yz
Optional:
Description: plot **YZ** slices

Restrictions:
Comments:

yz turns on plotting of YZ slices

Command: zt
Optional: ztic
Description: set **z**-axis tick mark interval

Restrictions: _0
Comments: first entry for major ticks; second entry for minor ticks; retained as slice types change

zt=10/1 sets major ticks every 10 km, minor ticks every 1 km
zt=/5 resets minor ticks to be every 5 km