

1.1 Streamer jako przykład modelu transferu promieniowania w atmosferze

Charakterystyka modelu STREAMER

- Model Płasko-równoległy
- Używa DISORT-u dla większej liczby strumieni niż dwa.
- Oblicza strumienie promieniowania oraz radiancję
- 24 pasma w obszarze promieniowania krótkofalowym i 20 pasma w obszarze długofalowym.
- 5 optycznych modeli aerozolu.
- 7 standardowych profili atmosferycznych (możliwość specyfikacji własnego profilu)
- 11 modeli podłoża (modele Lamberta) z możliwością zadania BRDF-u.
- możliwość zadania optycznych własności chmur.
- Uwzględnia tylko podstawowe gazy atmosferyczne

Przykładowy plik wejściowy do modelu

\$OPTIONS

Streamer sample input file - Fluxes

```
.TRUE.           ; Compute fluxes (or radiances)?      (FLUXES)
.FALSE.          ; Include thermal emission in band 106? (IR106)
.TRUE.           ; Compute cloud forcing?          (CLDFRC)
2 2              ; Number of streams, short and long  (NSTR*)
0 0              ; Number of Legendre coeff., method  (NCOEF,IMTHD)
.TRUE.           ; Include gaseous absorption?          (GASABS)
.TRUE.           ; Include Rayleigh scatter (shortwave)? (RAYLISHRT)
2                ; Surface albedo control          (ALBTYPE)
4                ; Surface emissivity control       (EMISSTYPE)
5 .TRUE.         ; Std prof; extend input profile to 100 km?
5 1              ; Aerosol model and profile
1 2 3 1 1 3     ; Height, temp, wv, oz, cloud units
4                ; Output levels control
.FALSE.          ; Log to file?
.TRUE.           ; Descriptive output desired?
testflx.des
.FALSE.          ; User-customized output?
.FALSE.          ; Apply spectral (band) weights?
$CASE
Clear sky only, April conditions
92 4 28 22.0 72.88 144.50 -99.0
                ; Viewing geometry

1 129
0.75 2 1 0.05 3 0.95
-25.15 0.99
0
                ; Cloud overlap
1 1 1 1 0 0 13 1.0 1.0 1.0 1.0 1.0 1.0
14.101 125.4 -50.9 2.0
```

```

10.948 204.9 -56.2 7.0
8.486 303.5 -60.2 35.0
7.864 335.1 -57.1 43.0
6.651 404.8 -50.0 47.0
6.041 444.1 -45.5 43.0
4.860 528.4 -36.8 58.0
3.702 622.4 -26.8 39.0
2.618 721.7 -19.7 67.0
1.592 828.2 -16.2 72.0
0.973 898.3 -10.9 60.0
0.577 945.8 -12.2 67.0
0.000 1022.0 -23.2 78.0
300.0 0.25
$CASE
Cloudy sky, 2 clouds, April conditions, shortwave only
92 4 28 22.0 72.88 144.50 -99.0
                                ; Viewing geometry
106 129
0.75 2 1 0.05 3 0.95
-25.15 0.99
2 1 0.4 -19.15 725.0 5.0 6.0 0.1 0
3 0.6 -60.15 300.0 1.0 20.0 0.01 1
0                                ; Cloud overlap
-1 -1 -1 -1 0 0 13 1.0 1.0 1.0 1.0 1.0

```

Przykładowy plik wynikowy

Streamer sample input file - Fluxes

Input File: testflx.inp

No spectral weighting.

INITIAL OPTIONS (Later changes will not be noted):

Number of Streams, Shortwave: 2, Longwave: 2

Gaseous absorption included.

Rayleigh scattering included.

Default profile: Subarctic Winter

Default aerosol optical model: Arctic

Default aerosol vertical profile: Background trop. and strat.

```

+++++
++

```

Case Number in Input File: 1

Clear sky only, April conditions

Band number range: 1 - 129

Spectral Interval: 20 1/cm (500.00 um) to 35710 1/cm (.28 um)

Year: 1992, Month: 4, Day: 28, Hour: 22.00

Lat: 72.880, Lon: 144.500, Zenith Angle (degrees): 58.82

Unscaled Atmospheric Profiles (22 Levels)

Height(km)	Press(mb)	T(K)	H2O(g/m ³)	RH(%)	O3(g/m ³)	Aer(km ⁻¹)
1 100.00	.00	210.00	.000000	.00	.0000000	.000000
2 70.00	.04	245.70	.000000	.00	.0000001	.000000
3 50.00	.57	259.30	.000003	.00	.0000028	.000004
4 45.00	1.11	247.00	.000005	.00	.0000084	.000008
5 40.00	2.24	234.70	.000011	.01	.0000265	.000016

6	35.00	4.70	222.20	.000024	.04	.0000595	.000032
7	30.00	10.20	216.00	.000054	.20	.0000970	.000129
8	25.00	22.56	211.20	.000123	.82	.0002070	.000254
9	20.00	50.14	214.10	.000269	1.25	.0003622	.001086
10	14.10	125.40	222.25	.001110	2.00	.0003215	.001035
11	10.95	204.90	216.95	.002119	7.00	.0002043	.002234
12	8.49	303.50	212.95	.006548	35.00	.0000802	.004192
13	7.86	335.10	216.05	.011700	43.00	.0000565	.008141
14	6.65	404.80	223.15	.028831	47.00	.0000410	.012096
15	6.04	444.10	227.65	.042846	43.00	.0000323	.015238
16	4.86	528.40	236.35	.139006	58.00	.0000302	.018521
17	3.70	622.40	246.35	.234690	39.00	.0000287	.022815
18	2.62	721.70	253.45	.736630	67.00	.0000273	.037149
19	1.59	828.20	256.95	1.050423	72.00	.0000265	.051794
20	.97	898.30	262.25	1.321236	60.00	.0000265	.080575
21	.58	945.80	260.95	1.336072	67.00	.0000265	.080575
22	.00	1022.00	249.95	.640325	78.00	.0000265	.000000

Total Column Amounts (scaled) -

Water Vapor: 3671.07 g/m²

Ozone: 6.43 g/m²

Aerosols Optical Depth: .25 (unitless)

Scaling Factors - w.v., O3, haze RH, CO2, O2, w.v. continuum:

1.00 1.00 1.00 1.00 1.00 1.00

Cloud/clear types (models) in scene (21=clear): 21

SURFACE CHARACTERISTICS:

Clear Sky Fraction: 1.00

Surface Type Fractions -

Sea Water: .05, Meltponds: .00, Snow: .95, Bare Ice: .00

Vegetation: .00, Dry Sand: .00, Freshwater: .00

Observed (Input) Surface Albedo (0.6 um): .750

Observed Surface Temp (K): 248.0

Emissivity (all bands): .9900

Broadband All-sky Surface Albedo, by type:

21: .608

Broadband All-sky Surface Albedo: .608

ALL-SKY FLUXES (W/m²), CLOUD RADIATIVE EFFECT (W/m²), HEATING RATE (degrees K/day):

	DirSW	DiffSW	TotalSW	LW	DiffSW	LW	Heating	
	Down	Down	Down	Down	Up	Up	NET	
1	691.31	.00	691.31	.00	357.68	181.98	151.65	.302
2	691.29	.01	691.30	.00	357.67	181.98	151.65	-2.926
3	691.10	.11	691.21	.23	357.65	181.95	151.84	-4.940
4	690.91	.19	691.10	.53	357.63	181.84	152.16	-2.812
5	690.38	.36	690.75	1.04	357.60	181.65	152.54	-.800
6	689.11	.73	689.84	1.85	357.55	181.37	152.78	-.452
7	686.90	1.51	688.41	3.26	357.44	181.15	153.08	-.372
8	682.75	3.48	686.23	5.79	357.25	181.14	153.63	-.152
9	675.27	7.56	682.83	10.48	356.95	182.23	154.13	-.363
10	655.42	20.54	675.95	22.21	355.73	185.05	157.39	-.407
11	640.68	30.15	670.83	29.21	354.34	184.46	161.24	-.053
12	621.89	42.20	664.09	36.05	352.31	185.96	161.86	.163
13	614.91	46.43	661.35	39.72	351.61	188.20	161.25	.078
14	595.04	58.13	653.17	51.79	349.94	194.40	160.61	-.017

15	582.41	65.51	647.93	60.14	348.98	198.40	160.69	-.060
16	553.60	81.54	635.14	81.29	346.97	208.17	161.29	-.070
17	522.73	97.98	620.71	105.66	344.83	219.48	162.07	-.347
18	488.80	114.83	603.63	134.40	343.00	228.88	166.15	-.086
19	449.46	136.10	585.57	157.18	341.04	234.46	167.25	-.330
20	422.94	151.75	574.69	173.89	339.83	238.76	169.99	-.762
21	401.39	164.71	566.10	179.41	339.25	231.97	174.28	.104
22	373.75	182.40	556.15	169.28	338.13	213.96	173.34	.000

Cloud Radiative Effect - Level: 1, Shortwave: .0, Longwave: .0
 Cloud Radiative Effect - Level: 22, Shortwave: .0, Longwave: .0

+++++

++

Case Number in Input File: 2
 Cloudy sky, 2 clouds, April conditions, shortwave only
 Band number range: 106 - 129
 Spectral Interval: 2500 1/cm (4.00 um) to 35710 1/cm (.28 um)
 Year: 1992, Month: 4, Day: 28, Hour: 22.00
 Lat: 72.880, Lon: 144.500, Zenith Angle (degrees): 58.82
 >>> Previous profiles used.

Cloud/clear types (models) in scene (21=clear): 1 3 21

INDIVIDUAL CLOUD CHARACTERISTICS:

Model	Top	Bott	Zthick	Pthick	Frac	Tau	Ttop	Ptop	Re	WC	Phase
Index	(m)	(mb)			(K)	(mb)	(um)	(g/m^3)			

1	18	19	187.1	18.4	.40	5.0	254.0	725.0	6.0	.100	Liq
3	12	13	562.9	28.1	.60	1.0	213.0	300.0	20.0	.010	Ice

(Note: Above fraction does not include overlapping portion, if any.)

SURFACE CHARACTERISTICS:

Clear Sky Fraction: .00
 Surface Type Fractions -
 Sea Water: .05, Meltponds: .00, Snow: .95, Bare Ice: .00
 Vegetation: .00, Dry Sand: .00, Freshwater: .00
 Observed (Input) Surface Albedo (0.6 um): .750
 Broadband All-sky Surface Albedo, by type:
 1: .645 3: .616 21: .608

Broadband All-sky Surface Albedo: .628

ALL-SKY FLUXES (W/m^2), CLOUD RADIATIVE EFFECT (W/m^2), HEATING RATE (degrees K/day):

DirSW	DiffSW	TotalSW	LW	DiffSW	LW	Heating
Down	Down	Down	Down	Up	Up	NET

1	691.31	.00	691.31	.00	406.40	.00	284.91	.941
2	691.29	.01	691.30	.00	406.40	.00	284.90	1.077
3	691.10	.11	691.21	.00	406.38	.00	284.83	1.318
4	690.91	.20	691.11	.00	406.36	.00	284.75	2.400
5	690.38	.37	690.75	.00	406.33	.00	284.42	2.895
6	689.11	.74	689.85	.00	406.29	.00	283.57	2.025
7	686.90	1.53	688.43	.00	406.20	.00	282.23	1.353
8	682.75	3.53	686.27	.00	406.04	.00	280.23	.951
9	675.27	7.66	682.93	.00	405.83	.00	277.10	.643
10	655.42	20.82	676.24	.00	404.90	.00	271.34	.405
11	640.68	30.59	671.27	.00	403.77	.00	267.50	.502

12	621.25	42.61	663.86	.00	402.25	.00	261.61	2.830
13	299.33	308.59	607.92	.00	356.94	.00	250.98	.574
14	289.64	312.21	601.85	.00	355.62	.00	246.23	.705
15	283.55	314.41	597.96	.00	355.02	.00	242.94	.873
16	269.59	318.46	588.05	.00	353.84	.00	234.20	.932
17	254.58	321.91	576.49	.00	352.70	.00	223.80	1.267
18	236.83	324.58	561.41	.00	352.55	.00	208.86	1.115
19	39.13	449.43	488.56	.00	293.79	.00	194.77	.951
20	36.82	442.93	479.75	.00	292.89	.00	186.86	1.037
21	34.94	439.02	473.95	.00	292.93	.00	181.02	.730
22	32.53	434.61	467.14	.00	292.72	.00	174.42	.000

Cloud Radiative Effect - Level: 1, Shortwave: -48.7, Longwave: .0

Cloud Radiative Effect - Level: 22, Shortwave: -43.6, Longwave: .0