OCEANS SUMMARY--3 October, 1991

MODIS-N SPECIFICATIONS

1. Spectral Band Registration

- Oceans need 0.1 of 1 km pixel co-registration between VIR and NIR bands

- 0.2 of 1 km pixel co-registration between VIS/NIR and SWIR/LWIR is o.k.

2. SST accuracy

- SST Gurus absent, but...
  please keep trying to match ATSR BB performance

3. SST projected accuracies of ~.6 for longer bands is a step in the right direction

4. VIS band changes

move band 12 to 555 - SeaWiFS
move band 13 to either:

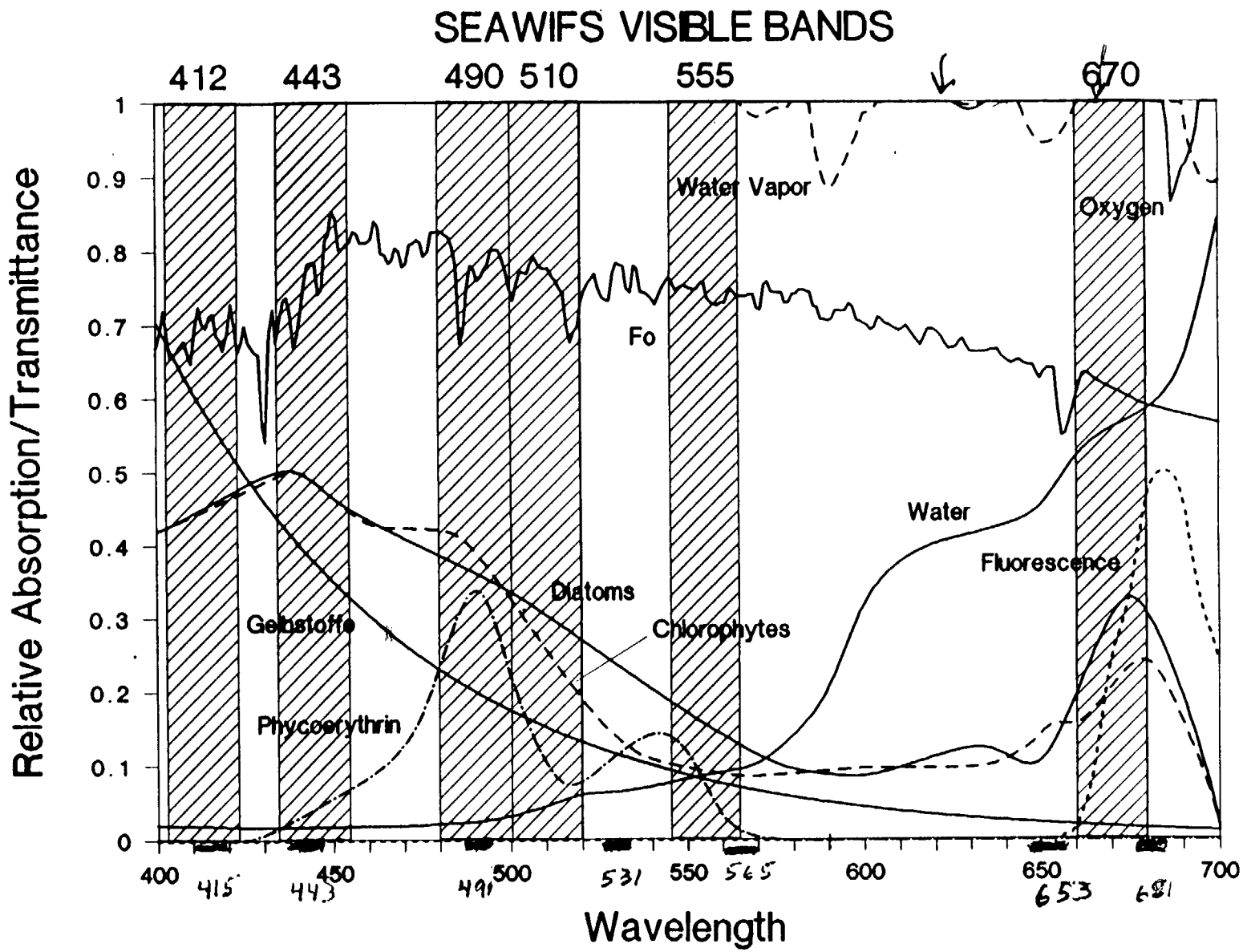
620 mm

resultant SNR is sufficient

667 mm

- Abbott, Gordon to reconcile and make recommendation in <2 months (1 Dec.)

- SBRC to look at dichroic position


SEAWIFS VISIBLE BANDS
412
443
490
510
555
670
Relative Absorption/Transmittance
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Water Vapor
Oxygen
Fo
Water
Fluorescence
Diatoms
Gelbstoffe
Chlorophytes
Phycoerythrin
400
415
443
450
491
500
531
550
565
600
650
653
681
700
Wavelength

SeaWiFS MODIS INTERACTIONS

1. SeaWiFS launch in 23 months

2. SeaWiFS algorithm development/cal-val depends on MODIS Oceans Group support at guideline levels, and additional funds from SeaWiFS

3. MODIS Ocean Group members are directed to focus on SeaWiFS

4. MOU (SeaWiFS/EOS) needed on DAAC archive and distribution of SeaWiFS data products

5. Need to clarify schedule of deliverables for certain MODIS Ocean Group members:

   - contracts

   - review

6. Demands on people's time in answering to 2 projects is a major concern

   - possible liason function

   - joint reviews of algorithms and progress thru '94

7. Out year '95, '96...efforts will coverage

REQUIRED CAPABILITIES FOR OCEAN COLOR

1. Continued data from a tilting sensor

   Coverage of the Southern Ocean at adequate temporal frequency

   Revisit times in tropics and mid lat. summers

2. Additional spectral information

   SeaWiFS corrects ambiguities in pigment, scattering, colored dissolved organic material

   Does not provide information on population composition, phycoerythrin, accessory pigments, fluorescences, reduction of errors

   Spectral information is needed for primary production models and process studies

3. Need to evolve improved calibration, characterization and product assurance over SeaWiFS

4. Adequate in-situ cal/val program

5. Primary Productivity models/coupled upper mixing layer models

REQUIREMENTS UNDER IPCC/WATSON #2 FOR MODIS T (budgets, processes)

1. Ocean head flux, budgets

2. Dissolved organic material cycle

3. Primary production/carbon cycling

4. Di-methyl sulfide (and other trace gases)

RECOMMENDATIONS

Orbits

T - Noon is best but $\leq$ 1.5 hr off is ok

N - off-noon is best

AM descending, PM ascending preferred

Sensors

MODIS-N

Excellent SNR, calibration, fluorescence @ 1 km, SST

Less than optimal global (southern ocean) sampling

Limited spectral capabilities

MODIS-T

Excellent SNR, calibration

Optimal global sampling

Full spectral coverage

Development (phase C/D) is moving along

Meets required specifications for oceans studies

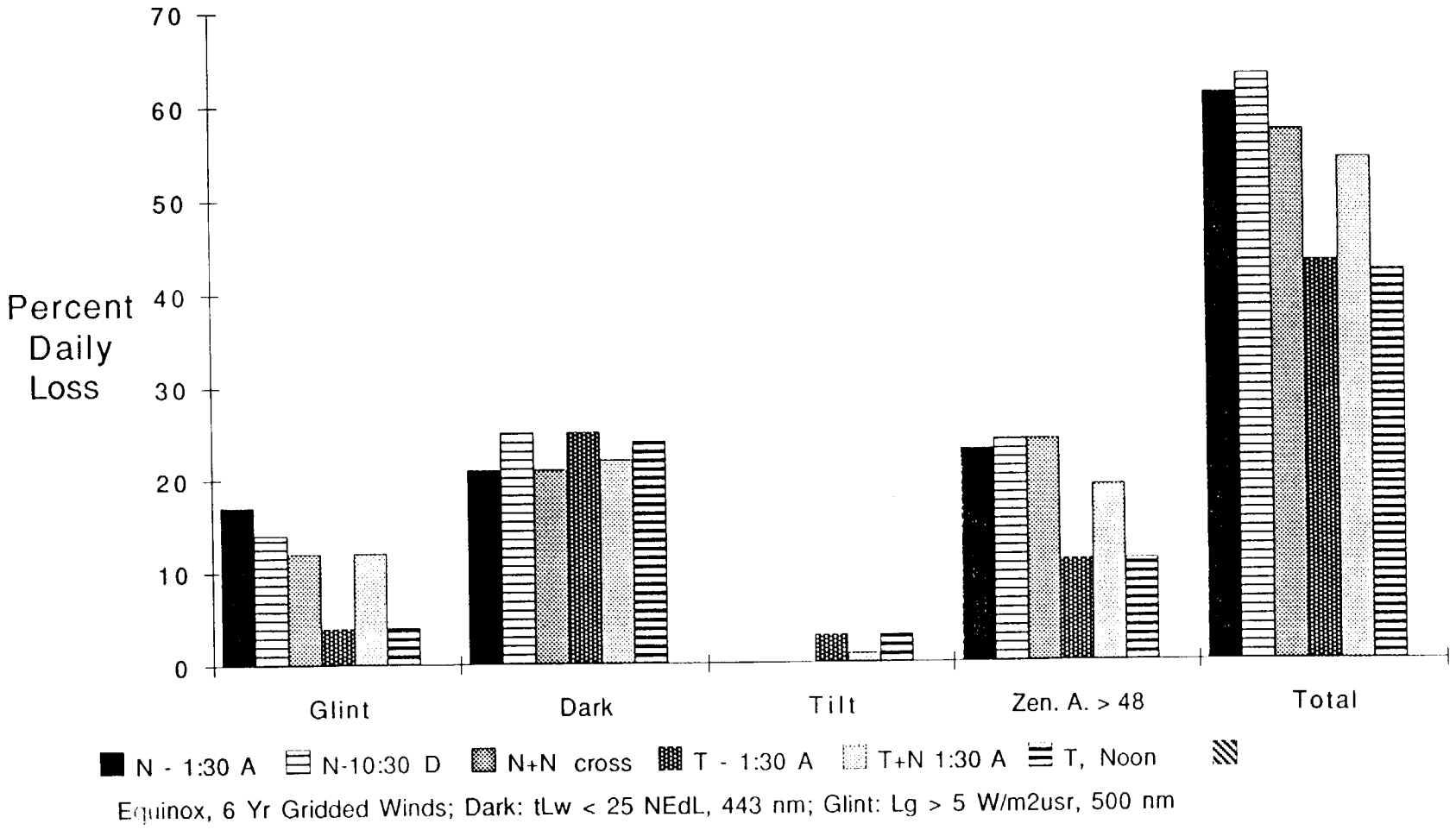
The superior ocean color instrument

Ocean Data Losses for various conditions

Sensor-Orbit	Glint	Dark	Tilt	Zen. A. > 48	Total Lost
N - 1:30 A	17	21	0	23	61
N-10:30 D	14	25	0	24	63
N+N cross	12	21	0	24	57
T - 1:30 A	4	25	3	11	43
T+N 1:30 A	12	22	1	19	54
T, Noon	4	24	3	11	42

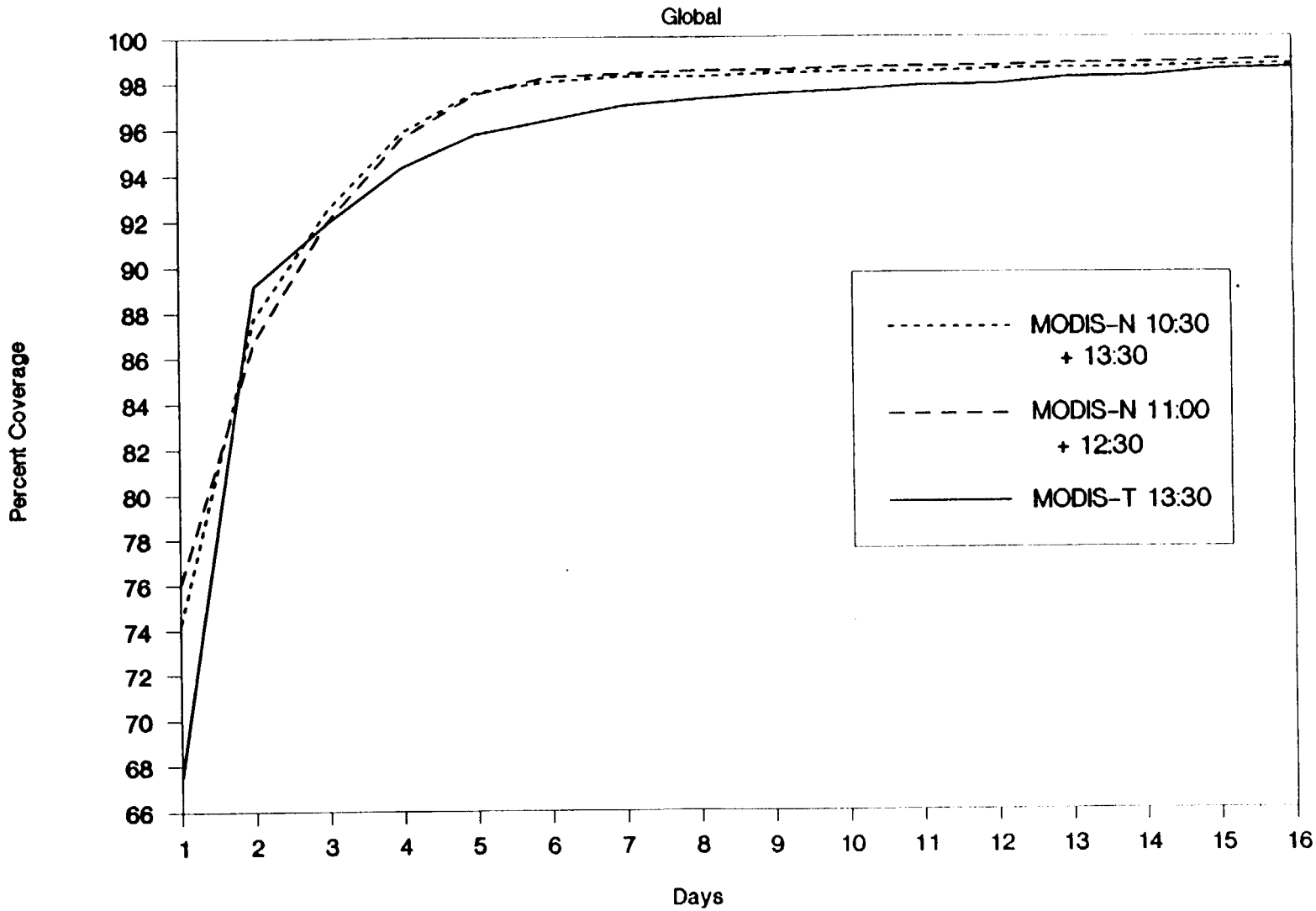
No clouds, gridded winds, equinox, 50% duty cycle
Dark is when tLw < 25 NEdL at 443 nm (ca. 2.5 CZCS counts)
Glint is when Lg > 5 W/m2usr at 500 nm (.5 mW/cm2....)

Data Loss With Various Scenarios

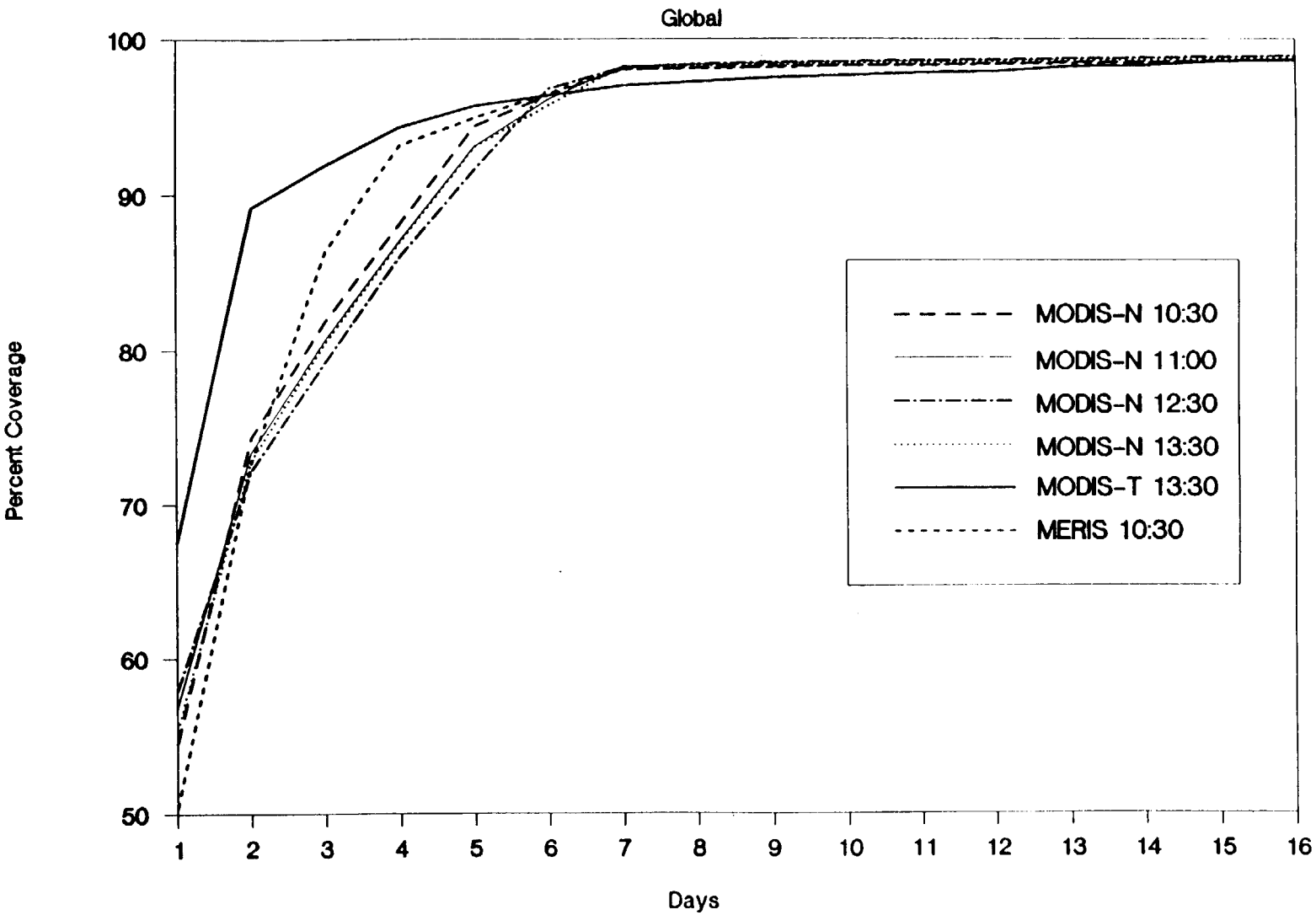


Equinox, 6 Yr Gridded Winds; Dark: tLw < 25 NEdL, 443 nm; Glint: Lg > 5 W/m2usr, 500 nm

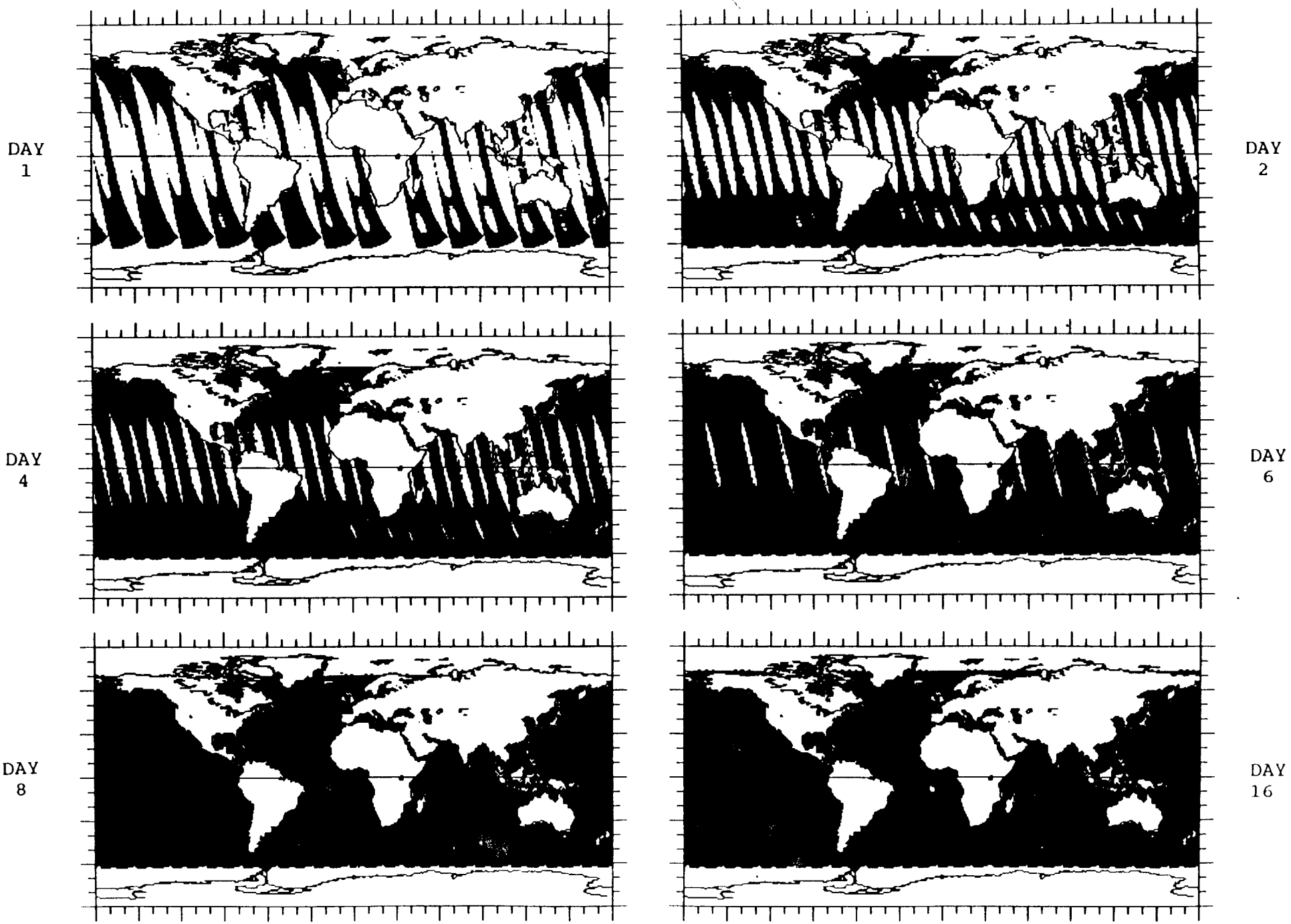
Percent Ground Coverage



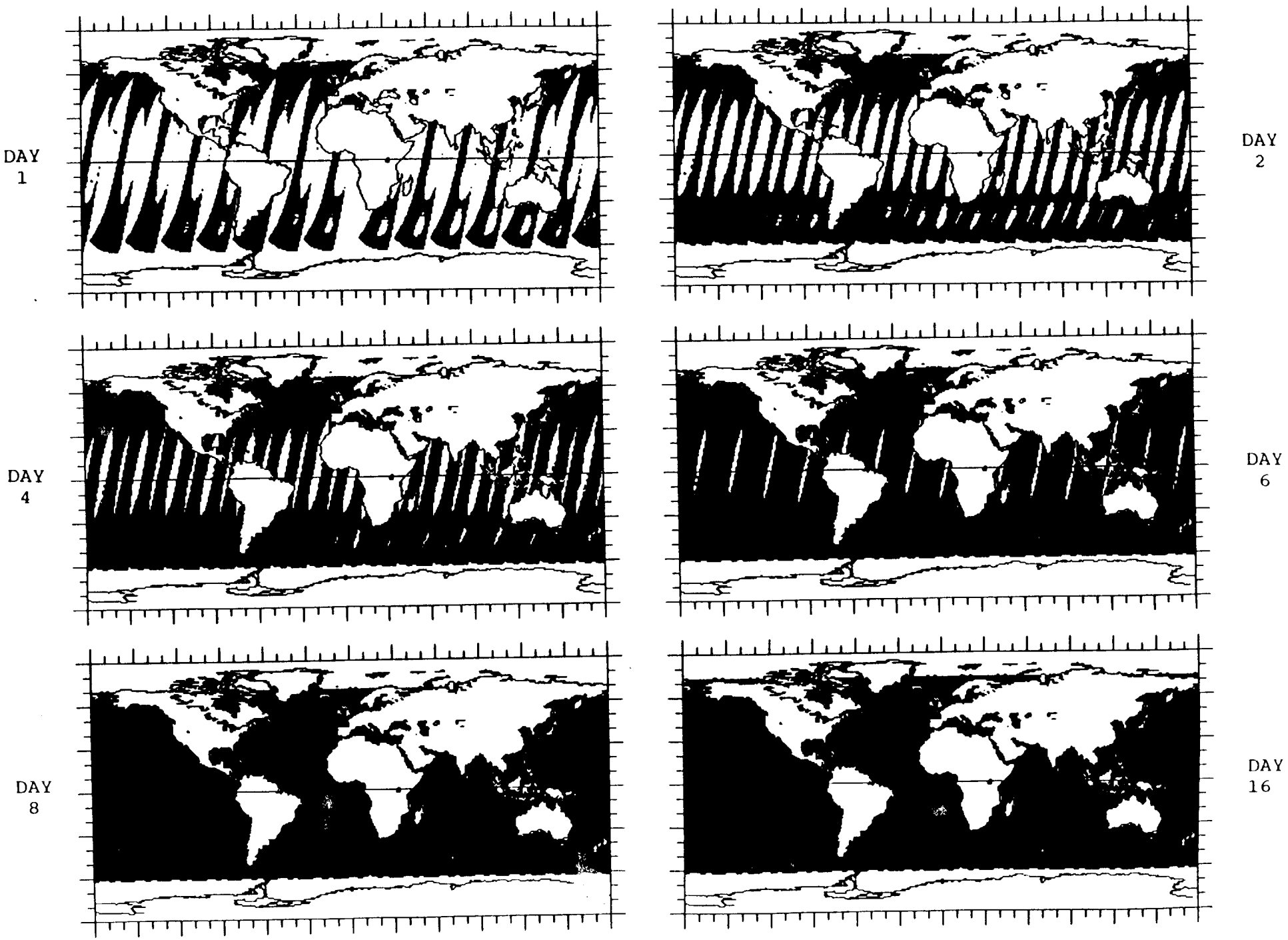
Percent Ground Coverage



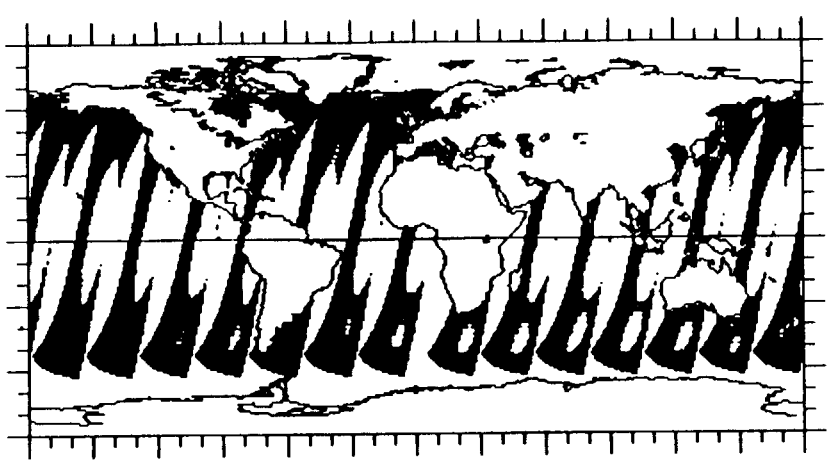
MODIS-N 1:30 PM ASCENDING



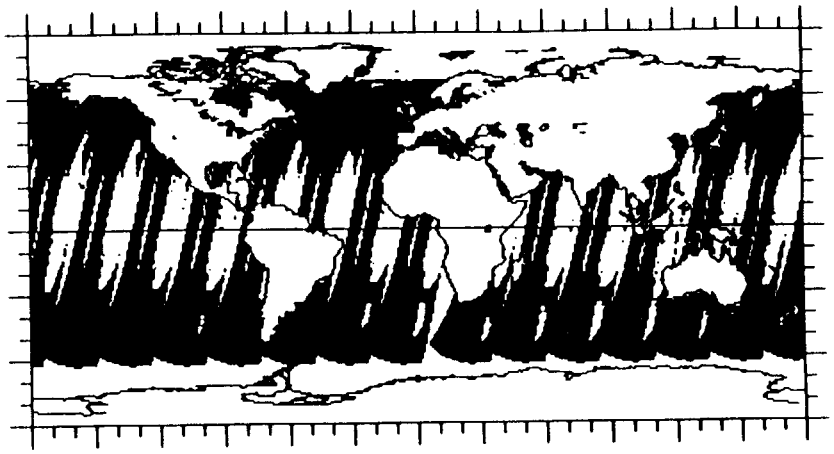
MODIS-N 10:30 AM DESCENDING



MERIS 10:30 AM DESCENDING



DAY 1



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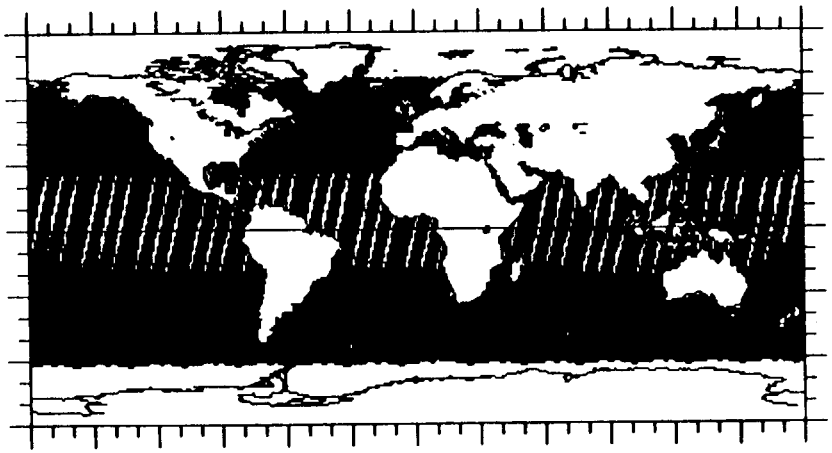

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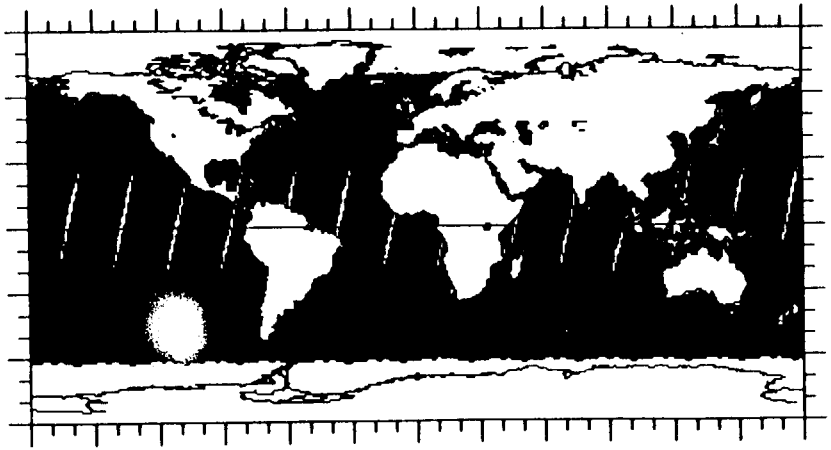

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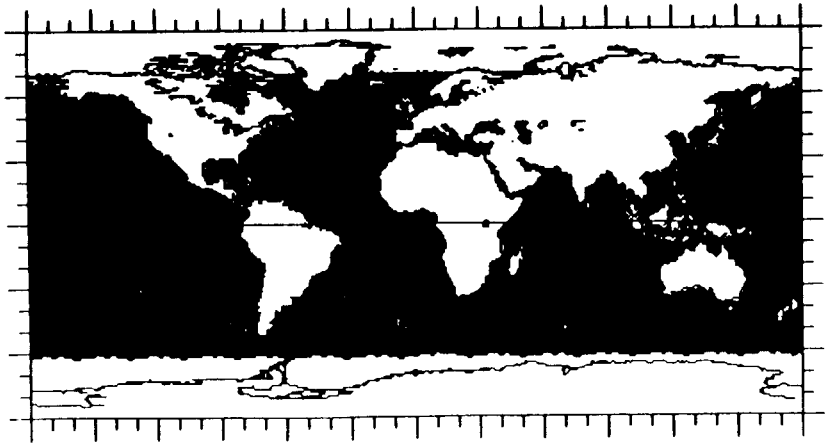

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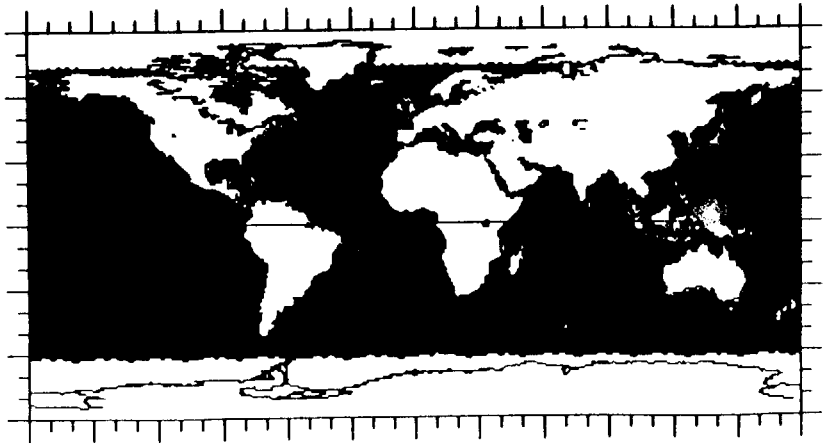
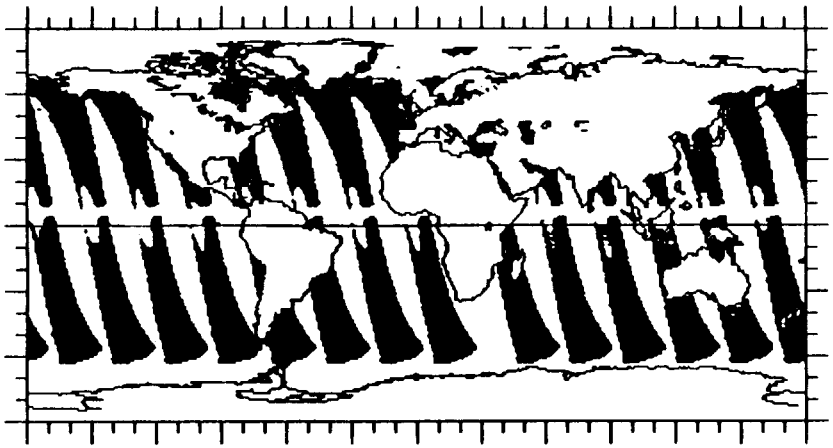


DAY 16

MODIS-T 1:30 PM ASCENDING

DAY 1



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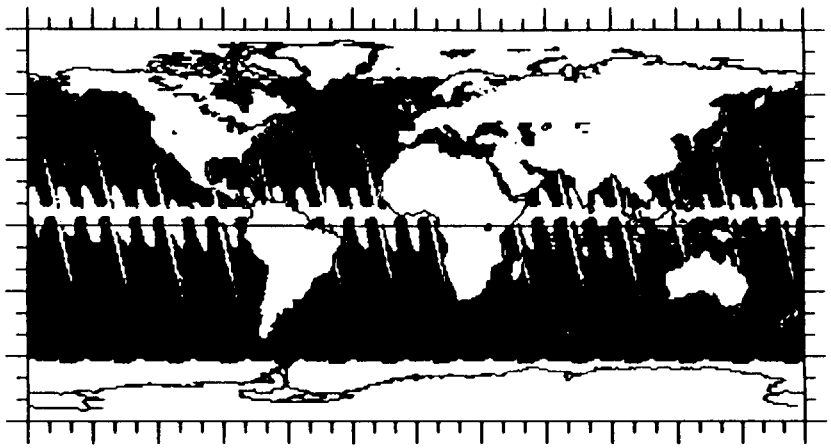

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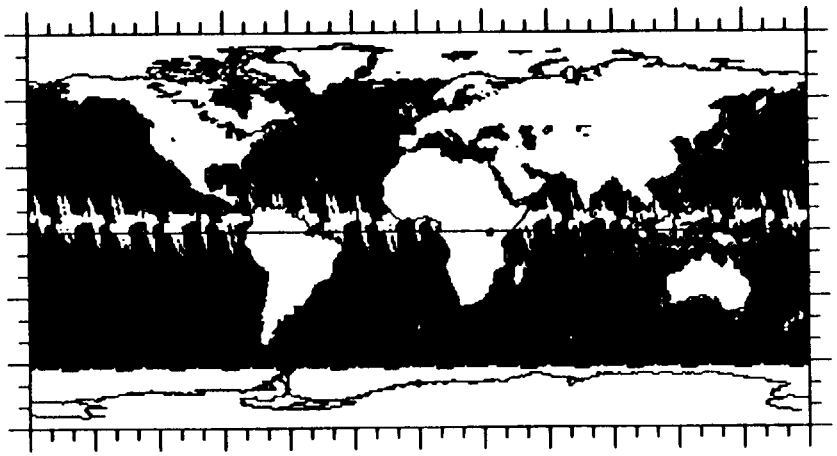

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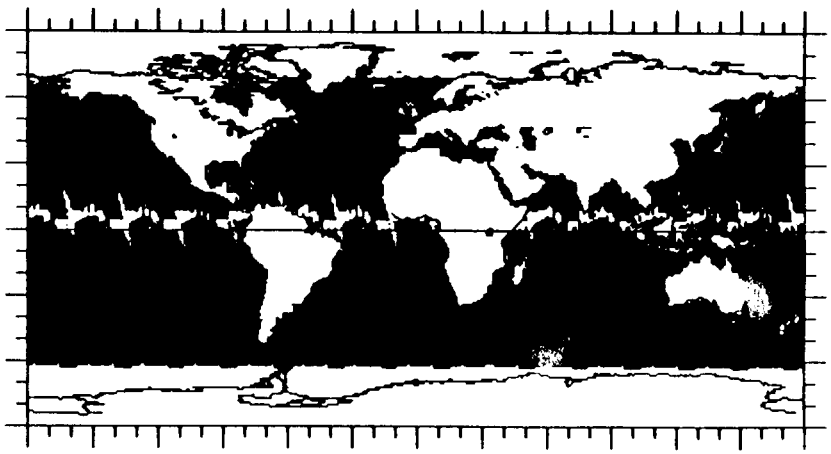

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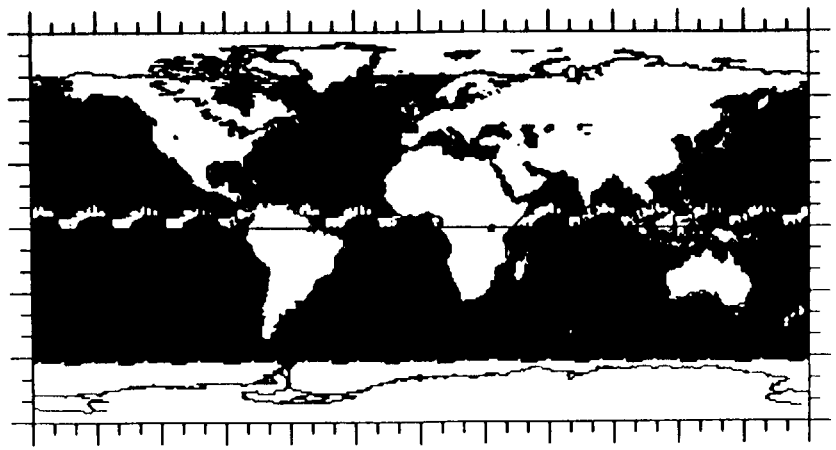

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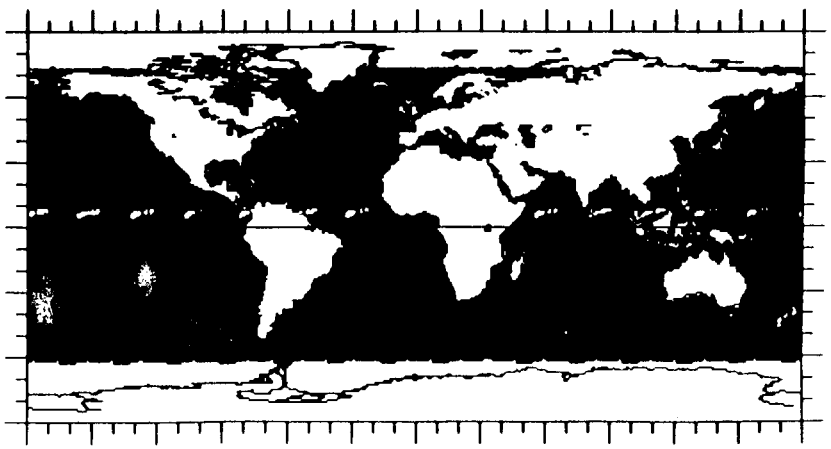

MERIS 1997 launch?

Incomplete, inconsistent specs

Lacks tilt

Poor sampling 1030 crossing - poor southern ocean

Limited spectral bands (~10 for oceans)

SeaWiFS - level SNR

Operational concerns
- US interactions
- Data availability

Won't suffice

OCTS 1995 launch?

CZCS - level SNR

SeaWiFS bands and thermal IR

No global coverage

Data access concern

GLI launch 2001/3 (Japan)

Undefined

MISR

CZCS - like on limited swath, 4 bands

Can't substitute for T or N

Provides useful additional information

MERIS SPECTRAL BANDS

1 October, 1991

O = Ocean
V = Vegetation
A = Atmosphere
TOA = At the Top of the Atmosphere

B.Nr.	[center]	L^{max} [$Wm^{-2}sr^{-1}\mu m^{-1}$]	Width	Application	Gr. Refl. [%]	Rad. Res.	Spatial Resolution	Input from
1	410	145 [O]	10	Op. + Coast. Ocean	.1 - 4	TBD	1 km [Driver] + 250 m	Morel
2	445	130 [O], 180 [V]	10	Op. + Coast.Ocean + Veg.	.2 - 3 [O] 0 - 80 [V]	$<1x10^{-4}$ [Goal] $<1x10^{-3}$ [Veg.]	1 km [Driver] + 250 m 250 m [V]	Morel, Curran/Verstraete
3	490	100 [O]	10	Op. + Coast.Ocean	.3 - 2 [O]	$<1x10^{-4}$ [Goal]	1 km [Driver] + 250 m	Morel
4	520	80 [O], 80 [V]	10	Op. + Coast.Ocean + Veg. (TBD)	.4 - .9 [O] 0. - 80 [V]	$<1x10^{-4}$ [Goal] $<1x10^{-3}$ [Veg.]	1 km [Driver] +250 m 250 m [V]	Morel, Curran/Verstrate
5	565	64 [O], 50 [V]	10	Op. + Coast.Ocean + Veg.	.3 - .8 [O]	$<1x10^{-4}$ [Goal] $<1x10^{-3}$ [Veg.]	1 km + 250 m 250 m [V]	Morel, Curran/Verstrate
6	620	51 [O]	10	Coast.Ocean	.3 - .9 [O]	$<1x10^{-4}$ [Goal]	250 m + 1km	Fischer, Morel
7	665	42 [O],100 [V]	10	Op. + Coast.Ocean + Veg.	.05- .2 [O] 0 - 80 [V]	$<1x10^{-4}$ [Goal] $<1x10^{-3}$ [Veg.]	1 km + 250 m 250 m [V]	Morel/Fischer Curran/Verstrate
8	682.5	40 [O], 150 [V]	5	Coast.+ Op. Ocean + Veg.	.05- .3 [O] 0 - 80 [V]	$<1x10^{-4}$ [Goal] $<1x10^{-3}$ [Veg.]	250 m + 1 km 250 m [V]	Morel/Fischer Curran/Verstrate
9	710 (?)	34 [O], 200 [V]	10	Ocean + Atmos. + Veg.	- [O] 0 - 80 [V]	TBD [O + A] $<1x10^{-3}$ [Veg.]	1 km + 250 m [O + A] 250 m [V]	Morel/Fischer
10	755 To be split!	24 [O],350 [A]	10 (?)	Ocean + Atmos. + Veg.	0.- 100[TOA] 0 - 80 [V]	TBD [O] Pri- TBD [A] ority? $<1x10^{-3}$ [Veg.]	1 km [O] 1 km [A] 250 m [V]	Morel Fischer Curran/Verstraete
11 - 13	762.5 765 767.5	330? [A],200 [V]	2.5 [TBD]	Atmos.	2 - 100 [A] [TOA], TBD	< 0.3 W (for albedo of 100%)	1 km [A]	Fischer
14	880	21 [O],250 [A]	10	Op. + Coast.Ocean + Atmos. + Veg.	TBD [O] 0.- 100 [A] 0 - 70 [V]	TBD [O] TBD [A] $<1x10^{-3}$ [Veg.]	1 km [O] 1 km [A] 250 m [V]	Morel Fischer Curran/Verstraete
15	900	220 [A]	10	Atmos.	0.- 100 [A]	.2 $wm^{-2}sr^{-1}$ m^{-1} [Goal]	1 km [A]	Fischer
16	1022.5	170 [A] 13.5 [O]	25	Atmos. + Ocean	TBD	TBD	1 km	Fischer, Morel

MERIS Spectral Bands

Assume:

Continuation of SeaWiFS data stream

Make data access consistent. Need EOS - level cal/val program and sensor buy now to keep costs down.

Fly:

1 MODIS-N on 1st platform 10:30 des.

2 MODIS-T on 2nd platform 1:30 asc.
with or without N

3 Don't deselect "T" until options are studied, approved

- critical to long term needs
- meets specs
- low risk
- development is in phase C/D and moving ahead

4 2 MODIS N's plus alternate platform for MODIS T

option: T/GLI on ADEOS II

option: T on Earth Probe, free flyer

5 Scatterometer for winds