MODTRAN TAPE5 CHEAT SHEET Ver. 2.0

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MODTRAN 4.7 Ver3 r1

CARD 1 (REQUIRED) MAIN RADIATION TRANSPORT DRIVER

[A1] **MODTRAN** = (T or M), (C or K), (F or L)
[A1] **SPEED** = S(slow 33 abs coef), M(med 17 abs coef)
[I3] **MODEL** = 0-8 (The model atmosphere, 2 is MLS)
[I5] **ITYPE** = 1,2,3 (2 is Vertical or slant path between two altitudes)
[I5] **IEMSCT** = 0,1,2,3 (2 is spectral thermal plus solar/lunar radiance)
[I5] **IMULT** = 0, +1, -1 (-1 MS solar geometry at location H2 surface is used)
[I5] **M1** = 0-6 (0 is default temp and pressure)
[I5] **M2** = 0-6 (0 is default H20)
[I5] **M3** = 0-6 (0 is default O3)
[I5] **M4** = 0-6 (0 is default CH4)
[I5] **M5** = 0-6 (0 is default N2O)
[I5] **M6** = 0-6 (0 is default CO)
[I5] **MDEF** = 1,2 (1 is default heavy species profiles used)
[I5] **IM** = 0,1 (0 for normal operation of program)
[I5] **NOPRINT** = 0,1,-1,-2 (0 for normal operation)
[F8.3] **TPTEMP** = greater 0, less-than/equal 0 (Boundary Temp, 294K = 70F)
[A7] **SURREF** = BRDF, LAMBER, greater 0, less-than 0 (Surface reflectance)

```
MM--2----2----2----1----0----0----0----0----0----0----1----0----0-294.000-LAMBER
```

CARD 1A (REQUIRED) RADIATIVE TRANSPORT DRIVER (continued)

[L1] **DIS** = T,S,F (T=use DISORT, F=use ISAAC 2-Stream, S=scaled DISORT)
[L1] **DISAZM** = T,F (Azimuth dependence with DISORT, increase run time)
[I3] **NSTR** = 2,4,8,16 (Streams to use by DISORT)
[L1] **LSUN** = T,F (T=read 1cm^{-1} solar irradiance, F=read 5cm^{-1})
[I4] **ISUN** = (FWHM of triangular scanning function in WN. Smooth TOA irrad.)
[F10.5] **CO2MX** = (Mixing ratio in PPMV. 0=330ppmv, 365ppmv recommended)
[A10] **H2OSTR** = (Vertical water vapor column string. 0= use default water)
[A10] **O3STR** = (Vertical ozone string. 0= use default ozone)
[1XA1] **LSUNFL** = T,F,1-4 (T=read solar rad. data file from CARD 1A1 LSUN=TRUE)
[1XA1] **LBMNAM** = T,F (T=read band model from CARD 1A2. F=default is 1cm^{-1})
[1XA1] **LFLTNM** = T,F (T=read user-defined instrument filter from CARD 1A3)
[1XA1] **H2OAER** = T,F (T=modify aerosol optical prop H2O. F=H2O prop are fixed)
[2X] Space in CARD
[I5] **LDATDR** = T,F (F, blank=data files are in DATA/, T=need to read in DIR name)
[I5] **SOLCON** = neg,zero,pos number (Scale the TOA irradiance, 0=no scale)

```
TF--8T--10-365.00000-----0.000----------0-T-T-F-T-------0.000
```

CARD 1A1 (Optional, used if LSUNFL=T)

[A80] **SUNFL2** = 1,2,3,4,or a filename (select TOA solar irradiance database, 1=newkur.dat, 2=chkur.dat, 3=cebchkur.dat, 4=thkur.dat)

```
1--------------------------------------------------------------------------------
```

CARD 1A2 (Optional, used if LBMNAM=T)

[A80] **BMNAME** = filename (select name of binary band model data file. B2001_01.bin (1cm^{-1}), B2001_05.bin (5cm^{-1}), B2001_15.bin (15cm^{-1})). Also dependent on user defined spectral resolution V1, V2, DV, FWHM.

```
DATA\B2001_01.bin------------------------------------------------------------------
```

CARD 1A3 (Optional, used if LFLTNM=T)

[A80] **FILTNM** = filename (select name of instrument filter channel response file)

```
DATA\landsat7.flt------------------------------------------------------------------
```

CARD 1A4 (Optional, used if LSUNFL=T)

[A80] **DATDIR** = path (path name for the MODTRAN data files)

CARD 2 (REQUIRED) MAIN AEROSOL AND CLOUD OPTIONS

[A2] **APLUS** = blank, A+ (A+ = Can specify user-defined aerosol optical properties)
[I3] **IHAZE** = -1 to 10 (Aerosol extinction model for 0-2KM, 1=RURAL extinction)
[A1] **CNOVAM** = blank, N (N=Navy Oceanic Vertical Aerosol Model)
[I4] **ISEASN** = 0-2 (Seasonal profile for tropo/stratosphere aerosol, 1=SPG/SUMMER)
[A3] **ARUSS** = blank, USS (USS = AeRosol User Supplied Spectra)
[I2] **IVULCN** = 0-8 (Volcanic. 0=background stratospheric profile and extinction)
[I5] **ICSTL** = 1-10 (Air mass character used with CNOVAM, 0=not used)
[I5] **ICLD** = 0-19 (Cloud/rain model used. 0=no cloud/rain)
[I5] **IVSA** = 0,1 (1=Use Army Vert. Structure Algo for aerosols in bound. layer)
[F10.5] **VIS** = neg,0,pos number (Meteorological range (KM) Overrides IHAZE value)
[F10.5] **WSS** = number (Current wind speed (m/s). Used w/ IHAZE=3 or 10. 0=no wind)
[F10.5] **WHH** = number (24 HR avg wind speed (m/s). Used with IHAZE=3. 0=no wind)
[F10.5] **RAINRT** = number (Rain rate (mm/hr). 0=no rain)
[F10.5] **GNDALT** = number (Altitude of surface relative to sea level (KM))

```
---1----1----0----0----0----0--20.00000---0.00000---0.00000---0.00000---0.01500
```

NOTE:
IHAZE (0-2KM), **ISEASN** (TROPO, 2-10KM) and (STRATO, 1-30KM), **IVULCN** (30-100KM), and **VIS** (the meteorological range in 0-2KM) set the altitude and season-dependent aerosol profiles and aerosol extinction coefficients.

CARD 3 (REQUIRED) LINE OF SIGHT GEOMETRY (not all parameters are needed)

[F10.5] **H1** = number (Initial altitude (KM), position of sensor, for ITYPE=2)
[F10.5] **H2** = number (Final altitude (KM), if using ITYPE=2)
[F10.5] **ANGLE** = 0-180 (Initial zenith angle (deg) measured from H1)
[F10.5] **RANGE** = number (Path length (KM))
[F10.5] **BETA** = 0-180 (Earth center angle (deg) subtended by H1 and H2)
[F10.5] **RO** = blank, number (Radius of Earth(KM) blank=default radius)
[I5] **LENN** = 0,1 (Determine short/long paths, 0=short default)
[5X] Space in CARD
[F10.5] **PHI** = 0-180 (Zenith angle (deg) as measured from H2 towards H1)

```
---3.00000---0.01500-180.00000---0.00000---0.00000----------0--------0.00000
```

NOTE:
For **ITYPE**=2, can specify one of 6 geometries (e.g., **H1**, **H2**, **ANGLE**, and **LENN**))

CARD 3A1 (IF IEMSCT=2) SOLAR / LUNAR SCATTERING GEOMETRY

[I5] **IPARM** = 0,1,2,10,11,12 (Method of specifying geometry on CARD 3A2)
[I5] **IPH** = 0,1,2 (Type of phase function, 2=Mie-generated aerosol phase fun.)
[I5] **IDAY** = 1-365 (day of year for Earth to Sun distance if IPARM=1)
[I5] **ISOURCE** = 0,1 (Select 0=Sun or 1=Moon)

```
----1----2--236----0
```

CARD 3A2 (IF IEMSCT=2) SOLAR / LUNAR SCATTERING GEOMETRY
FOR IPARM=1, use the following:

[F10.3] **PARM1** = -90 to +90 (Observer latitude (deg))
[F10.3] **PARM2** = 0-360 (Observer longitude, WEST of Greenwich (deg))
[F10.3] **PARM3** = (not used)
[F10.3] **PARM4** = (not used)
[F10.3] **TIME** = number (Greenwich decimal time (GMT). Used with IPARM=1,11)
[F10.3] **PSIPO** = 0-360 (Path azimuth from H1 to H2 deg East of North)
[F10.3] **ANGLEM** = 0-180 (Phase angle of moon (deg), for ISOURCE=1)
[F10.3] **G** = 0-1 (Asymmetry factor for Henyey-Greenstein phase function for IPH=0)

```
----39.334----76.278-----0.000-----0.000----15.000-----0.000-----0.000-----0.000
```

NOTE (example):
15.0 GMT = 11AM (EDT) = 10AM (EST)
EDT = GMT-4 (EDT 2013: From March 10 to November 3)
EST = GMT-5

CARD 4 (REQUIRED) SPECTRAL RANGE AND RESOLUTION

[F10.0] **V1** = number (Initial freq.in wavenumber or wavelength)
[F10.0] **V2** = number (Final frequency in wavenumber or wavelength)
[F10.0] **DV** = number (Freq(or wavelength) increment used for spectral outputs)
[F10.0] **FWHM** = number (Slit function FWHM, units from FLAGS(1:1), Let DV=FWHM/2)
[A1] **YFLAG** = T,R (T=Trans output in PLTOUT, R=Radiance output in PLTOUT)
[A1] **XFLAG** = W,M,N (Units for output files PLTOUT, W=WN, M=um, N=nm)
[A8] **DLIMIT** = string (String for repeat runs for PLTOUT (rootname.plt))
[A7] **FLAGS** = (7 characters to define units, slit, sampling, etc.)
1: blank, W,M,N (Spectral units for V1, V2, DV, FWHM)
2: blank,T,R,G,S,C,H,U (Type of slit function, R=RECT function)
3: blank or A,R (A=FWHM is absolute, R=FWHM is percent relative)
4: blank, A (blank=Degrade only total rad and trans, A=Degrade all)
5: blank, S (S=Save non-degraded results, blank=Do not save)
6: blank, R (R=Use saved results for degrading, blank=Do no use saved results)
7: blank,T,F (blank=no SPECFLUX flux file, T,F=Write file, i.e.UP/DOWN Fluxes)
[I3] **MLFLX** = number(Number of ATM level SPECFLUX are output starting from ground)

-----0.300-----5.000-----0.005-----0.010RM--------MRAA---

CARD 4A,4B1,4B2,4B3,4L1,4L3 (Optional) GROUND SURFACE CHARACTERIZATION

CARD 4A (Optional) IF SURREF=BRDF or LAMBER (permits modeling of ADJACENCY)
[I1] **NSURF** = 1,2 (1=Use refl. of image pixel, 2=define an area around pixel too)
[F8.2] **AATEMP** = pos,0, neg (ground surf temp (for NSURF=2) 70F = 294K)

2--294.00

CARD 4L1 (Optional) IF SURREF=LAMBER
[A80] **SALBFL** = filename (Name for the spectral albedo file)

DATA\my_spec_alb.dat----------

CARD 4L2 (Optional) IF SURREF=LAMBER (repeated NSURF times -TARGET, BACKGROUND)
[A80] **CSALB** = filename (name of spectral albedo curve from SALBFL file)

CARY Red Cloth----------
Grass Background----------

CARD 5 (REQUIRED) REPEAT RUN OPTION

[I5] IRPT = 0,+1,-1,+3,-3,+4,-4 (0=stop program otherwise read in new cards)

----0

COMMON DOWN-LOOKING SENSOR SCENERO TAPE5 (at 10,000 FEET at 11 EDT, 0.3 to 5 um)

```
MM--2----2----2----1----0----0----0----0----0----0----1----0----0-294.000-LAMBER
TF--8T--10-365.00000-----0.000---------0-T-T-F-T--------0.000
1-------------------------------------------------------------------------------
DATA\B2001_01.bin-----------------------------------------------------------------
----1---1---0----0----0----0--20.00000---0.00000---0.00000---0.00000---0.01500
---3.00000---0.01500-180.00000---0.00000---0.00000----------0--------0.00000
----1----2--236----0
----39.334----76.278-----0.000-----0.000----15.000-----0.000-----0.000-----0.000
-----0.300-----5.000-----0.005-----0.010RM--------MRAA---
2--294.00
DATA\spec_alb.dat-----------------------------------------------------------------
CARY Red Cloth--------------------------------------------------------------------
Grass Background------------------------------------------------------------------
----0
```