Testing of successive KRC versions DRAFT

Hugh H. Kieffer File=-/krc/Doc/VerTest.tex 2018nov05

November 5, 2018

Contents

1 Introduction

ALERT: There is also an older document *-/krc/VER/Vtest.tex* and .pdf which has not been integrated with this document.

This document is a guide to running a standard minimal sets of cases on two versions of KRC and analysis of any changes in the output temperatures.

1.1 Notation

Program and routines are in UPPERCASE plain text or as **routine**
If **PROGRM [,N]** , then **N** indicates a major control code.

Code variables are in plain text, or in single quotes or as `variab` and within equations as `variab`..

Input parameters are shown as INPUT.

Files are indicated in plain text or as *file.ext*

Material within a LaTeXverbatim section will appear `in this font style` .

For convenience, some physical parameter default values are shown within square brackets at their point of mention.

Symbols:

-/ is the equivalent of ~ /, as the tilde is a special symbol in LaTeX

]] is the command prompt, as the dollar sign is a special symbol in LaTeX

1.2 Input file

Find the desired input file for the base version, usually *-/krc/tes/bbbTest.inp*

Edit all instances of bbb to vvv for the new version. Save as *-/krc/tes/vvvTest.inp*

Run krc on the new input file; should produce a Type 52 output file *vvvTest.t52*

Locate the Type 52 output file for the base version. If not available, locate the installation of the base version and run that version of krc on the base input file.

Edit *-/idl/krc/kv3.pro*

add a line in `parff` for the new version

In IDL:
.rnew kv3
@114 sets the names

respond: 4 CR 355 361 CR

115 123 reads the two version files

kons=[201,202,207,252,22, 26, 200,207,252,22,12] ; ttt=A, tth=B

Many options for case range, items 7=kr1 and 8=kr2 [extract from arrsub.pro]

both - : arg1[k2] -arg1[k1] single
k1 is - : arg1[*] -arg1[k2] set
k2 <k1 : arg1[*] -arg2[*] set
both + & =: arg1[k2] -arg2[k1] single
both + : arg1[k1:k2] -arg2[k1:k2] set

116 123 does comparisons.

kons=[233,56,561,562,563,564,565,61,622,-1,63] ; Compare versions After 115

233.. KRCINDIFF changes REQ 26
55... Delta .t52
56... Select array and item
561.. Prepare the base and difference REQ 252,26,252 56
562.. Stats versus latitude REQ ttt and 561
564.. uuu
565.. vvv
61... Plot LS-LSH
622.. Clot Tx for 1 hour & lat, Ver A and B, all cases
-1... Wait
63... Stats on VerB-VerA (briefer than 56x) REQ 550

at 56: Which array: t d g u or v ¿ enter t to select `ttt` array

Which item, 0-based: enter 0 to select Tsurf

535 to call KRC35

jlat? respond 2

112 123

to look at one .t52:

2 361 consistency test

2.1 t361b

Test fff options, using equi-area lat bands for Mars, N2=1536 Cases 1:4 with atm,

1: flat $\Longrightarrow$ *t361bflat.tm3* R*8
2: slope 0.1°
3: slope 0.1° and flat fff for surface and atm
4: slope 30° and flat fff for surface and atm

Cases 5:8 the same, but no atmosphere

5: flat $\Longrightarrow$ *t361bp0flat.tm1* R*4 =======

krc35

112
123
18

Input t361a.inp, Mars, with 5 latitudes, 1 year spinup; fast version, cases are

1: flat, $\Longrightarrow$ *t361aflat.tm3*
2: 0.1° slope, output 4-byte, $\Longrightarrow$ *t361atiny.tm3*
3: 0.1° slope, fff=*361aflat.tm3* no
4: 30° slope, same fff in, output 8-byte, $\Longrightarrow$ *t361aHi.tm3*
5: no Atm, no fff, flat, output 8-byte $\Longrightarrow$ *t361ap0flat.tm1*
6: no Atm, 0.1° slope, output 4-byte $\Longrightarrow$ *t361ap0tiny.tm1*
7: no Atm, 0.1° slope, fff=*361aflat.tm1*, output 8-byte $\Longrightarrow$ *t361ap0Lo8.tm1*
8: no Atm, 30° slope, same fff in, output 8-byte, $\Longrightarrow$ *t361ap0Hi.tm1*
9: =8, but fff in is 4-byte ,nft361ap0tiny.tm1

These same cases were run for a more detailed "slow" input file, t361b, that had 4 times as many time steps, more and thinner layers, and a 2-year spinup,

```
0 0 1 / KOLD: season to start with;  KEEP: continue saving data in same disk file
 0 0 0 0 0 0  / IDB1 to IDB6
V361 consistency tests   5 lat,  fast Run: 40 seas with 1 yr spinup
    ALBEDO     EMISS   INERTIA     COND2     DENS2    PERIOD SPEC_HEAT   DENSITY
       .25      0.95     200.0      2.77     928.0    1.0275      647.     1600.
      CABR       AMW    SatPrA    PTOTAL     FANON      TATM     TDEEP   SpHeat2
      0.11      43.5  27.95460     546.0      .055      200.     180.0     1711.
      TAUD     DUSTA    TAURAT     TWILI  Hen-Gren ARC3/Safe     SLOPE    SLOAZI
       0.3       .90      0.25       0.0       0.5     0.801       0.0       90.
    TFROST    CFROST    AFROST     FEMIS       AF1       AF2    FROEXT    SatPrB
     146.0   589944.       .65      0.95      0.54    0.0009       50.   3182.48
      RLAY      FLAY     CONVF     DEPTH     DRSET      PHOG       GGT     DTMAX
```

```
    1.2000      .1800    2.0000       0.0       0.0       0.0       0.1       0.1
      DJUL    DELJUL  SOLARDEC       DAU     LsubS    SOLCON      GRAV     AtmCp
   151.293 17.174822      00.0     1.465        .0     1368.     3.727     735.9
    ConUp0    ConUp1    ConUp2    ConUp3    ConLo0    ConLo1    ConLo2    ConLo3
  0.038640 -0.002145  0.002347 -0.000750  2.766722 -1.298966  0.629224 -0.527291
    SphUp0    SphUp1    SphUp2    SphUp3    SphLo0    SphLo1    SphLo2    SphLo3
  646.6275  246.6678  -49.8216    7.9520  1710.648  721.8740  57.44873  24.37532
       N1        N2        N3        N4        N5       N24        IB        IC
       18       384        15         5        81        48         0         7
    NRSET      NMHA      NRUN     JDISK     IDOWN    FlxP14    FlxP15     KPREF
        3        24         0        41         0        45        65         1
    K4OUT     JBARE     Notif    IDISK2                                      end
       -3         0        20         0                                       0
    LP1    LP2    LP3    LP4    LP5    LP6 LPGLOB   LVFA   LVFT  LkofT
      F      T      F      F      F      F      F      F      F      F
  LPORB   LKEY    LSC  LZONE  LOCAL  Prt76 LPTAVE  Prt78  Prt79  L_ONE
      T      F      F      F      T      F      F      F      F      F
Latitudes: in 10F7.2  _____7 _____7 _____7 _____7 _____7 _____7 _____7
 -60.00 -30.00   0.00  30.00  60.00      0      0      0      0      0
 _____7 _____7 _____7 Elevations: in 10F7.2 ____7 _____7 _____7 _____7
   1.22   1.17   0.17  -1.99  -4.08      0      0      0      0      0
 2013 Jul 24 11:28:09=RUNTIME.  IPLAN AND TC= 104.0 0.10000 Mars:Mars
   104.0000      0.1000000      0.8644665      0.3226901E-01  -1.281586
  0.9340198E-01   1.523712      0.4090926       0.000000      0.9229373
   5.544402       0.000000       0.000000       686.9929       3397.977
   24.62296       0.000000      -1.240317       0.000000       0.000000
   0.000000      0.3244965      0.8559126      0.4026359     -0.9458869
  0.2936298      0.1381285       0.000000     -0.4256703      0.9048783
2 8 999 'IC2'   / homogenous: ignore the 2nd material
8  5 0 './out/t361a.t52'   / type 52 file name for Run
8 21 0 './out/t361aflat.tm3'   / output fff
0/
3  2 0 'LP2' / turn off print of parameters
1 23 0.1 'SLOPE' /
2 24 4 'ID24' / DA out file R*4
8 21 0 './out/t361atiny.tm3'   / output fff
0/
2 24 8 'ID24' / DA out file R*8
8 3 0 './out/t361aflat.tm3' / fff input for Tsur and Tatm
0/
1 23 30. 'SLOPE' /
8 21 0 './out/t361aHi.tm1'   / output fff
0/  ----------------------------------------------------
8 3 0 'off' / fff input for Tsur and Tatm
1 12 0.1 'PTOTAL' / no atm
1 23 0. 'SLOPE' / flat
```

```
2 17 -1 'K4OUT' / output type .tm1
8 21 0 './out/t361ap0flat.tm1' / DA output of type K4out
0/
1 23 0.1 'SLOPE' /
2 24 4 'ID24' / DA out file R*4
8 21 0 './out/t361ap0tiny.tm1'   / output fff
0/
2 24 8 'ID24' / DA out file R*8
8 3 0 './out/t361ap0flat.tm1' / fff input for Tsur and Tatm R*8
8 21 0 './out/t361ap0Lo8.tm1'   / output fff
0/
1 23 30. 'SLOPE' /
8 21 0 './out/t361ap0Hi.tm1'   / output fff
0/
8 3 0 './out/t361ap0tiny.tm1' / fff input for Tsur and Tatm R*4
0/
0/  ====================== end of run
```

3 361 vrs 355 2018oct27

355: /home/hkieffer/krc/tes/out/355Test.t52
361 input file

```
 0 0 1 / KOLD: season to start with; KEEP: continue saving data in same disk file
  0 0 0 0 0 0 / six debug flags
V361 test cases   5 lat, 40 seas with 2 yr spinup  First cases Compat with 321
    ALBEDO     EMISS   INERTIA     COND2     DENS2    PERIOD SPEC_HEAT   DENSITY
       .25      0.95     200.0      2.77     928.0    1.0275      647.     1600.
      CABR       AMW    SatPrA    PTOTAL     FANON      TATM     TDEEP   SpHeat2
      0.11      43.5  27.95460     546.0      .055      200.     180.0     1711.
      TAUD     DUSTA    TAURAT     TWILI  Hen-Gren ARC3/Safe     SLOPE    SLOAZI
       0.3       .90      0.25       0.0       0.5     0.801       0.0       90.
    TFROST    CFROST    AFROST     FEMIS       AF1       AF2    FROEXT    SatPrB
     146.0   589944.       .65      0.95      0.54    0.0009       50.   3182.48
      RLAY      FLAY     CONVF     DEPTH     DRSET      PHOG       GGT     DTMAX
    1.2000     .1800    2.0000       0.0       0.0       0.0       0.1       0.1
      DJUL    DELJUL  SOLARDEC       DAU     LsubS    SOLCON      GRAV     AtmCp
   151.293 17.174822      00.0     1.465        .0     1368.     3.727     735.9
    ConUp0    ConUp1    ConUp2    ConUp3    ConLo0    ConLo1    ConLo2    ConLo3
  0.038640 -0.002145  0.002347 -0.000750  2.766722 -1.298966  0.629224 -0.527291
    SphUp0    SphUp1    SphUp2    SphUp3    SphLo0    SphLo1    SphLo2    SphLo3
  646.6275  246.6678  -49.8216    7.9520  1710.648  721.8740  57.44873  24.37532
        N1        N2        N3        N4        N5       N24        IB        IC
        20       384        15         5       120        48         0         7
     NRSET      NMHA      NRUN     JDISK     IDOWN    FlxP14    FlxP15     KPREF
```

```
         3        24         0        81         0        45        65         1
     K4OUT     JBARE     Notif    IDISK2                                       end
        -2         0        20         0                                        0
    LP1    LP2    LP3    LP4    LP5    LP6 LPGLOB   LVFA   LVFT  LkofT
      F      T      F      F      F      F      F      F      F      F
  LPORB   LKEY    LSC  LZONE  LOCAL  Prt76 LPTAVE  Prt78  Prt79  L_ONE
      T      F      F      F      T      F      F      F      F      F
Latitudes: in 10F7.2  _____7 _____7 _____7 _____7 _____7 _____7 _____7
 -60.00 -30.00   0.00  30.00  60.00      0      0      0      0      0
 _____7 _____7 _____7 Elevations: in 10F7.2 ____7 _____7 _____7 _____7
   1.22   1.17   0.17  -1.99  -4.08      0      0      0      0      0
 2013 Jul 24 11:28:09=RUNTIME.  IPLAN AND TC= 104.0 0.10000 Mars:Mars
   104.0000      0.1000000      0.8644665      0.3226901E-01  -1.281586
  0.9340198E-01   1.523712      0.4090926       0.000000      0.9229373
   5.544402       0.000000       0.000000       686.9929       3397.977
   24.62296       0.000000      -1.240317       0.000000       0.000000
   0.000000      0.3244965      0.8559126      0.4026359     -0.9458869
  0.2936298      0.1381285       0.000000     -0.4256703      0.9048783
1 34  .2160 'FLAY' / match first physical layer of older versions
1 35 3 'CONVF' / attempt to match V2 run
8 5 0 './out/361Test.t52' / Type 52 file to write
3 2 1 'LP2' / turn on printing parameters and layer table
2 17 -3 'K4OUT' / file type
8 21 0 './out/361Testflat.tm3' / Direct-access file to write one case
0/
3 2 0 'LP2' / turn on printing parameters and layer table
3 10 1 'LkofT' / T-dependent properties
2 24 4 'ID24'  / .tmx output files to have R*4 seasonal records
8 21 0 './out/361Testtdep.tm3' / Direct-access file to write one case
0/
3 10 0 'LkofT' / reset
3 8 1 'LVFA' / use variable frost albedo
3 9 1 'LVFT' / use variable frost temperature
2 20 0 'IDISK2' / TDISK not write every action
0/
1 12 .5 'PTOTAL' / no atm
2 17 -1 'K4OUT' / file type
8 21 0 './out/361Testp0flat.tm1' / Direct-access file to write one case
0/
1 38 0.15 'PhotoF' / set to Kheim-like
0/
3 10 1 'LkofT' / T-dependent properties
0/
12 0.038640 0.0  0.0 0.0  2.77 0.0 0.0 0.0    /  constant Conductivity
13 647.0 0.0 0.0 0.0  1711.  0.0 0.0 0.0      / constant Specific heat
0/
```

```
12 0.038640 -0.002145  0.002347 -0.000750  2.766722 -1.298966  0.629224 -0.527291/ reset Cond
13 646.6275  246.6678  -49.8216    7.9520  1710.648  721.8740  57.44873  24.37532 / reset SpecHeat
3 10 0 'LkofT' / reset
1 12 546. 'PTOTAL' / reset to Mars
1 23 33. 'SLOPE'    / dune slip face
1 24 45. 'AZIMUTH'  / facing north-east  self-heating
0/
8 3 0 './out/361Testflat.tm3'   / Far-field input
0/
0/  ====================== end of run  9 cases
```

There are no differences in the input real, integer or logical values that were common to both versions. The last case is different in that v355 used far surface and atmosphere temperatures from the fff sloped run whereas v361 used far surface from the sloped run but atmosphere from a flat run.

Statistics on delta between v355 and v361 follow. The overall result is that differences in the 3 temperate latitudes and excluding the last case average 6 mK.

```
     IDL     KRC
       0   1_MarsBase
       1   2_LKofT
       2   3_varFrost
       3   4_noAtm
       4   5_Kheim
       5   6_LkofT
       6   7_Tdep=0
       7   8_MarsAtmSLope
       8   9_AtmSLope+fff

Doing -------------->     233
KRCINDIFF: test for changes. Input limits:       64     120     220
out  i    Label     Arg1       Arg2       Arg1-Arg2
 68 67   FSPARE      686.99      0.0000      686.99
 70 69     RGAS      8.3145      8.3145 -4.0200e-05
 71 70   TATMIN      143.40      143.39   0.0099579
 72 71     PRES      913.99      912.59      1.4075
 73 72  OPACITY     0.50219     0.50142  0.00077335
 74 73    TAUIR     0.30969     0.30921  0.00047690
 75 74   TAUEFF     0.61937     0.61842  0.00095380
 76 75    TATMJ      165.44      165.99    -0.54723
 82 81   TEQUIL      192.25      192.24   0.0090752
 83 82    TBLOW      639.68      639.67   0.0040329
 85 84   SCALEH      8.1796      8.2050   -0.025351
 86 85     BETA     0.46172     0.46120  0.00051366
 95 94    SIGSB  5.6704e-08  5.6705e-08 -1.4300e-12
124 23     ID24       8       0       8
125 24     ID25     361       0     361
```

```
138 37       J3      13       9       4

All latitudes and cases:

Doing -------------->     562
                     Mean       StdDev      Minimum      Maximum
         1       0.615758      7.60132     -71.1419      65.3827  signed
N=   86400        1.90106      7.38547      0.00000      71.1419  absolute
Doing -------------->     562
361Test: case -1 - 0:  Tsurf. CaseRange=all  LatRange=all  SeasonRange=all
         -60.         -30.           0.          30.          60.
Mean= (each case) last row and column are average
     -2.02910   0.00344616  -0.00858017   0.00355852     -6.79919     -1.76597
     -1.99398   0.00349064    0.0820432   0.00650857     -6.74363     -1.72911
    -0.399473   0.00344585  -0.00858017   0.00355852     -6.41686     -1.36358
     0.134830   0.00339933   0.00986396  -0.00999871   -0.0377676    0.0200654
    -0.274034   0.00332084    0.0111150    0.0383585   -0.0208800   -0.0484240
    -0.391245   0.00337858   -0.0502521    0.0204039   0.00288379   -0.0829663
    -0.274035   0.00332083  -0.00199543   -0.0358335   -0.0208797   -0.0658845
     -1.98045   0.00352382   0.00564316   0.00327734     -14.0404     -3.20168
      36.0563      18.0498      12.1962      14.1494      30.7379      22.2379
      3.20542      2.00857      1.35950      1.57547    -0.370974      1.55560
StDev=
      9.09687  0.000248898    0.0157836  4.95179e-05      10.1153      3.84565
      9.15079  0.000249321    0.0433477    0.0116389      10.0071      3.84263
      1.35262  0.000248693    0.0157836  4.95179e-05      13.1998      2.91370
     0.157151  0.000235163    0.0164952    0.0206014    0.0449523    0.0478869
     0.310699  0.000246759    0.0154983    0.0275865     0.200145     0.110835
     0.563285  0.000253814    0.0457277    0.0238048     0.184378     0.163490
     0.310699  0.000246757   0.00905440    0.0231420     0.200145     0.108658
      5.14155  0.000174013   0.00681441  0.000173474      26.1971      6.26917
      19.0224      8.75377      3.73860      4.03524      17.0699      10.5240
      5.01178     0.972853     0.434123     0.460254      8.57988      3.09178


Omitting the last case, and the polar latitudes.
 The large Tplan

    Item       Mean     StdDev        Min        Max    MeanAbs     MaxAbs
   Tsurf    0.00159    0.01209   -0.09047    0.11352    0.00614    0.11352
   Tplan  -10.58744   14.50282  -47.55258    0.10210   10.59131   47.55258
    Tatm    0.00083    0.00594   -0.01043    0.07620    0.00304    0.07620
 DownVIS    0.00000    0.00002   -0.00039    0.00046    0.00000    0.00046
  DownIR    0.00035    0.00268   -0.00827    0.03465    0.00069    0.03465

Mean= (each case), last row and column are average. All in milliK
```

```
 Idx    -30.      0.     30. Average
  1     1.4     5.4     1.4     2.7
  2     1.4    32.5     3.9    12.6
  3     1.4     5.4     1.4     2.7
  4     1.3     6.1     6.9     4.8
  5     1.3     6.0    16.3     7.8
  6     1.3    20.6    10.1    10.7
  7     1.3     2.8    14.2     6.1
  8     1.4     2.3     1.3     1.7
  9     1.4    10.1     6.9     6.1 <<< grand average
   StDev
  1     0.1     4.6     0.0     1.6
  2     0.1    17.2     3.6     6.9
  3     0.1     4.6     0.0     1.6
  4     0.1     4.6     5.8     3.5
  5     0.1     4.6     9.2     4.6
  6     0.1    17.2     7.2     8.2
  7     0.1     2.3     9.2     3.9
  8     0.1     2.6     0.1     0.9
  9     0.1     7.2     4.4     3.9
```

For these 3 latitudes and 8 cases, all seasons and all hours, the change in Tsurf has mean=1.6 mK, stDev 12. mK, minimum -0.090 K and max 0.114 K. Values for the average absolute change over hour and season is shown in Fig. 1

3.1 2018 Nov 5 08:25:56

Make most IDBx actions into D lines, make krc without debug

Run t361a and t361b; fast and slow versions of the same cases
IDL kv3, @114, the @11 to reset 1=t361a 6=t361b
115 123

The fast run had 18 layers to a total depth of 19.07 diurnal skin depths, 384 times-steps per sol, and 1 year spin-up, total time 1.732 s. The slow case had 28 layers to a total depth of 28.36 diurnal skin depths, 1536 times-steps per sol, and 2 year spin-up; total time 9.992 s, a factor of 5.77 slower.

Typical difference in surface temperature is shown in Figure 2.

```
kv3 -------------->     233
KRCINDIFF: test for changes. Input limits:       64     120     220
out  i    Label     Arg1       Arg2       Arg1-Arg2  At end of run!!
 33 32     RLAY      1.2000      1.1500    0.050000
 34 33     FLAY     0.18000     0.10000    0.080000
 35 34    CONVF      2.0000      3.0000     -1.0000
 43 42     SDEC    0.029749    0.029745  4.2494e-06
 44 43     D_AU      1.5578      1.5578  2.4722e-08
 45 44    LsubS    0.069890    0.069880  9.9829e-06
```

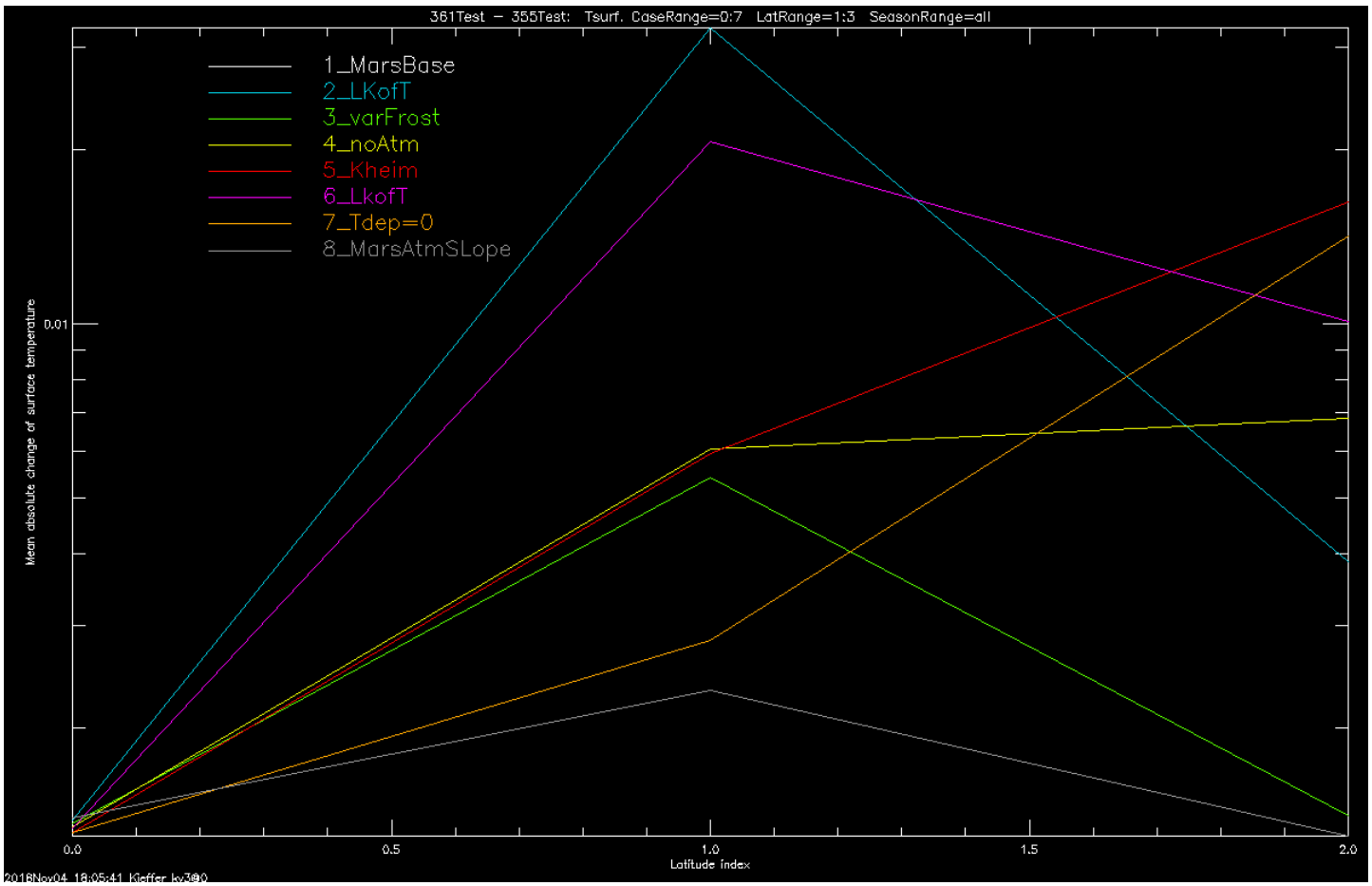

Figure 1: Average of the absolute change in diurnal average Tsurf between version 355 and 361. Abscissa is latitude index, -30, 0, +30, and right-most is the average. Ordinate is log scale, so the largest values is 0.032K for case 2, temperature-dependant properties, for the equator. vt562a.png

71	70	TATMIN	143.73	143.73	-5.4216e-06
72	71	PRES	961.10	961.10	-0.00083496
73	72	OPACITY	0.52808	0.52808	-4.5877e-07
74	73	TAUIR	0.32565	0.32565	-2.8291e-07
75	74	TAUEFF	0.65129	0.65129	-5.6582e-07
76	75	TATMJ	147.33	147.33	0.00051625
80	79	PZREF	555.03	555.03	0.00032544
82	81	TEQUIL	169.53	169.53	0.00014449
83	82	TBLOW	639.68	639.68	-5.0757e-06
85	84	SCALEH	7.4309	7.4309	1.9693e-05
86	85	BETA	0.47863	0.47863	-2.9500e-07

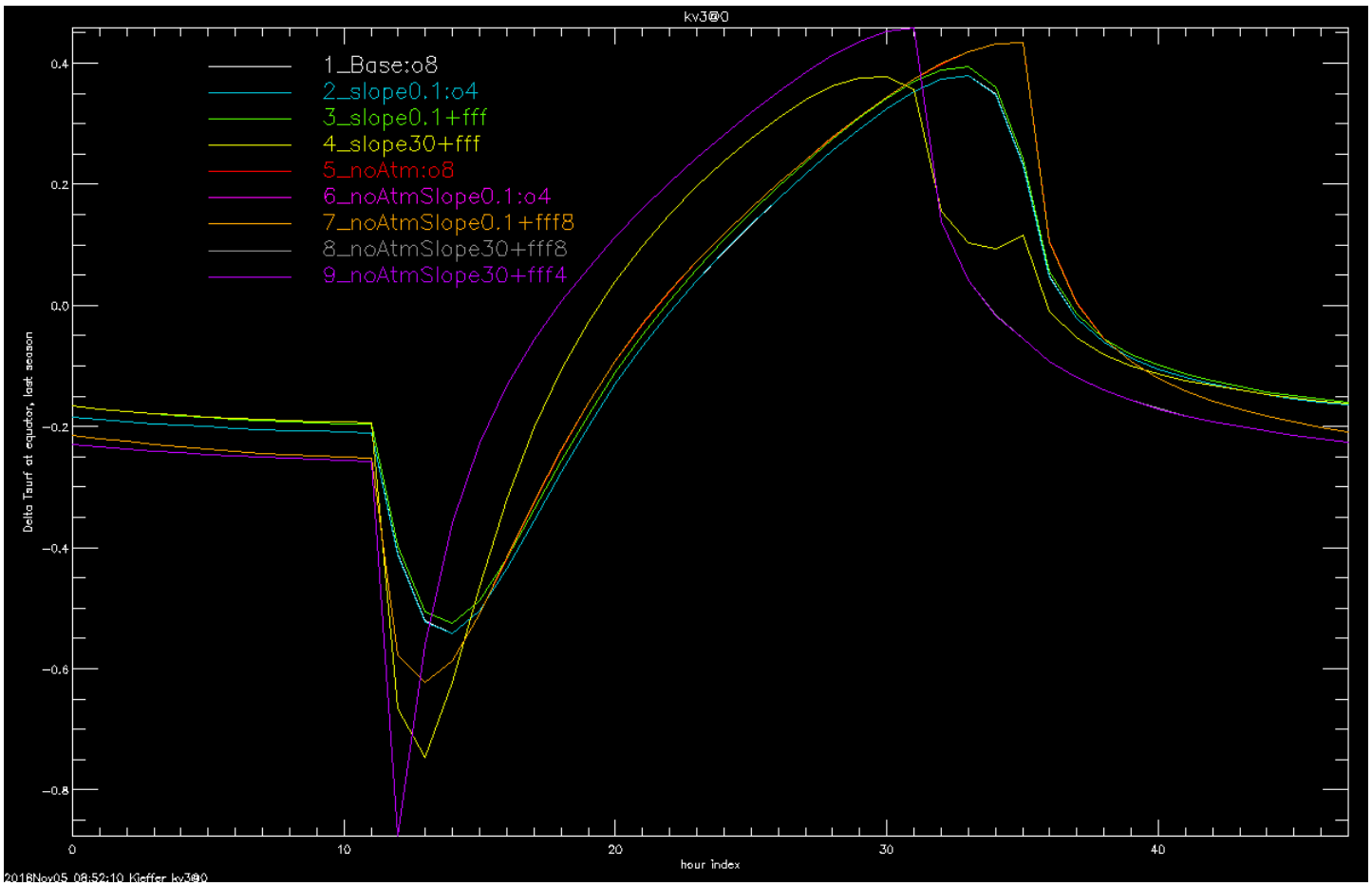

Figure 2: Delta surface temperature at the equator on the last date of run; fast-slow run, Changes are largely as dawn and dusk. tsdelt.png

87	86	DJU5	838.29	1525.3	-686.99
88	87	DAM	90.052	90.052	7.3603e-06
89	88	EFROST	404.02	378.44	25.573
101	0	N1	18	28	-10
102	1	N2	384	1536	-1152
105	4	N5	81	121	-40
112	11	JDISK	41	81	-40
119	18	Notif	20	40	-20
131	30	N1M1	17	27	-10
132	31	NLW	2	3	-1
134	33	KKK	8	10	-2
135	34	N1PIB	18	28	-10

```
140 39       J5      41      81     -40

kv3 -------------->     561
    Item       Mean     StdDev        Min        Max    MeanAbs     MaxAbs
   Tsurf   -0.21798    1.12928  -56.37955    3.18767    0.43530   56.37955
   Tplan   -0.01241    0.66178  -44.30767    0.85996    0.10438   44.30767
    Tatm    0.03516    0.12683   -0.49962    0.53894    0.08384    0.53894
 DownVIS   -0.00253    4.38939 -319.07159    4.18801    0.82042  319.07159
  DownIR    0.01096    0.05719   -0.14041    0.37316    0.02448    0.37316
QY              DOUBLE    = Array[48, 5, 41, 9]
QB              DOUBLE    = Array[48, 5, 41, 9]
QP              DOUBLE    = Array[48, 5, 41, 9]
Tsurf CaseRange=all  LatRange=0:4  SeasonRange=all  hour   lat  seas  case
 quilt before any other display
                   Mean       StdDev      Minimum      Maximum
         1      -0.217980      1.12928     -56.3796      3.18767  signed
N=   88560       0.435299      1.06456      0.00000      56.3796  absolute
kv3 -------------->     562
Mean= (each case) last row and column are average
t361a - t361b:  Tsurf. CaseRange=all  LatRange=0:4  SeasonRange=all
Idx    -60.    -30.      0.     30.     60. Average
  1   111.4  -144.6   -65.0   -58.8   108.7    -9.6
  2   111.4  -144.6   -65.0   -58.8   108.7    -9.6
  3   107.5  -149.5   -68.9   -63.7   107.4   -13.4
  4   110.2  -153.0   -66.6   -64.9  -668.6  -168.6
  5 -1004.6  -155.4   -94.7   -97.0  -555.7  -381.5
  6 -1004.7  -155.4   -94.5   -97.1  -555.7  -381.5
  7 -1004.7  -155.4   -94.5   -97.1  -555.7  -381.5
  8  -760.0  -157.2   -80.8  -112.6  -429.7  -308.0
  9  -760.0  -157.2   -80.8  -112.6  -429.7  -308.0
 10  -454.8  -152.5   -79.0   -84.7  -318.9  -218.0
StDev=
  1   291.8   309.7    87.2   155.4   286.2   226.1
  2   291.7   309.7    87.2   155.4   286.2   226.0
  3   293.0   307.4    84.9   157.2   289.4   226.4
  4   315.1   319.7    91.4   162.7  4837.8  1145.3
  5  1741.9   252.7    73.3   131.8  1203.6   680.7
  6  1741.9   252.8    73.3   131.8  1203.6   680.7
  7  1741.9   252.8    73.3   131.8  1203.6   680.7
  8  1348.0   282.6    78.8   172.1   944.0   565.1
  9  1348.0   282.6    78.8   172.1   944.0   565.1
 10  1012.6   285.5    80.9   152.3  1244.3   555.1
kv3 -------------->     564
    Item       Mean     StdDev        Min        Max    MeanAbs     MaxAbs  0]=Lat
    Lat.    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
    elev    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
```

```
kv3 -------------->     565
    Item       Mean     StdDev        Min        Max    MeanAbs     MaxAbs  0]=DJU5
    DJU5 -686.99286    0.00000 -686.99286 -686.99286  686.99286  686.99286



    Item       Mean     StdDev        Min        Max    MeanAbs     MaxAbs
   Tsurf    -0.10539    0.35730  -10.24632    3.18767    0.26774   10.24632
   Tplan    -0.03121    0.18829   -1.10532    0.55193    0.10101    1.10532
    Tatm    -0.01053    0.09343   -0.49962    0.22083    0.06587    0.49962
 DownVIS     0.00146    4.73669 -319.07159    4.18801    0.99135  319.07159
  DownIR     0.00162    0.04177   -0.14041    0.23393    0.02246    0.23393
QY              DOUBLE    = Array[48, 3, 41, 9]
QB              DOUBLE    = Array[48, 3, 41, 9]
QP              DOUBLE    = Array[48, 3, 41, 9]
Tsurf CaseRange=all  LatRange=1:3  SeasonRange=all  hour   lat  seas  case
 quilt before any other display
                  Mean       StdDev      Minimum      Maximum
         1      -0.105391     0.357299     -10.2463      3.18767  signed
N=   53136       0.267737     0.259008  7.11211e-06      10.2463  absolute
kv3 -------------->     562
Mean= (each case) last row and column are average
t361a - t361b:  Tsurf. CaseRange=all  LatRange=1:3  SeasonRange=all
Idx    -30.      0.     30. Average
  1  -144.6   -65.0   -58.8   -89.4
  2  -144.6   -65.0   -58.8   -89.4
  3  -149.5   -68.9   -63.7   -94.1
  4  -153.0   -66.6   -64.9   -94.9
  5  -155.4   -94.7   -97.0  -115.7
  6  -155.4   -94.5   -97.1  -115.7
  7  -155.4   -94.5   -97.1  -115.7
  8  -157.2   -80.8  -112.6  -116.8
  9  -157.2   -80.8  -112.6  -116.9
 10  -152.5   -79.0   -84.7  -105.4
StDev=
  1   309.7    87.2   155.4   184.1
  2   309.7    87.2   155.4   184.1
  3   307.4    84.9   157.2   183.2
  4   319.7    91.4   162.7   191.2
  5   252.7    73.3   131.8   152.6
  6   252.8    73.3   131.8   152.6
  7   252.8    73.3   131.8   152.6
  8   282.6    78.8   172.1   177.8
  9   282.6    78.8   172.1   177.8
 10   285.5    80.9   152.3   172.9
```