CSU – RAMS

REVU Post-Processing Package
Model Variable Listing
&
Diagnostic Process Budget Variables

This document contains a list of output variables that can be specified in the REVU post-processing namelist "REVU_IN" for output in ASCII and HDF5 format. This provides an ASCII-ID, the variable string to input in REVU_IN, and a description of the variable with units. Also provided is a current list and description of available diagnostic process budget variables in which most are microphysical budgets.

Prepared by:

Stephen Saleeby
Department of Atmospheric Science
Colorado State University

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RAMS OUTPUT VARIABLES:

ASCII ID:	REVU INPUT NAME:	Description with units:
DEFAULT EMPTY VARIABLES USED AS PLACE HOLDERS – 1 variables		
EMT3	empty3d	nothing here – all zeros
AEROSOL AOD 2D – 18 variables		
These are generated after running RAMS output through "AOD-Python" post-processing code. Requires inputting ALL simulation vertical levels into "AOD-Python" and reformatting RAMS "head" files for these new variables. Bash scripts are available for generating AOD. AOD at 550nm is default.		
ACND	ccn_dry_AOD_550	CCN AOD(dry aerosol value)
ACNW	ccn_wet_AOD_550	CCN AOD(hydrated, RH mask)
AD1D	dust1_dry_AOD_550	Dust-1 AOD(dry aerosol value)
AD1W	dust1_wet_AOD_550	Dust-1 AOD(hydrated, RH mask)
AD2D	dust2_dry_AOD_550	Dust-2 AOD(dry aerosol value)
AD2W	dust2_wet_AOD_550	Dust-2 AOD(hydrated, RH mask)
AR1D	regen_aero1_dry_AOD_550	Regenerated-1 AOD(dry aerosol value)
AR1W	regen_aero1_wet_AOD_550	Regenerated-1 AOD(hydrated, RH mask)
AR2D	regen_aero2_dry_AOD_550	Regenerated-2 AOD(dry aerosol value)
AR2W	regen_aero2_wet_AOD_550	Regenerated-2 AOD(hydrated, RH mask)
ASFD	salt_film_dry_AOD_550	Salt-film AOD(dry aerosol value)
ASFW	salt_film_wet_AOD_550	Salt-film AOD(hydrated, RH mask)
ASJD	salt_jet_dry_AOD_550	Salt-jet AOD(dry aerosol value)
ASJW	salt_jet_wet_AOD_550	Salt-jet AOD(hydrated, RH mask)
ASSD	salt_spume_dry_AOD_550	Salt-spume AOD(dry aerosol value)
ASSW	salt_spume_wet_AOD_550	Salt-spume AOD(hydrated, RH mask)
ATOD	Total_dry_AOD_550	Sum Total AOD(dry aerosol value)
ATOW	Total_wet_AOD_550	Sum Total AOD(hydrated, RH mask)
AEROSOL EXTINCTION COEFFICIENT 3D – 18 variables		
Same as aerosol AOD from AOD-Python code, except for extinction coeff.		
ECND	ccn_dry_ext_550	CCN dry extinction(1/Mm)
ECNW	ccn_wet_ext_550	CCN wet extinction(1/Mm)
ED1D	dust1_dry_ext_550	Dust-1 dry extinction(1/Mm)
ED1W	dust1_wet_ext_550	Dust-1 wet extinction(1/Mm)
ED2D	dust2_dry_ext_550	Dust-2 dry extinction(1/Mm)
ED2W	dust2_wet_ext_550	Dust-2 wet extinction(1/Mm)
ER1D	regen_aero1_dry_ext_550	Regenerated-1 dry extinction(1/Mm)
ER1W	regen_aero1_wet_ext_550	Regenerated-1 wet extinction(1/Mm)
ER2D	regen_aero2_dry_ext_550	Regenerated-2 dry extinction(1/Mm)
ER2W	regen_aero2_wet_ext_550	Regenerated-2 wet extinction(1/Mm)
ESFD	salt_film_dry_ext_550	Salt-film dry extinction(1/Mm)
ESFW	salt_film_wet_ext_550	Salt-film wet extinction(1/Mm)
ESJD	salt_jet_dry_ext_550	Salt-jet dry extinction(1/Mm)
ESJW	salt_jet_wet_ext_550	Salt-jet wet extinction(1/Mm)
ESSD	salt_spume_dry_ext_550	Salt-spume dry extinction(1/Mm)
ESSW	salt_spume_wet_ext_550	Salt-spume wet extinction(1/Mm)
ETOD	Total_dry_ext_550	Sum Total dry extinction(1/Mm)
ETOW	Total_wet_ext_550	Sum Total wet extinction(1/Mm)
3D VELOCITY AND VORTICITY VARIABLES – 21 variables		
UWND	u	u(m/s)
VWND	v	v(m/s)
UWDA	u_avg	u_avg(m/s)
VWDA	v_avg	v_avg(m/s)
UEWD	ue	ue(m/s)

VEWD	ve	ve(m/s)
UEWA	ue_avg	ue_avg(m/s)
VEWA	ve_avg	ve_avg(m/s)
WWND	w	w(m/s)
WCMS	wcms	w(cm/s)
WAVG	w_avg	w_avg(m/s)
SPED	speed	speed(m/s)
SMPH	speed_mph	speed(mph)
SP10	speed10m	speed-10m-AGL(m/s)
DRCT	direction	direction(deg)
XVOR	relvortx	x-vorticity(rad/s)
YVOR	relvorty	y-vorticity(rad/s)
ZVOR	relvortz	relative-z-vorticity(rad/s)
AVOR	absvortz	absolute-z-vorticity(rad/s)
PVOR	potvortz	potential-z-vorticity(rad/s)
HDIV	horiz_div	horizontal-divergence(/s)

3D THERMODYNAMIC PROPERTIES OF AIR – 18 variables

XNER	pi	Exner-func(J/kg*K)
PRES	press	pressure(mb)
PPRM	pprime	mslp-perturbation(mb)
THIL	theta_il	ice-liquid-potential-temp(K)
THTA	theta	potenial-temperature(K)
DEN0	dn0	reference-density(kg/m3)
XNR0	pi0	reference-Exner-function(J/kg*K)
THV0	th0	reference-virtual-potential-temp(K)
PERT	pert_pressure	perturbation-pressure(mb)
TMPK	tempk	temperature(K)
TMPC	tempc	temperature(C)
TMPF	tempf	temperature(F)
THTE	theta_e	equivalent-potential-temp(K)
THTV	theta_v	virtual-potential-temp(K)
THTR	theta_rho	density-potential-temp(K)
BOYL	buoyancy_liquid	buoyancy-liquid(m/s2)
TMPF2	tempf2m	temp-2m-AGL(F)
TMPC2	tempc2m	temp-2m-AGL(C)

3D HYDROMETEOR GAMMA DISTRIBUTION INFO – 22 VARIABLES

CGDM	cloud_gam_dm	cloud mass-weighted-mean-diam(mm)
CGD0	cloud_gam_d0	cloud volumetric-mean-diam(mm)
RGDM	rain_gam_dm	rain mass-weighted-mean-diam(mm)
RGD0	rain_gam_d0	rain volumetric-mean-diam(mm)
RGNW	rain_gam_lognw	rain normalized-intercept(1/mm x 1/m3)
RGSG	rain_gam_sigma	rain mass-spectrum-stdv(mm)
SGDM	snow_gam_dm	snow mass-weighted-mean-diam(mm)
SGD0	snow_gam_d0	snow volumetric-mean-diam (mm)
SGNW	snow_gam_lognw	snow normalized-intercept(1/mm x 1/m3)
SGSG	snow_gam_sigma	snow mass-spectrum-stdv(mm)
AGDM	aggr_gam_dm	aggregate mass-weighted-mean-diam(mm)
AGD0	aggr_gam_d0	aggregate volumetric-mean-diam(mm)
AGNW	aggr_gam_lognw	aggregate normalized-intercept(1/mm x 1/m3)
AGSG	aggr_gam_sigma	aggregate mass-spectrum-stdv(mm)
GGDM	grau_gam_dm	graupel mass-weighted-mean-diam(mm)
GGD0	grau_gam_d0	graupel volumetric-mean-diam(mm)
GGNW	grau_gam_lognw	graupel normalized-intercept(1/mm x 1/m3)
GGSG	grau_gam_sigma	graupel mass-spectrum-stdv(mm)
HGDM	hail_gam_dm	hail mass-weighted-mean-diam(mm)
HGD0	hail_gam_d0	hail volumetric-mean-diam(mm)

HGNW	hail_gam_lognw	hail normalized-intercept(1/mm x 1/m3)
HGSG	hail_gam_sigma	hail mass-spectrum-stdv(mm)

3D MOISTURE MASS MIXING RATIOS AND HUMIDITY — 37 variables

VPRS	vapr_press	vapor-pressure(mb)
RSLF	rslf	liquid-supersat-mixing-ratio(g/kg)
RSIF	rsif	ice-supersat-mixing-ratio(g/kg)
VMIX	vapor	vapor-mixing-ratio(g/kg)
CMIX	cloud	cloud-mixing-ratio(g/kg)
CMXV	cloud_m3	cloud-mixing-ratio(g/m3)
RMIX	rain	rain-mixing-ratio(g/kg)
RMXV	rain_m3	rain-mixing-ratio(g/m3)
PMIX	pristine	pristine-mixing-ratio(g/kg)
PMXV	pristine_m3	pristine-mixing-ratio(g/m3)
SMIX	snow	snow-mixing-ratio(g/kg)
SMXV	snow_m3	snow-mixing-ratio(g/m3)
AMIX	aggregates	aggregate-mixing-ratio(g/kg)
AMXV	aggregates_m3	aggregate-mixing-ratio(g/m3)
GMIX	graupel	graupel-mixing-ratio(g/kg)
GMXV	graupel_m3	graupel-mixing-ratio(g/m3)
HMIX	hail	hail-mixing-ratio(g/kg)
HMXV	hail_m3	hail-mixing-ratio(g/m3)
DMIX	drizzle	drizzle-mixing-ratio(g/kg)
DMXV	drizzle_m3	drizzle-mixing-ratio(g/m3)
PSAM	prissnowagg	snowprisagg-mixing-ratio(g/kg)
GHMX	grauphail	grauphail-mixing-ratio(g/kg)
LMIX	liquid	liquid-mixing-ratio(g/kg)
IMIX	ice	ice-mixing-ratio(g/kg)
CTST	ctop_tempc_sstbase	cloud-top-temperature(C)
CTOP	ctop_tempc_nobase	cloud-top-temperature(C)
TMIX	total_cond	total-condensate-mixing-ratio(g/kg)
TMXV	total_cond_m3	total-condensate-mixing-ratio(g/m3)
MIXR	r_total	total-mixing-ratio(g/kg)
MIXR	rtotal_orig	orig-rtotal(g/kg)
DWPK	dewptk	dewpoint-temperature(K)
DWPF	dewptf	dewpoint-temperature(F)
DWPC	dewptc	dewpoint-temperature(C)
RELH	relhum	relative-humidity(%)
RHFR	relhum_frac	relative-humidity(fraction)
CLRF	clear_frac	clear-sky(fraction)
CLDF	cloud_frac	cloud-cover(fraction)

3D HYDROMETEOR NUMBER CONCENTRATIONS — 22 variables

CNMG	cloud_concen_mg	cloud-concen(#/mg)
CNKG	cloud_concen_kg	cloud-concen(#/kg)
RNKG	rain_concen_kg	rain-concen(#/kg)
PNMG	pris_concen_mg	pristine-concen(#/mg)
PNKG	pris_concen_kg	pristine-concen(#/kg)
SNKG	snow_concen_kg	snow-concen(#/kg)
ANKG	agg_concen_kg	aggregate-concen(#/kg)
GNKG	graup_concen_kg	graupel-concen(#/kg)
HNKG	hail_concen_kg	hail-concen(#/kg)
DNMG	drizzle_concen_mg	drizzle-concen(#/mg)
DNKG	drizzle_concen_kg	drizzle-concen(#/kg)
CNC3	cloud_concen_cm3	cloud-concen(#/cm3)
RNM3	rain_concen_m3	rain-concen(#/m3)
RND3	rain_concen_dm3	rain-concen(#/dm3)
PNM3	pris_concen_m3	pristine-concen(#/m3)

PNC3	pris_concen_cm3	pristine-concen(#/cm3)
SNM3	snow_concen_m3	snow-concen(#/m3)
SNC3	snow_concen_cm3	snow-concen(#/cm3)
ANM3	agg_concen_m3	aggregate-concen(#/m3)
GNM3	graup_concen_m3	graupel-concen(#/m3)
HNM3	hail_concen_m3	hail-concen(#/m3)
DNC3	drizzle_concen_cm3	drizzle-concen(#/cm3)

HUCM-SBM SPECIFIC MICROPHYSICS – 18 variables

IPMX	ice_plates	plates-mixing-ratio(g/kg)
ICMX	ice_columns	columns-mixing-ratio(g/kg)
IDMX	ice_dendrites	dendrites-mixing-ratio(g/kg)
PCMG	plates_concen_mg	plates-concen(#/mg)
PCKG	plates_concen_kg	plates-concen(#/kg)
CCMG	columns_concen_mg	columns-concen(#/mg)
CCKG	columns_concen_kg	columns-concen(#/kg)
DCMG	dendrites_concen_mg	dendrites-concen(#/mg)
DCKG	dendrites_concen_kg	dendrites-concen(#/kg)
PVIP	pcpvip	3D-iceplates-precip-rate(mm/hr)
PVIC	pcpvic	3D-icecolumns-precip-rate(mm/hr)
PVID	pcpvid	3D-icedendrites-precip-rate(mm/hr)
PRIP	pcprip	iceplates-precip-rate(mm/hr)
PRIC	pcpric	icecolumns-precip-rate(mm/hr)
PRID	pcprid	icedendrites-precip-rate(mm/hr)
ACIP	accpip	accum-iceplates(kg/m2)
ACIC	accpic	accum-icecolumns(kg/m2)
ACID	accpid	accum-icedendrites(kg/m2)

3D AEROSOLS NUMBER, MASS, SIZE, SOLUBILITY – 37 variables

IFNM	ifn_concen_mg	ice-nuclei-concentration(#/mg)
IFNC	ifn_concen_cm3	ice-nuclei-concentration(#/cm3)
CCNM	ccn_concen_mg	ccn-concentration(#/mg)
CCNC	ccn_concen_cm3	ccn-concentration(#/cm3)
GCNM	gccn_concen_mg	gccn-concentration(#/mg)
GCNC	gccn_concen_cm3	gccn-concentration(#/cm3)
D1CN	dust1_concen	dust1-concentration(#/cm3)
D2CN	dust2_concen	dust2-concentration(#/cm3)
SFCN	salt_film_concen	salt-film-concentration(#/cm3)
SJCN	salt_jet_concen	salt-jet-concentration(#/cm3)
SSCN	salt_spume_concen	salt-spume-concentration(#/m3)
R1CN	regen_aero1_concen	regenerated-aero1-concentration(#/cm3)
R2CN	regen_aero2_concen	regenerated-aero2-concentration(#/cm3)
CCCM	ccn_mass	ccn-mass(um-grams/m3)
GCCM	gccn_mass	gccn-mass(um-grams/m3)
D1CM	dust1_mass	dust1-mass(um-grams/m3)
D1CM	dust1_massd10	dust1-mass(um-grams/m3/10)
D2CM	dust2_mass	dust2-mass(um-grams/m3)
D2CM	dust2_massd10	dust2-mass(um-grams/m3/10)
SFCM	salt_film_mass	salt-film-mass(um-grams/m3)
SJCM	salt_jet_mass	salt-jet-mass(um-grams/m3)
SSCM	salt_spume_mass	salt-spume-mass(um-grams/m3)
R1CM	regen_aero1_mass	regenerated-aero1-mass(um-grams/m3)
R2CM	regen_aero2_mass	regenerated-aero2-mass(um-grams/m3)
R1SO	resol_aero1_mass	regen-soluble-aero1-mass(um-grams/m3)
R2SO	resol_aero2_mass	regen-soluble-aero2-mass(um-grams/m3)
R1EP	regen1_epsilon	regen1-solubility-fraction(fraction)
R2EP	regen2_epsilon	regen2-solubility-fraction(fraction)
CCCR	ccn_medrad	ccn-median-radius(um)

GCCR	gccn_medrad	gccn-median-radius(um)
D1CR	dust1_medrad	dust1-median-radius(um)
D2CR	dust2_medrad	dust2-median-radius(um)
SFCR	salt_film_medrad	salt-film-median-radius(um)
SJCR	salt_jet_medrad	salt-jet-median-radius(um)
SSCR	salt_spume_medrad	salt-spume-median-radius(um)
R1CR	regen_aero1_medrad	regenerated-aero1-median-radius(um)
R2CR	regen_aero2_medrad	regenerated-aero2-median-radius(um)

3D AEROSOL TRACKING VARIABLES – 41 variables

ARMC	aerosol_cloud_mass	aerosol-mass-in-cloud-drop(um-grams/m3)
ARMR	aerosol_rain_mass	aerosol-mass-in-rain-drop(um-grams/m3)
ARMP	aerosol_pris_mass	aerosol-mass-in-prisice(um-grams/m3)
ARMS	aerosol_snow_mass	aerosol-mass-in-snow(um-grams/m3)
ARMA	aerosol_aggr_mass	aerosol-mass-in-aggregates(um-grams/m3)
ARMG	aerosol_grau_mass	aerosol-mass-in-graupel(um-grams/m3)
ARMH	aerosol_hail_mass	aerosol-mass-in-hail(um-grams/m3)
ARMD	aerosol_driz_mass	aerosol-mass-in-drizzle(um-grams/m3)
ARHY	aerosol_hydro_mass	aerosol-mass-in-hydromets(um-grams/m3)
SLMC	soluble_cloud_mass	soluble-mass-in-cloud-drop(um-grams/m3)
SLMR	soluble_rain_mass	soluble-mass-in-rain-drop(um-grams/m3)
SLMP	soluble_pris_mass	soluble-mass-in-prisice(um-grams/m3)
SLMS	soluble_snow_mass	soluble-mass-in-snow(um-grams/m3)
SLMA	soluble_aggr_mass	soluble-mass-in-aggregates(um-grams/m3)
SLMG	soluble_grau_mass	soluble-mass-in-graupel(um-grams/m3)
SLMH	soluble_hail_mass	soluble-mass-in-hail(um-grams/m3)
SLMD	soluble_driz_mass	soluble-mass-in-drizzle(um-grams/m3)
SLHY	soluble_hydro_mass	soluble-mass-in-hydromets(um-grams/m3)
EPSI	aero_epsilon	solubility-fraction(fraction)
DUMC	dust_cloud_mass	dust-mass-in-cloud-drops(um-grams/m3)
DUMR	dust_rain_mass	dust-mass-in-rain-drops(um-grams/m3)
DUMP	dust_pris_mass	dust-mass-in-pristineice(um-grams/m3)
DUMS	dust_snow_mass	dust-mass-in-snow(um-grams/m3)
DUMA	dust_aggr_mass	dust-mass-in-aggregates(um-grams/m3)
DUMG	dust_grau_mass	dust-mass-in-graupel(um-grams/m3)
DUMH	dust_hail_mass	dust-mass-in-hail(um-grams/m3)
DUMD	dust_driz_mass	dust-mass-in-drizzle(um-grams/m3)
DUHY	dust_hydro_mass	dust-mass-in-hydrometeors(um-grams/m3)
DINC	dustifn_cloud_mass	dust-mass-in-cloud-drops(um-grams/m3)
DINR	dustifn_rain_mass	dustifn-mass-in-rain-drops(um-grams/m3)
DINP	dustifn_pris_mass	dustifn-mass-in-prisice(um-grams/m3)
DINS	dustifn_snow_mass	dustifn-mass-in-snow(um-grams/m3)
DINA	dustifn_aggr_mass	dustifn-mass-in-aggregates(um-grams/m3)
DING	dustifn_grau_mass	dustifn-mass-in-graupel(um-grams/m3)
DINH	dustifn_hail_mass	dustifn-mass-in-hail(um-grams/m3)
DIND	dustifn_driz_mass	dustifn-mass-in-drizzle(um-grams/m3)
DIHY	dustifn_hydro_mass	dustifn-mass-in-hydromets(um-grams/m3)
INTR	ifn_nuc_numtrack	IFN-already-nucleated-DeMott(#/cm3)
CICN	ifn_incloud	IFN-within-cloud-DeMott(#/cm3)
DICN	ifn_indriz	IFN-within-drizzle-DeMott(#/cm3)
RICN	ifn_inrain	IFN-within-rain-DeMott(#/cm3)

3D VERTICAL VELOCITY AND MICROPHYSICAL INSTANTANEOUS BUDGETS – 15 variables

WPAD	wp_advdif	W-advection-diffusion(m/s)
WPTH	wp_buoy_theta	W-theta-buoyancy(m/s)
WPCD	wp_buoy_cond	W-theta-cond(m/s)
LHVP	latheatvap	Lat-Heat-Vap-dTheta-inst(dTheta)
LHFZ	latheatfrz	Lat-Heat-Frz-dTheta-inst(dTheta)

NUCR	nuccldr	Cloud-Nucleate-Mixing-Ratio-inst(g/kg)
CL2R	cld2rain	Cloud-to-rain-water-inst(g/kg)
IC2R	ice2rain	Ice-to-rain-water-inst(g/kg)
NUIR	nucicer	Ice-Nucleated-Mixing-Ratio-inst(g/kg)
VAPL	vapliq	Liq-Vapor-diff-evap-MixRatio-inst(g/kg)
VAPI	vapice	Ice-Vapor-diff-evap-MixRatio-inst(g/kg)
MELT	meltice	Melting-of-ice-inst(g/kg)
RIMC	rimecld	Rimed-Amount-from-Cloud-inst(g/kg)
R2IC	rain2ice	Rain-Water-Collected-by-Ice-inst(g/kg)
AGGR	aggregate	Aggregation-of-Pris-Snow-inst(g/kg)

3D MICROPHYSICAL TOTAL BUDGETS – 55 variables
** These values are accumulated between analysis (A) output files, so if you output Grid-1 every 15 minutes then you would get, for example, the sum of cloud vapor growth “VAPCLD” in g/kg/15-min. If Grid-2 is output every 5 minutes then units for “VAPCLD” would be g/kg/5-min. Also note that this only accumulates appropriately for standard analysis files and not LITE or MEAN files.

NUCRT	nuccldrt	Cloud-Nucleate-Mixing-Ratio-Total(g/kg)
CL2RT	cld2raint	Cloud-to-rain-water-total(g/kg)
IC2RT	ice2raint	Ice-to-rain-water-total(g/kg)
NUIRT	nucicert	Ice-Nucleated-Mixing-Ratio-Total(g/kg)
VAPLT	vapliqt	Liq-Vapor-diff-evap-MixRatio-tot(g/kg)
VAPIT	vapicet	Ice-Vapor-diff-evap-MixRatio-tot(g/kg)
MELTT	melticet	Melting-of-ice-total(g/kg)
RIMCT	rimecldt	Rimed-Amount-from-Cloud-total(g/kg)
R2ICT	rain2icet	Rain-Water-Collected-by-Ice-total(g/kg)
AGGRT	aggregatet	Aggregation-of-Pris-Snow-total(g/kg)
LHVPT	latheatvapt	Lat-Heat-Vap-ThetaChange-total(dTheta)
LHFZT	latheatfrzt	Lat-Heat-Frz-ThetaChange-total(dTheta)
IHMRT	inuchomrt	Homogeneous-ice-nucleation-total(mg/kg)
ICORT	inuccontrt	Contact-ice-nucleation-total(mg/kg)
IINRT	inucifnrt	IFN-ice-nucleation-total(mg/kg)
IHZRT	inuchazrt	Haze-ice-nucleation-total(mg/kg)
VAPCT	vapcldt	Vapor-DepEvap-Cloud-total(g/kg)
VAPRT	vapraint	Vapor-DepEvap-Rain-total(g/kg)
VAPPT	vapprist	Vapor-DepEvap-Pristine-total(g/kg)
VAPST	vapsnowt	Vapor-DepEvap-Snow-total(g/kg)
VAPAT	vapaggrt	Vapor-DepEvap-Aggregate-total(g/kg)
VAPGT	vapgraut	Vapor-DepEvap-Graupel-total(g/kg)
VAPHT	vaphailt	Vapor-DepEvap-Hail-total(g/kg)
VAPDT	vapdrizt	Vapor-DepEvap-Drizzle-total(g/kg)
MELPT	meltprist	Melt-pristine-total(g/kg)
MELST	meltsnowt	Melt-snow-total(g/kg)
MELAT	meltaggrt	Melt-aggregates-total(g/kg)
MELGT	meltgraut	Melt-graupel-total(g/kg)
MELHT	melthailt	Melt-hail-total(g/kg)
RIMST	rimecldsnowt	Snow-rime-cloud-total(g/kg)
RIMAT	rimecldaggrt	Aggr-rime-cloud-total(g/kg)
RIMGT	rimecldgraut	Graupel-rime-cloud-total(g/kg)
RIMHT	rimecldhailt	Hail-rime-cloud-total(g/kg)
R2PRT	rain2prt	Pristine-rime-rain-total(g/kg)
R2SNT	rain2snt	Snow-rime-rain-total(g/kg)
R2AGT	rain2agt	Aggr-rime-rain-total(g/kg)
R2GRT	rain2grt	Graupel-rime-rain-total(g/kg)
R2HAT	rain2hat	Hail-rime-rain-total(g/kg)
AGPPT	aggrselfprist	Pristine-Selfcollect-total(g/kg)

AGSST	aggrselfsnowt	Snow-Selfcollect-total(g/kg)
AGPST	aggrprissnowt	Pristine-Snow-collect-total(g/kg)
D1CRT	dust1cldrt	dust1-cloud-nucleation-total(g/kg)
D2CRT	dust2cldrt	dust2-cloud-nucleation-total(g/kg)
D1DRT	dust1drzrt	dust1-drizzle-nucleation-total(g/kg)
D2DRT	dust2drzrt	dust2-drizzle-nucleation-total(g/kg)
VNUCRT	vt_nuccldrt	vertically-integrated-nuccldrt(mm)
VCL2RT	vt_cld2raint	vertically-integrated-cld2raint(mm)
VIC2RT	vt_ice2raint	vertically-integrated-ice2raint(mm)
VNUIRT	vt_nucicert	vertically-integrated-nucicert(mm)
VVAPLT	vt_vapliqt	vertically-integrated-vapliqt(mm)
VVAPIT	vt_vapicet	vertically-integrated-vapicet(mm)
VMELTT	vt_melticet	vertically-integrated-melticet(mm)
VRIMCT	vt_rimecldt	vertically-integrated-rimecldt(mm)
VR2ICT	vt_rain2icet	vertically-integrated-rain2icet(mm)
VAGGRT	vt_aggregatet	vertically-integrated-aggregatet(mm)

3D HYDROMETEOR DIAMETERS — 9 variables

TDIAM	cloudtop_diam	cloud-top-diam(um)
CDIAM	cloud_diam	cloud-diam(um)
RDIAM	rain_diam	rain-diam(mm)
PDIAM	pris_diam	pristine-diam(um)
SDIAM	snow_diam	snow-diam(mm)
ADIAM	agg_diam	aggregates-diam(mm)
GDIAM	graup_diam	graupel-diam(mm)
HDAIM	hail_diam	hail-diam(mm)
DDIAM	drizzle_diam	drizzle-diam(um)

3D HYDROMETEOR TEMP, ENERGY, LIQUID FRACTION — 11 variables

Q2RA	q2	q2(J/kg)
Q6GR	q6	q6(J/kg)
Q7HA	q7	q7(J/kg)
RTMP	rain_temp	rain-temperature(K)
GTMP	graup_temp	graupel-temperature(C)
HTMP	hail_temp	hail-temperature(C)
RATD	rain_air_tempdif	rain-air-temp(K)
GATD	graup_air_tempdif	graupel-air-temp(K)
HATD	hail_air_tempdif	hail-air-temp(K)
GLIQ	graup_fracliq	graupel-liq-frac(fraction)
HLIQ	hail_fracliq	hail-liq-frac(fraction)

3D MISCELLANEOUS FIELDS — 4 variables

HGHT	geo	geopotential-height(m)
TKET	tke	turb-kinetic-energy(m2/s2)
PBLH	pbl_ht	PBL-height(m)
DBZZ	reflect_all	radar-reflectivity(dBZ)

3D CUMULUS PARM - RADIATION — TURBULENCE — 15 variables

CVHR	cuparm_thetasrc	conv-heat-rate(K/s)
CVMR	cuparm_rtsrc	conv-moist-rate(kg/kg/s)
KHHC	khh	horiz-diffusion-coeff(m2/s)
KHVC	khv	vert-diffusion-coeff(m2/s)
VISB	visibility	visibility(km)
AODT	aodt	Visible-Band-AOD(AOD)
SWUP	swup	shortwave-up(W/m2)
SWDN	swdn	shortwave-down(W/m2)
LWUP	lwup	longwave-up(W/m2)
LWDN	lwdn	longwave-down(W/m2)

RAHR	rad_thetasrc	rad-heat-rate(K/day)
NETR	column_net_rad_flx	column-net-radiative-flux(W/m2)
NETF	sum_rad_flx	sum-rad-flux-up-down(W/m2)
SWHT	sw_heat_rate	sw_heat_rate(K/day)
LWHT	lw_heat_rate	lw_heat_rate(K/day)

2D SURFACE PRECIPITATION — 55 variables

ACCR	accpr	accum-rain(kg/m2)
ACCP	accpp	accum-pristine(kg/m2)
ACCS	accps	accum-snow(kg/m2)
ACCA	accpa	accum-aggregates(kg/m2)
ACCG	accpg	accum-graupel(kg/m2)
ACCH	accph	accum-hail(kg/m2)
ACCD	accpd	accum-drizzle(kg/m2)
ACTA	accpaero	accum-total-aerosol-mass(mg/m2)
ACDU	accpdust	accum-dust-aerosol-mass(mg/m2)
DFRC	dustfrac	dust-erodible-fraction(fraction)
TRPM	totpcp	total-resolved-precip(mm-liq)
TRPI	totpcp_in	total-resolved-precip(in-liq)
TAPM	precip	total-accum-precip(mm-liq)
TAPI	precip_in	total-accum-precip(in-liq)
PCRR	pcprr	rain-precip-rate(mm/hr-liq-equiv)
PCVR	pcpvr	3D-rain-pcp-rate(mm/hr-liq-equiv)
PCRP	pcprp	pristine-precip-rate(mm/hr-liq-equiv)
PCVP	pcpvp	3D-pristine-pcp-rate(mm/hr-liq-equiv)
PCRS	pcprs	snow-precip-rate(mm/hr-liq-equiv)
PCVS	pcpvs	3D-snow-pcp-rate(mm/hr-liq-equiv)
PCRA	pcpra	aggregates-precip-rate(mm/hr-liq-equiv)
PCVA	pcpva	3D-aggregates-pcp-rate(mm/hr-liq-equiv)
PCRG	pcprg	graupel-precip-rate(mm/hr-liq-equiv)
PCVG	pcpvg	3D-graupel-pcp-rate(mm/hr-liq-equiv)
PCRH	pcprh	hail-precip-rate(mm/hr-liq-equiv)
PCVH	pcpvh	3D-hail-pcp-rate(mm/hr-liq-equiv)
PCRD	pcprd	drizzle-precip-rate(mm/hr-liq-equiv)
PCVD	pcpvd	3D-drizzle-pcp-rate(mm/hr-liq-equiv)
PCPG	pcpg	pgpg(kg/m2)
PCPQ	qpcpg	qpcpg(J/m2)
PCPD	dpcpg	dpcpg(m)
PRRM	pcprate	resolved-precip-rate(mm/hr)
PRRI	pcprate_in	resolved-precip-rate(in/hr)
PRTM	precipr	total-precip-rate(mm/hr)
PRTI	precipr_in	total-precip-rate(in/hr)
CNPR	conpcp	convective-pcp-rate(mm/hr)
ACON	acccon	accum-convective-pcp(mm)
VMXW	vertmax_w	maximum-vertical-motion(m/s)
VAVW	vertavg_w	average-vertical-motion(m/s)
COND	vertint_cond	vertically-integrated-condensate(mm)
WATR	vertint_rt	vertically-integrated-total-water(mm)
VERT	vertint_orig	vertically-integrated-condensate(mm)
VRTV	vertint_vapor	vertically-integrated-vapor(mm)
VRTL	vertint_liq	vertically-integraded-liquid(mm)
VRTI	vertint_ice	vertically-integrated-ice(mm)
VRTC	vertint_cloud	vertically-integrated-cloud-water(mm)
VRTD	vertint_driz	vertically-integrated-drizzle(mm)
VRTR	vertint_rain	vertically-integrated-rain(mm)
VRTP	vertint_pris	vertically-integrated-pristine(mm)
VRTS	vertint_snow	vertically-integrated-snow(mm)
VRTA	vertint_aggr	vertically-integrated-aggregates(mm)

VRTG	vertint_graupel	vertically-integrated-graupel(mm)
VRTH	vertint_hail	vertically-integrated-hail(mm)
VTDU	vertint_dust	vertically-integrated-dust(g/m2)
VTDH	vertint_dust_hydro	vertint-dust-in-hydromets(ug/m2)

2D SEA ICE – 5 variables (not currently available)

DEPS	snowdepthonice	snow-depth-on-ice(m)
DEPI	cicedepth	cice-depth(m)
ICEF	cicefract	cice-fraction(frac)
ICET	cicetemp	cice-temperature(C)
ICER	cicerough	cice-roughness(#)

2D HEAT, MOISTURE, MOMENTUM AND RADIATIVE FLUXES – 12 variables

SFLX	sens_flux	sfc-sens-heat-flx(W/m2)
LFLX	lat_flux	sfc-lat-heat-flx(W/m2)
EVAP	etrans	evapo-transpiration(mm/hour)
ETRI	etrans_in	evapo-transpiration(in/hour)
UFLX	umom_flx	sfc-u-momentum-flx(Pa)
VFLX	vmom_flx	sfc-v-momentum-flx(Pa)
WFLX	wmom_flx	sfc-w-momentum-flx(Pa)
BOWN	bowen	bowen-ratio(fraction)
RSHT	rshort	rshort(W/m2)
RLON	rlong	rlong(W/m2)
RLNU	rlongup	rlongup(W/m2)
ALBE	albedt	albedt(fraction)

2D TOPOGRAPHY AND GEOGRAPHIC VALUES – 3 variables

TOPT	topt	topography(m)
LATI	lat	latitude(deg)
LONG	lon	longitude(deg)

2D MISCELLANEOUS FIELDS – 3 variables

MSLP	sea_press	sea-level-pressure(mb)
SDIV	sfc_div	surface-divergence(1/s)
SSTC	sst	water-temperature(C)

LEAF/SIB VARIABLES SECTION – 34 variables

**Note that variables with the name "_ps" are the Patch Sum values and the "_bp" are the Biggest Patch or dominant class values.

PFRA	patch_area	patch-fractional-area(fraction)
OCEN	water	water-fractional-area(fraction)
LAND	land	land-frac-area(fraction)
SNOL	snow_levels	number-of-snow-levels(#)
SNOD	snow_depth_ps	snow-depth(m)
SNOM	snow_mass_ps	snow-water-equivalent(kg/m2)
SNOT	snow_temp_ps	snow-water-temperature(C)
TRUF	topo_z0_ps	topo-roughness(m)
NRUF	net_z0_ps	net-roughness(m)
SRUF	soil_z0_ps	soil-roughness(m)
VRUF	veg_z0_ps	vegetation-roughness(m)
NDVI	veg_ndvi_ps	veg-ndvi(#)
VEGC	veg_class_bp	dominant-vegetation-class(#)
VEGA	veg_albedo_ps	vegetation-albedo(fraction)
VEGF	veg_fracarea_ps	vegetation-frac-area(fraction)
LAIF	veg_lai_ps	leaf-area-index(#)
VDIS	veg_disp_ps	vegetation-displacement-height(m)

CANM	canopy_mixrat_ps	canopy-mixing-ratio(g/kg)
GRDM	grnd_mixrat_ps	ground-mixing-ratio(g/kg)
SOIM	soil_mixrat_ps	soil-mixing-ratio(g/kg)
VEGM	veg_moist_ps	vegetation-moisture(kg/m2)
VEGT	veg_temp_ps	vegetation-temperature(C)
CANC	canopy_tempc_ps	canopy-temperature(C)
CANF	canopy_tempf_ps	canopy-temperature(F)
USTR	ustar_ps	ustar(m/s)
TSTR	tstar_ps	tstar(K)
RSTR	rstar_ps	rstar(kg/kg)
SLTX	sltex_bp	dominant-soil-textural-class(#)
SOIQ	soilq_ps	soil-energy(J/m3)
SOIT	soil_temp_ps	soil/sea-temp(C)
SLMS	soil_moist_ps	soil-moisture(m3/m3)
SLMF	soil_moistfrac_ps	soil-moisture-fraction(m3/m3)
50TC	5050_tempc_ps	avg-canopy-airlev2-tempC(C)
50TF	5050_tempf_ps	avg-canopy-airlev2-tempF(F)

SIB VARIABLES SECTION – 40 variables

**Note that variables with the name "_ps" are the Patch Sum values

CO2C	co2_concen	co2-concentration(ppm)
SNO1	snow1_ps	vegetation-snow(kg/m2)
SNO2	snow2_ps	ground-surface-snow(kg/m2)
CAP1	capac1_ps	vegetation-liquid-store(kg/m2)
CAP2	capac2_ps	ground-surface-liquid-store(kg/m2)
PCOA	pco2ap_ps	CAS-co2-concen(Pa)
CO2F	co2flx_ps	surface-co2-flux(umol/m2/s)
SFAL	sfcswa_ps	surface-albedo(fraction)
SFUP	uplwrf_ps	surface-longwave-upward-rad(W/m2)
ASSM	assimn_ps	canopy-uptake-of-co2(umol/m2/s)
RESP	respg_ps	ground-respiration-flux(umol/m2/s)
RST1	rstfac1_ps	leaf-surface-humidity-resistance(#)
RST2	rstfac2_ps	soil-moisture-resistance-stress(#)
RST3	rstfac3_ps	temperature-resistance-stress(#)
ECTF	ect_ps	transpiration-flux(W/m2)
ECIF	eci_ps	canopy-interception-flux(W/m2)
EGIF	egi_ps	ground-interception-flux(W/m2)
EGSF	egs_ps	ground-surface-layer-evaporation(W/m2)
HCFX	hc_ps	canopy-sensible-heat-flux(W/m2)
HGFX	hg_ps	ground-surface-sensible-heat-flux(W/m2)
RAST	ra_ps	CAS-to-atmos-resistance(s/m)
RBST	rb_ps	leaf-surfce-to-CAS-resistance(s/m)
RCST	rc_ps	total-canopy-resistance(s/m)
RDST	rd_ps	ground-to-CAS-resistance(s/m)
ROFF	roff_ps	water-runoff(mm)
GREN	green_ps	greenness-fraction(fraction)
APAR	apar_ps	absorbed-fraction-of-PAR(fraction)
VENT	ventmf_ps	ventilation-mass-flux(kg/m2/s)
PCOC	pco2c_ps	leaf-chloroplast-co2-concen(Pa)
PCOI	pco2i_ps	leaf-internal-co2-concen(Pa)
PCOS	pco2s_ps	leaf-surface-co2-concen(Pa)
PCOM	pco2m_ps	lowest-atmos-level-co2-concen(Pa)
EAPR	ea_ps	canopy-water-vapor-pressure(hPa)
EMPR	em_ps	reference-level-vapor-pressure(hPa)
RHAC	rha_ps	CAS-relative-humidity(fraction)
RVDR	radvbc_ps	visible-direct-radiation(W/m2)

RVDF	radvdc_ps	visible-diffuse-radiation(W/m2)
RNDR	radnbc_ps	NIR-direct-radiation(W/m2)
RNDV	radndc_ps	NIR-diffuse-radiation(W/m2)
PSYC	psy_ps	psychrometric-constant(hPa/deg)

KPP OCEAN MIXED LAYER MODEL VARIABLES – 10 variables

KHMX	kpp_hmix	kpp-mixed-layer-depth(m)
KOCD	kpp_ocdepth	kpp-ocean-depth(m)
KFUS	kpp_flx_ust	kpp-uwnd-stress(N/m2)
KFVS	kpp_flx_vst	kpp-vwnd-stress(N/m2)
KNSW	kpp_flx_nsw	kpp-shortwave-flux(W/m2)
KNLW	kpp_flx_nlw	kpp-longwave-flux(W/m2)
KICE	kpp_flx_ice	kpp-ice-flux(not-used)
KPCP	kpp_flx_pcp	kpp-freshwater-flux(mm/sec)
KDTP	kpp_depth_temp	kpp-depth-temperature(C)
KDSL	kpp_depth_salinity	kpp-depth-salinity(o/oo)

RAMS TRACER VARIABLES

The number of the tracer variables in REVU will have to correspond with the number of scalar tracers added to the model. By default, in the model and REVU code, the aerosol sub-micron CCN category 1 and the dust mode categories 3 and 4 are used for tracer initialization. 6 tracers are set that are initialized identical to CCN, DUST1, DUST2 number concentration and mass mixing ratio. This default is set in order to compare processed and unprocessed CCN and DUST aerosols. The tracer variables are passive and thus only diffused and advected throughout the model.

ASCII ID:	REVU INPUT NAME:	Description with units:
T001	tracer001	Tracer #001 (units depend on tracer)
T002	tracer002	Tracer #002 (units depend on tracer)

Tracer output pattern continues to the maximum number of tracers.

RAMS BUDGET VARIABLES IN VERSION 6+

This is the list and description of the currently available microphysical budget variables as well as several others. Most variables are time accumulated between model analysis file writes, while others are instantaneous values. After each analysis file write time (grid dependent), the time-accumulated variables are reset to zero and begin new accumulations. Instantaneous variables are reset to zero each timestep and recomputed. The variables are 3D scalars but have no tendencies since they are diagnostic only. However, memory must be allocated for these variables; as such, use of these variables can require substantially more system memory.

NOTES:

1: Time accumulated variables end with the letter "t".

2: For microphysical budgets (mixing ratio units), in micphys.f90 there is a variable called "budget_scalet". This is set to 1.0 by default. This retains units in the analysis files as (kg/kg). If the user needs to scale the output units then this can be modified. If budget_scalet=1000. then all microphysical budget outputs are multiplied by 1000 and units would be accumulaed in (g/kg). If you are not using a value of 1, then the output of the variables in REVU will not correspond to the units given in revu.

3: Below is mention of the terms “rcx”, “rcy”, and “xtoz”. These refer to RAMS’ collection routines and the contribution of collection by a particular contributing species and the end destination category of hydrometeors undergoing collision-coalescense. The user should refer to the file mic_coll.f90 for a specific understanding of these variables.

4: Time accumulation is grid-dependent. If grid-1 is output only every 3-hours then its budget variables will be accumulated for 3 hours before being reset when its analysis file is written. If grid-2 for the same simulation is output every 15-minutes, the the variables will be accumulated for 15-minutes and reset to zero when grid-2 analysis files are written. The different grids do not interfere with one another.

5: The resetting of time accumulated budgets only pertains to ANALYSIS files and NOT LITE or MEAN files.

6: Be aware that the sum of the microphysical processes for hydrometeor type X will not equal the mixing ratio or change in mixing ratio of hydrometeor X. This is due to application of microphysical adjustment schemes, positive definite schemes, addition of other tendencies (advection + diffusion), and data filtering that are applied to the predicted mixing ratio and determine the total prognostic values. Futher, we do no output every microphysical contribution that leads to predicted mixing ratio.

7: Addition of other microphysical budgets requires allocating memory in the file mem_micro.f90 as well as adding 1D temporary variables in micphys.f90 under the header “Variables Needed for COMPUTING BUDGETS”.

8. Several non-microphysical budgets exist and are allocated in mem_basic.f90. These are NOT declared elsewhere in temporary variables as are the microphysical budgets.

For RAMSIN flag IMBUDGET = 1

wp_adv_dif = instantaneous vertical velocity contribution by the combination of both advection and diffusion

wp_buoy_theta = instantaneous vertical velocity contribution from Theta-V buoyancy computation

wp_buoy_cond = instantaneous vertical velocity contribution from condensate loading

latheatvap = instantaneous change in Theta due to vapor diffusion and cloud & ice nucleation

latheatfrz = instantaneous change in Theta due to collision-coalescence and melting routines

nuccldrt = nucleation of cloud and drizzle water mixing ratio

cld2raint = cloud water transferred to rain via collection

ice2raint = ice melting due to collection of rain (rcy values)

nucicert = nucleation of pristine ice mixing ratio from all nucleation mechanisms

vapliqt = vapor deposition summed for all liquid hydrometeor species (this can be + or – depending on growth or evaporation)

vapicet = vapor deposition summed for all ice hydrometeor species (this can be + or – depending on growth or evaporation)

melticet = melting of all ice species in melting routine

rimecldt = cloud water collected by all ice species (rcx values)

rain2icet = rain water collected by ice species (rcx values)

aggregatet = ice amount transferred to aggregates via collection

latheatvapt = change in Theta due to vapor diffusion and cloud & ice nucleation

latheatfrzt = change in Theta due to collision-coalescence and melting routines

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For RAMSIN flag IMBUDGET = 2 (include all above +)

inuchomrt = homogeneous ice nucleation

inuccontrt = contact ice nucleation

inucifnrt = heterogeneous ice nucleation via IN (Meyers or DeMott activation)

inuchazrt = haze nucleation (from deliquesced CCN)

vapcldt = vapor deposition for cloud (+/- for growth or evaporation)

vapraint = vapor deposition for rain (+/- for growth or evaporation)

vapprist = vapor deposition for pristine ice (+/- for growth or evaporation)

vapsnowt = vapor deposition for snow (+/- for growth or evaporation)

vapaggrt = vapor deposition for aggregates (+/- for growth or evaporation)

vapgraut = vapor deposition for graupel (+/- for growth or evaporation)

vaphailt = vapor deposition for hail (+/- for growth or evaporation)

vapdrizt = vapor deposition for drizzle

(+/- for growth or evaporation)

meltprist = melting of pristine ice in melting routine

meltsnowt = melting of snow in melting routine

meltaggrt = melting of aggregates in melting routine

meltgraut = melting of graupel in melting routine

melthailt = melting of hail in melting routine

rimecldsnowt = cloud water collected by snow (rcx value)

rimecldaggrt = cloud water collected by aggregates (rcx value)

rimecldgraut = cloud water collected by graupel (rcx value)

rimecldhailt = cloud water collected by hail (rcx value)

rain2prt = rain water collected by pristine ice (rcx value)

rain2snt = rain water collected by snow (rcx value)

rain2agt = rain water collected by aggregates (rcx value)

rain2grt = rain water collected by graupel (rcx value)

rain2hat = rain water collected by hail (rcx value)

aggrselfprist = transfer of pristince ice to aggregates via self-collection

aggrselfsnowt = transfer of snow to aggregates via self-collection

aggrprissnowt = transfer of snow and pristine ice to aggregates via inter-collection

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For RAMSIN flag IMBUDGET = 3 (include all above +)

dust1cldrt = cloud water nucleated via the small dust mode

dust2cldrt = cloud water nucleated via the large dust mode

dust1drzrt = drizzle water nucleated via the small dust mode

dust2drzrt = drizzle water nucleated via the large dust mode