The Automated Satellite Data Processing System

Ocean Color Sensor Processing

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The Automated Satellite Data Processing System: Ocean Color Sensor Processing

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Part I. Ocean Color Satellites

The chapters in Part I form a User's Guide for the ocean color processing programs available within the Automated Processing System.

Part II. Command Line Reference

The chapters in Part II form a reference guide for each program available in the Automated Processing System for ocean color processing.

Name

n2gen — calibrate and atmospherically correct ocean color data

Synopsis

n2gen *par=file*
- or -

n2gen *ifile=ifile ofile1=ofile1*
- or -

n2gen *ifile=ifile geofile=geofile ofile1=ofile1 ofile=ofile tgtfile=tgtfile aerfile=aerfile metafile=metafile* [*def_l2prod_file=def_l2prod_file*] [*l2prod1=l2prod1*] [*ofile* [*#*] *=ofile* [*#*]] [*l2prod* [*#*] *=l2prod* [*#*]] [*spixl=spixl*] [*epixl=epixl*] [*dpixl=dpixl*] [*sline=sline*] [*eline=eline*] [*dline=dline*] [*ctl_pt_incr=ctl_pt_incr*] [*proc_ocean=proc_ocean*] [*proc_land=proc_land*] [*proc_sst=proc_sst*] [*mode=mode*] [*aer_opt=aer_opt*] [*stumpf_opt=stumpf_opt*] [*stumpf_wave=stumpf_wave*] [*aer_wave_short=aer_wave_short*] [*aer_wave_long=aer_wave_long*] [*aer_swir_short=aer_swir_short*] [*aer_swir_long=aer_swir_long*] [*aer_rrs_short=aer_rrs_short*] [*aer_rrs_long=aer_rrs_long*] [*aermodmin=aermodmin*] [*aermodmax=aermodmax*] [*aermodrat=aermodrat*] [*aer_angstrom=aer_angstrom*] [*taua=taua*] [*aer_iter_max=aer_iter_max*] [*mumm_alpha=mumm_alpha*] [*mumm_gamma=mumm_gamma*] [*mumm_epsilon=mumm_epsilon*] [*absaer_opt=absaer_opt*] [*glint_opt=glint_opt*] [*outband_opt=outband_opt*] [*oxaband_opt=oxaband_opt*] [*filter_opt=filter_opt*] [*filter_file=filter_file*] [*brdf_opt=brdf_opt*] [*gas_opt=gas_opt*] [*land_opt=land_opt*] [*land_ndvi=land_ndvi*] [*land_Lt=land_Lt*] [*cloud_opt=cloud_opt*] [*sharpen=sharpen*] [*iop_opt=iop_opt*] [*pol_opt=pol_opt*] [*xcal_opt=xcal_opt*] [*resolution=resolution*] [*giop_wave=giop_wave*] [*giop_fit_opt=giop_fit_opt*] [*giop_aph_opt=giop_aph_opt*] [*giop_adg_opt=giop_adg_opt*] [*giop_bbp_opt=giop_bbp_opt*] [*giop_maxiter=giop_maxiter*] [*giop_aph_s=giop_aph_s*] [*giop_aph_w=giop_aph_w*] [*giop_adg_s=giop_adg_s*] [*giop_adg_w=giop_adg_w*] [*giop_bbp_s=giop_bbp_s*] [*giop_bbp_w=giop_bbp_w*] [*giop_aphs=giop_aphs*] [*giop_aphw=giop_aphw*] [*gsm_opt=gsm_opt*] [*gsm_fit=gsm_fit*] [*gsm_adg_s=gsm_adg_s*] [*gsm_bbp_s=gsm_bbp_s*] [*gsm_aphw=gsm_aphw*] [*gsm_aphs=gsm_aphs*] [*ndvi_wav=ndvi_wav*] [*rgb_wave=rgb_wave*] [*qaa_version=qaa_version*] [*qaa_opt=qaa_opt*] [*qaa_adg_s=qaa_adg_s*] [*qaa_wave=qaa_wave*] [*wmc_version=wmc_version*] [*ofmt=ofmt*] [*ofloat=ofloat*] [*chloc2_wave=chloc2_wave*] [*chloc2_coef=chloc2_coef*] [*chloc3_wave=chloc3_wave*] [*chloc3_coef=chloc3_coef*] [*chloc4_wave=chloc4_wave*] [*chloc4_coef=chloc4_coef*] [*chlclark_wave=chlclark_wave*] [*chlclark_coef=chlclark_coef*] [*ocm_destripe_mean_len=ocm_destripe_mean_len*] [*ocm_destripe_chunk_size=ocm_destripe_chunk_size*] [*ocm_destripe_cloud_threhold=ocm_destripe_cloud_threhold*] [*met1=met1*] [*met2=met2*] [*met3=met3*] [*ozone1=ozone1*] [*ozone2=ozone2*] [*ozone3=ozone3*] [*land=land*] [*water=water*] [*demfile=demfile*] [*icefile=icefile*] [*sstfile=sstfile*] [*no2file=no2file*] [*alphafile=alphafile*] [*tauafile=tauafile*] [*cldfile=cldfile*] [*calfile=calfile*] [*vcal_opt=vcal_opt*] [*offset=offset*] [*gain=gain*] [*albedo=albedo*] [*glint=glint*] [*absaer=absaer*]

[*sunzen=sunzen*] [*satzen=satzen*] [*epsmin=epsmin*] [*epsmax=epsmax*] [*tauamax=tauamax*] [*nlwmin=nlwmin*] [*hipol=hipol*] [*wsmax=wsmax*] [*windspeed=windspeed*] [*windangle=windangle*] [*pressure=pressure*] [*ozone=ozone*] [*watervapor=watervapor*] [*maskland=maskland*] [*maskbath=maskbath*] [*maskcloud=maskcloud*] [*maskglint=maskglint*] [*masksunzen=masksunzen*] [*masksatzen=masksatzen*] [*maskhilt=maskhilt*] [*maskstlight=maskstlight*] [*sl_frac=sl_frac*] [*sl_pixl=sl_pixl*]

Description

This program is capable of performing atmospheric correction of top-of-atmosphere (TOA) radiances from several ocean remote sensing, spaceborne spectrometers, including SeaWiFS and MOS, and deriving atmospheric and bio-optical properities using identical algorithms for both sensors. Data input format and sensor identification are automatically determined by the program, which presently recognizes SeaWiFS Level-1A or Level-1B, and MOS Level-1B. Sensor dependent details such as band-pass-weighted quantities are included in a sensor-specific external data file, and pre-computed sensor-specific look-up tables are provided for Rayleigh scattering and Rayleigh-aerosol transmittance. Aerosol model tables make use of SeaWiFS-specific coefficients, with some adjustment of the model epsilons to correct for deviations from SeaWiFS center wavelengths. The use of pre-computed SeaWiFS aerosol tables limits the ability of **n2gen** to perform atmospheric correction to sensors that do not signficantly deviate from SeaWiFS wavelengths, or sensors that contain no more than six wavelengths in the 400-700 nm.

Products

This table contains all the products (don't get dizzy) which are available from this one program! Most outputs are 2-D arrays stored in an HDF file as a Scientific Data Sets (SDS) with the given name. The products which contain *nnn* are available at each wavelength of the given sensor. For SeaWiFs these are: 412, 443, 490, 510, 555, 670, 765, and 865; for MOS these are: 408, 443, 485, 520, 570, 685, 750, and 870; and for OCTS these are: 412, 443, 490, 520, 565, 670, 765, and 865. For the eps_*nnn*_*lll* product, *lll* represents the longest wavength, that is, 865 for SeaWiFS and OCTS or 870 for MOS. Note that some products have multiple names for the same exact product. This is due to the nature of HDF's SDS interface wherein each SDS must have a unique name. Duplicate names are used for compatability between several systems which use the same code (SeaDAS, SeaWiFS Project, and NRL).

Product	**Description**
rrs_*nnn*	remote sensing reflectance at *nnn* nm
nLw_*nnn*	normalized water-leaving radiance at *nnn* nm
Lw_*nnn*	water-leaving radiance at *nnn* nm
Lr_*nnn*	Rayleigh radiance at *nnn* nm
L_q_*nnn*	polarization radiance at *nnn* nm, q-component
L_u_*nnn*	polarization radiance at *nnn* nm, u-component
polcor_*nnn*	polarization correction at *nnn* nm
La_*nnn*	aerosol radiance at *nnn* nm
TLg_*nnn*	TOA glint radiance at *nnn* nm
tLf_*nnn*	foam (white-cap) radiance at *nnn* nm
Lt_*nnn*	calibrated TOA radiance at *nnn* nm
Ltir_*nnn*	calibrated TOA radiance at *nnn* nm
rhot_*nnn*	TOA reflectance at *nnn* nm

Product	**Description**
brdf_*nnn*	BRDF coefficient at *nnn* nm
t_sol_*nnn*	Rayleigh-aerosol transmittance,sun to ground at *nnn* nm
t_sen_*nnn*	Rayleigh-aerosol transmittance,ground to sensor at *nnn* nm
t_oz_sol_*nnn*	ozone transmittance,sun to ground at *nnn* nm
t_oz_sen_*nnn*	ozone transmittance,ground to sensor at *nnn* nm
taua_*nnn*	aerosol optical depth at *nnn* nm
tau_*nnn*	same as taua_*nnn*
angstrom_*nnn*	aerosol angstrom coefficents (*nnn*,865) nm
eps_*nnn*_*lll*	ratio of *nnn* to *lll* single-scattering aerosol radiances
Es_*nnn*	extra-terestrial surface irradiance at *nnn* nm
rhos_*nnn*	surface reflectance at *nnn* nm
rhom_*nnn*	water + aeorsol reflectance at *nnn* nm (MUMM)
t_o2_*nnn*	total oxygen transmittance at *nnn* nm
t_h2o*nnn*	total water vaport transmittance at *nnn* nm
dpol_*nnn*	transmittance at *nnn* nm
alpha	polarization rotation angle
foq_*nnn*	f/Q correction to nadir at *nnn* nm
a_*nnn*	total absorption at *nnn* nm using default IOP algorithm (see iop_opt)
bb_*nnn*	backscatter at *nnn* nm using default IOP algorithm (see iop_opt)
a_*nnn*_arnone	total absorption at *nnn* nm using Arnone algorithm
bb_*nnn*_arnone	backscatter at *nnn* nm using Arnone algorithm
b_*nnn*_arnone	total scattering at *nnn* nm using Arnone algorithm
c_*nnn*_arnone	beam attenuation at *nnn* nm using Arnone algorithm
a_*nnn*_carder	total absorption at *nnn* nm using Carder algorithm
aph_*nnn*_carder	phytoplankton absorption at *nnn* nm using Carder algorithm
adg_*nnn*_carder	detris/gelbstuff absorption at *nnn* nm using Carder algorithm
bb_*nnn*_carder	backscatter at *nnn* nm using Carder algorithm
b_*nnn*_carder	total scattering at *nnn* nm using Carder algorithm
c_*nnn*_carder	beam attenuation at *nnn* nm using Carder algorithm
c_length_*nnn*_carder	beam attenuation length at *nnn* nm using Carder algorithm
a_*nnn*_gsm	total absorption at *nnn* nm using GSM algorithm

Product	**Description**
aph_*nnn*_gsm	phytoplankton absorption at *nnn* nm using GSM algorithm
adg_*nnn*_gsm	detris/gelbstuff absorption at *nnn* nm using GSM algorithm
bb_*nnn*_gsm	backscatter at *nnn* nm using GSM algorithm
bbp_*nnn*_gsm	particulate backscatter at *nnn* nm using GSM algorithm
b_*nnn*_gsm	total scattering at *nnn* nm using GSM algorithm
c_*nnn*_gsm	beam attenuation at *nnn* nm using GSM algorithm
a_*nnn*_las	total absorption at *nnn* nm using Loisel and Stramski algorithm
b_*nnn*_las	total scattering at *nnn* nm using Loisel and Stramski algorithm
bb_*nnn*_las	backscatter at *nnn* nm using Loisel and Stramski algorithm
bbp_*nnn*_las	particulate backscatter at *nnn* nm using Loisel and Stramski algorithm
c_*nnn*_las	beam attenuation at *nnn* nm using Loisel and Stramski algorithm
a_*nnn*_niwa	total absorption at *nnn* nm using NIWA algorithm
bb_*nnn*_niwa	backscatter at *nnn* nm using NIWA algorithm
a_*nnn*_qaa	total absorption at *nnn* nm using QAA algorithm
aph_*nnn*_qaa	phytoplankton absorption at *nnn* nm using QAA algorithm
adg_*nnn*_qaa	detris/gelbstuff absorption at *nnn* nm using QAA algorithm
bb_*nnn*_qaa	backscatter at *nnn* nm using QAA algorithm
bbp_*nnn*_qaa	particulate backscatter at *nnn* nm using QAA algorithm
b_*nnn*_qaa	total scattering at *nnn* nm using QAA algorithm
c_*nnn*_qaa	beam attenuation at *nnn* nm using QAA algorithm
flag_qaa	quality flags from QAA algorithm
mod_rrs_qaa	modeled rrs at 640 nm from QAA algorithm
a_*nnn*_pml	total absorption at *nnn* nm using Plymouth Marine Laboratory algorithm
aph_*nnn*_pml	phytoplankton absorption at *nnn* nm using Plymouth Marine Laboratory algorithm
adg_*nnn*_pml	detris/gelbstuff absorption at *nnn* nm using Plymouth Marine Laboratory algorithm
bb_*nnn*_pml	backscatter at *nnn* nm using Plymouth Marine Laboratory algorithm

Product	Description
bbp_*nnn*_qaa	particulate backscatter at *nnn* nm using Plymouth Marine Laboratory algorithm
c_645	beam attenuation at 645 nm using Gould algorithm
cp_645	particulate attenuation at 645 nm using Gould algorithm
wmass	water mass classification using Gould algorithm
water_mass	water mass classification image using Gould algorithm
PIM_gould	particulate inorganic matter using Gould algorithm
POM_gould	particulate organic matter using Gould algorithm
TSS_gould	total suspened particles using Gould algorithm
aph_412_gould	phytoplankton absorption at 412 nm using Gould algorithm
aph_443_gould	phytoplankton absorption at 443 nm using Gould algorithm
asd_412_gould	sediment and detrital absorption at 412 nm using Gould algorithm
asd_443_gould	sediment and detrital absorption at 443 nm using Gould algorithm
ad_412_gould	detrital absorption at 412 nm using Gould algorithm
ad_443_gould	detrital absorption at 443 nm using Gould algorithm
ag_412_gould	gelbstuff absorption at 412 nm using Gould algorithm
ag_443_gould	gelbstuff absorption at 443 nm using Gould algorithm
ap_412_gould	particulate absorption at 412 nm using Gould algorithm
ap_443_gould	particulate absorption at 443 nm using Gould algorithm
as_412_gould	sediment absorption at 412 nm using Gould algorithm
as_443_gould	sediment absorption at 443 nm using Gould algorithm
aph_443_stumpf	phytoplankton absorption at 443 nm using Stumpf's algorithm
adg_412_stumpf	DOM and gelbstuff absorption at 412 nm using Stumpf's algorithm
adg_555_stumpf	DOM and gelbstuff absorption at 555 nm using Stumpf's algorithm
a_412_stumpf	total absorption at 412 nm using Stumpf's algorithm

Product	**Description**
a_555_stumpf	total absorption at 555 nm using Stumpf's algorithm
chl_oc2	chlorophyll-a concentration using OC2 algorithm
chl_oc3	chlorophyll-a concentration using OC3 algorithm
chl_oc4	chlorophyll-a concentration using OC4 algorithm
chlor_a	chlorophyll-a concentration using sensor-specific default
chl_stumpf	chlorophyll-a concentration using Stumpf's algorithm
chl_carder	chlorophyll-a concentration using Carder's algorithm
Kd_532	diffuse attenuation at 532 nm using 490/555 ratio
K_length_532	diffuse attenuation at 532 nm using 443/555 ratio
Kd_*nnn*_lee	diffuse attenuation at *nnn* nm using Lee algorithm
Kd_490_morel	diffuse attenuation at 490 nm using Morel Eq8
Kd_490_morel_ok2	diffuse attenuation at 490 nm using Morel OK2
Kd_490_mueller	diffuse attenuation at 490 nm using Mueller
Kd_490_obpg	diffuse attenuation at 490 nm using OBPG
Kd_PAR_morel	diffuse attenuation (PAR) using Morel algorithm (1st optical depth)
Kd_PAR_lee	diffuse attenuation (PAR) using Lee algorithm (1st optical depth)
Zsd_lee	Secchi depth, Lee algorithm
Zsd_morel	Secchi depth, Morel algorithm
Zeu_lee	Euphotic depth, Lee algorithm
Zeu_morel	Euphotic depth, Morel algorithm
par	photosynthetically active radiation
ipar	instantaneous photosynthetically active radiation
arp	instantaneous absorbed radiation by photoplankton
flh	fluourescene line height
cfe	fluorescene efficiency
depth	water depth index
aerindex	aerosol index
aer_model_min	minimum bounding aerosol model #
aer_model_max	maximum bounding aerosol model #
aer_model_ratio	model mixing ratio
aer_num_iter	number of aerosol iterations, NIR correction
glint_coeff	glint radiance normalized by solar irradiance
l2_flags	level-2 processing flags

Product	Description
epsilon	retreived epsilon used for model selection
eps_78	same as epsilon
cloud_albedo	cloud albedo at 865 nm
rho_cirrus	cirrus reflectance (1380 nm)
tindx_morel	turbidity index, Morel
tindx_morel	turbidity index, Shi and Wang
latitudes	latitudes (-90.0 to 90.0)
longitudes	longitudes (-180.0 to 180.0)
solz	solar zenith angle
sola	solar azimuth angle
senz	satellite zenith angle
sena	satellite azimuth angle
pixnum	pixel number
detnum	detector number
mside	mirror side
windspeed	magnitude of wind at 10 meters
zwind	zonal wind speed at 10 meters
mwind	meridional wind speed at 10 meters
windangle	wind direction at 10 meters
water_vapor	precipital water concentration
humidity	relative humidity
pressure	barometric pressure
ozone	ozone concentration
no2_tropo	tropospheric NO2
no2_strat	stratospheric NO2
fsol	solar distance correction (1-D, not an image)
ndvi	normalized difference vegetation index
evi	enhanced vegetation index
smoke	smoke index
height	terrain height
BT_39	Brightness Temperature at 3.9 um
BT_40	Brightness Temperature at 4.0 um
BT_11	Brightness Temperature at 11 um
BT_12	Brightness Temperature at 12 um
sst	Sea Surface Temperature
sst4	4um Sea Surface Temperature
bias_sst	Sea Surface Temperature Bias
bias_sst4	4um Sea Surface Temperature Bias

Product	Description
stdv_sst	Sea Surface Temperature Standard Deviation
stdv_sst4	4um Sea Surface Temperature Standard Deviation
N_small_particles	number of small particles using Haltrin's algorithm
N_large_particles	number of small particles using Haltrin's algorithm
N_particles	number of small particles using Haltrin's algorithm
salinity	salinity using Arnone's algorithm
horiz_vis	horizontal diver visibility using 4.8/c_531_lee
horiz_vis_645	horizontal diver visibility using 4.8/c_645
vert_vis	vertical diver visibility using 4.0/(c_531_lee +Kd_531_lee)
lidar	LIDAR penetration from Kd

Options

Each of these options listed below must be placed on the command line or in the parameter files as keyword=value pairs. If the enviornment variables (see Environmental Variables below) are defined, then the only required keyword=value pairs are ifile and ofile1. The others have reasonable defaults.

par Input parameter file to be used in the specific command mode **n2gen, par="pfile"**. The parameter file is a text file containing the user-defined keyword=value pairs, each on a single line.

Input/Output File

n2gen has the ability to output up to four seperate files each with their own list of products (ofile1, ofile2, ofile3, and ofile4 contain the names of each file, and l2prod1, l2prod2, l2prod3, and l2prod4 contain the list of desired products for each output file). This allows the user to seperate products into various output files.

ifile Directory path and filename of the input level-1A data product. An OCTS input must be either a NASDA L1B format file or a SIMBIOS-format L1B file (generated by l1bocts). A MOS input must be MOS-B L1B data. A SeaWiFs input may be either a L1A or L1B file.

ofile1 Directory path and filename of the output Level-2 HDF file containing the products specified in the defaults file def_l2prod_file or by the **l2prod1** keyword.

def_l2prod_file The file containing the default output products by files. (Default=$APS_DATA/*sensor*/*sensor*_def_l2prod.dat.)

l2prod1 The product names (see main description section above) to be output to ofile1.

ofile[2-4] Directory path and filename of the output L2 files containing the products specified in the default file def_l2prod_file or by the l2prod[2-4] keyword.

l2prod[2-4] The product names (see main description section above) to be output to ofile[2-4].

ofmt *n* This keyword defines the type of file output. If set to 0 or 1, a flat binary type of format is written. The default value of 2, creates the standard NASA HDF fileformat. A value of 3 will produce an NRL HDF fileformat.

Input File Parameters

n2gen has the ability to subsection/subsample the input file and to control the number of control points in each output file. If not specified, n2gen will work on the entire input file.

spixl — Starting pixel to be processed (default=1)

epixl — End pixel to be processed (default=0, meaning the last pixel in the scan line)

dpixl — Pixel subsampling interval (default=1)

sline — Starting line number to be processed (default=1)

eline — Ending line number to be processed (default=0, meaning the last line in file)

dline — Line subsampling interval (default=1)

ctl_pt_incr — Control-point pixel increment for lon/lat arrays (0=optimize, default=8)

Calibration Control Options

These keywords control the calibration of the input data.

calfile — Directory path and filename of the input calibration table file. The default is $CAL_HDF_PATH.

vcal_opt — Control for calibration modification: 0 - use gain, offset from the calibration table 1 - use the gain (as multipliers of the existing gains in the table file) from the input (gain) and offset from the calibration table 2 - use offsets from the input (offset) and the gains from the calibration table 3 - use both gain (as multipliers of the existing gains in the table file) and offset from the input (gain & offset)

gain — Calibration gain factors to multiply the gain values read from the $APS_DATA/*sensor*/*sensor*_table.dat file. Defaults to [0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0].

offset — Calibration gain offset factors to substitute for values read from the calibration table. Defaults to [1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0].

Ancillary Input Files

These keywords control the ancilliary input files. If the environment variables have been set (see Environmental Variables), then these keywords have reasonable defaults. If they are not set, then the user *must* define these: land, water, met1, and ozone1.

land — Directory path and filename of the land-mask input file. Default is $APS_DATA/landmask.dat

water — Directory path and filename of the shallow water mask input file used for setting the l2_flags bit to indicate shallow water (defined as 30m) areas (McClain et al., 1995). Default is $APS_DATA/watermask.dat

met1 — Directory path and filename of the climatological product or the near-real-time (NRT) meteorological ancillary data product available for the nearest time preceding the time of ifile product's first scan line. If met1 is the climatological file, then met2 and met3 will not be used, otherwise, see met2 for logic. Default is $MSL1_DATA/CLIMATOLOGY.MET.

met2 — Directory path and filename of the NRT meteorological ancillary data product available for the nearest time following the time of ifile product's first scan line's. If met2 is not specified (null) and met1 is a NRT product, then met2 will be set to met1. If met1 <> met2 and the scan line's date and time, fall between the times of met1 and met2, get_ancillary will use met1 and met2

to generate the interpolated meteorological values (if the scan line's date and time fall before those of met1, an error occurs). If met1 = met2 and the scan line's date and time fall before met2, get_ancillary will use only met2 to generate the meteorological values. If met2 <> met3 and the scan line's date and time fall between the times of met2 and met3, get_ancillary will use met2 and met3 to generate the interpolated meteorological values (if the scan line's date and time fall after those of met3, an error occurs). If met2 = met3 and the scan line's date and time fall after met2, get_ancillary will use only met2 to generate the meteorological values.

met3 Directory path and filename of the NRT meteorological ancillary data product for the nearest time following the time of ifile product's last scan line. If met3 is not specified (null) and met1 is a NRT product, then met3 will be set to met2 and the logic specified in met2 will be applied.

ozone1 Directory path and filename of the climatological product or the NRT ozone ancillary data product available for the nearest time preceding the time of ifile product's first scan line. If ozone1 is the climatological file, then ozone2 and ozone3 will not be used, otherwise see ozone2 for logic. (For TOVS data, the center point time is used to represent the time of that product.) Defaults to $APS_DATA/CLIMATOLOTY.OZONE.

ozone2 Directory path and filename of the NRT ozone ancillary data product available for the nearest time following the time of ifile product's first scan line's. If ozone2 is not specified (null) and ozone1 is a NRT product, then ozone2 will be set to ozone1. If ozone1 <> ozone2 and the scan line's date and time, fall between the times of ozone1 and ozone2, get_ancillary will use ozone1 and ozone2 to generate the interpolated ozone values (if the scan line's date and time fall before those of ozone1, an error occurs). If ozone1 = ozone2 and the scan line's date and time fall before ozone2, get_ancillary will use only ozone2 to generate the ozone values. If ozone2 <> ozone3 and the scan line's date and time fall between the times of ozone2 and ozone3, get_ancillary will use ozone2 and ozone3 to generate the interpolated ozone values (if the scan line's date and time fall after those of ozone3, an error occurs). If ozone2 = ozone3 and the scan line's date and time fall after ozone2, get_ancillary will use only ozone2 to generate the ozone values. (For TOVS data, the center point time is used to represent the time of that product.)

ozone3 Directory path and filename of the NRT ozone ancillary data product for the nearest time following the time of ifile product's last scan line. If ozone3 is not specified (null) and ozone1 is a NRT product, then ozone3 will be set to ozone2 and the logic specified in ozone2 will be applied. (For TOVS data, the center point time is used to represent the time of that product.)

Algorithm control options

These keywords modify and/or select the algorithms used to correct the input data or change certain thresholds used for various tests.

ocm_destripe_mean_len The number of pixels used in a running mean which gives smooth data to derive correction coefficients from. Default = 30 pixels. OCM only.

ocm_destripe_chunk_size The number of lines used for each chunk of the image used to derive striping correction coefficients. Each chunk of lines is averaged into a mean scan for that chunk. A running mean of this mean scan gives the estimate of de-striped data from which correction coefficients are derived. All scan lines are used from the processed segment of the image and the resulting correction coefficients are averaged together (excluding noise) to produce the coefficients used to apply to the entire image. Default=100. OCM only.

ocm_destripe_cloud_threshold The Lt(865) cloud/land threshold for OCM destriping. This threshold is used to exclude pixels from the destripe algorithm used

to derive correction coefficients for all bands. Defaults to 0.75. OCM only.

filter_opt

Option for filtering the L1B data with the method specified in filter_file. 1=apply filtering , 0=do not apply filtering. (Default for OCTS=1, Default for others=0).

filter_file

Directory path and filename of the filter file that contains the filter method and information to be applied to the L1B data when *filter_opt* is set to 1. (Default=$APS_DATA/*sensor*/*sensor*_filter.dat).

outband_opt

SeaWiFs out-of-band corrections. 0 = no correction, 1 = no Lw correction, 2 = full correction. (Default = 1 for SeaWiFs, 0 for all others)

oxaband_opt

SeaWiFs/OCTS 764nm band Oxygen correction. 0 = off, 1 = on. (Default = 1 for SeaWiFs and OCTS, 0 for others)

glint_opt

Correct for residual glint radiance. 0 = off, 1 = on. (Default = 0)

aer_opt

Option for aerosol calculation mode. The default is -3.

Value	Description
1	Multi-scattering with fixed model (Oceanic, 90% humidity)
2	Multi-scattering with fixed model (Oceanic, 99% humidity)
3	Multi-scattering with fixed model (Maritime, 50% humidity)
4	Multi-scattering with fixed model (Maritime, 70% humidity)
5	Multi-scattering with fixed model (Maritime, 90% humidity)
6	Multi-scattering with fixed model (Maritime, 99% humidity)
7	Multi-scattering with fixed model (Coastal, 50% humidity)
8	Multi-scattering with fixed model (Coastal, 90% humidity)
9	Multi-scattering with fixed model (Coastal, 99% humidity)
10	Multi-scattering with fixed model (Tropospheric - 50% humidity)

11	Multi-scattering with fixed model (Tropospheric - 90% humidity)
12	Multi-scattering with fixed model (Tropospheric - 99% humidity)
0	Single-scattering white aerosols
-1	Multi-scattering with 2-band model selection
-3	Multi-scattering with 2-band model selection with iterative NIR correction
-9	Multi-scattering with 2-band model selection with SWIR correction (High-Resolution MODIS only)

aer_wave_short
: shortest sensor wavelength for aerosol model selection (default: 765 or similar)

aer_wave_long
: longest sensor wavelength for aerosol model selection (default: 865 or similar)

aer_swir_short
: shortest sensor wavelength for SWIR-based NIR Lw correction (default: -1)

aer_swir_long
: longest sensor wavelength for SWIR-based NIR Lw correction (default: -1)

aermodmin
: lower-bounding model to use for fixed model pair aerosol option (default: -1)

aermodmax
: upper-bounding model to use for fixed model pair aerosol option (default: -1)

aermodrat
: ratio to use for fixed model pair aerosol option (default: 0.0)

aer_iter_max
: The maximum number of aerosol iterations (Default = 10 for any NIR algorithm).

tau_a
: Aerosol optical thickness at 865 nm for fixed model. If tau_a > 0 and aer_opt > 0, then the input tau_a will be used to derive aerosol reflectance.

qaa_version
: Select QAA algorithm version. Version 4 is based on Rrs@640 nm and Version 5 is based on Rrs@670.

qaa_opt
: Source of 640 reflectance for use in QAA algorithm version 4. 0 is using the Rrs@640 (useful only for the Hi-Res MOIS and MERIS sensors). 1 is for using a synthetically derived Rrs@640.

qaa_wave
: Used to define the sensor wavelengths that best are to be used for the QAA algorithm.

qaa_adg_s	Define the S parameter to use in the QAA algorithm. Default is 0.015.
sunzen	Solar zenith angle in degrees; threshold for setting the l2_flags bit to indicate large solar zenith angles (McClain et al., 1995). Default is 65.0.
satzen	Spacecraft zenith angle in degrees; threshold for setting the l2_flags bit to indicate large satellite zenith angles (McClain et al., 1995). Default is 56.0.
albedo	Cloud albedo for band 8 in percent; threshold for setting the l2_flags bit to indicate clouds or ice (McClain et al., 1995).
absaer	Absorbing aerosol threshold on aerosol index. Default is 0.5.
glint_thresh	Sun glint threshold (fraction of F0(865)); used in calculations for setting the l2_flags bit to indicate sun glint (McClain et al., 1995).
tauamax	Maximum 865 aerosol optical depth used for setting the l2_flags bit #5. (Default=0.3)
epsmin	Minimum epsilon to trigger atmospheric correction failure flag (default is 0.65).
epsmax	Maximum epsilon to trigger atmospheric correction failure flag (default is 1.35).
nlwmin	Minimun nlw(555) used for setting the l2_flags bit #15. (Default=0.15).
wsmax	Windspeed limit on white-cap correction. (Default=8.0 m/s).
sl_frac	Lt 865 threshold for stray-light correction. (SeaWiFs only.) (Default = 0.25)
sl_pixl	Number of LAC pixels over which stray-light correction is applied. 0 = no correction, -1 = program defaults (8 for GAC, 3 for LAC)

Masking keywords

These keywords select flags to be used as masks. A mask is a special flag that will cease execution on the pixel which passes the flag. For example, maskland will skip all land pixels.

maskland	Mask out land pixels: 0=off, 1=on. (Default=1).
maskbath	Mask out shallow water pixels: 0=off , 1=on. (Default=0).
maskcloud	Mask out cloud or ice pixels: 0=off, 1=on. (Default=1).
maskglint	Mask out sun glint pixels: 0=off, 1=on. (Default=1).
masksunzen	Mask out large solar zenith angle pixels: 0=off, 1=on. (Default=0).
masksatzen	Mask out large sensor zenith angle pixels: 0=off, 1=on. (Default=0).
maskhilt	Mask out pixels for which total radiance was greater than knee value: 0=off, 1=on. (Default=1).

maskstlight — Mask out stray light contaminated pixels: 0=off, 1=on. (Default=1).

Debugging controls

station_input — The name of an input station file. The format is UNIX text file with three columns. The first two are the sample and line location of the desired pixel and the last is an ASCII station name field. During each iteration of the atmosopheric correction information will be dumped to an output file designated by station_output

station_output — The name of an output station file. This will receive the data dumps for each station for each iteration of the atmospheric correction algorithm.

Environmental Variables

APS_DATA — Root directory for atmospheric correction data files. If this environmental variable is not set, then several ancilliary input file keywords will have to be defined. See ANCILLIARY INPUT FILES above.

`CAL_HDF_PATH` — The directory and pathname of the sensor calibration file. May be undefined if *calfile* keyword has been set.

Examples

This the minimum command line execution (assumes the enviornmental variables have been set as shown):

```
>
$ export APS_DATA=/home/aps/aps_v3.8.2.3-72-g7b866d/data
$ export CAL_HDF_PATH=$APS_DATA/seawifs/cal/SEAWIFS_SENSOR_CAL.TBL
$ n2gen ifile=S2000148173615.L1A_HNAV ofile1=S2000148173615.L2_HNAV
```

In this example, the user has selected to output the remote sensing reflectance data into one file, the bio-optical products K_490 and chl_oc4 in another, and some of the Arnone IOP products in a third. It also turns off the masking of high Lt values and increases the cloud and ice threshold to 1.5.

```
>
$ n2gen ifile=S2000148173615.L1A_HNAV ofile1=S2000148173615.L2.rrs \
     l2prod1="rrs_412 rrs_443 rrs_490 rrs_510 rrs_555 rrs_670" \
     ofile2=S2000148173615.L2.bio l2prod2="chl_oc4 K_490" \
     ofile3=S2000148173615.L2.iop l2prod3="a_443_qaa bb_555_qaa" \
     albedo=0.3 maskhilt=0
```