Section 6

SUBROUTINE ARGUMENTS

This section lists (alphabetically) and defines all the subroutine arguments. The dimension and units are given, and argument variables or constants that also appear in common blocks are appended with a (/). Arguments listed more than once indicate that the variable (or constant) has different definition among different subroutines. For these situations, the description includes the name of the subroutine that the argument refers to (unless several subroutines share one of the multiple argument definitions).

A/	(**MKX**); half-sigma levels where **A**(**K**)=0.5 (**SIGMA** (**K**)+**SIGMA**(**K**+1)).
A/	(**KX**); local input array in VPRNTV and VPRNTM (**A** (**KX**, **KX**)) that will be printed.
A/	(**KX**, **KX**); local input array in INVMTX that holds a matrix that will be inverted.
A	an array used in ZX4LP.
A1/	(**KX**, **KX**); output array that is the addition, subtraction, or product of two matrix arrays or a constant times a matrix array.
A2/	(**KX**, **KX**); local input array that holds a variable used for matrix operations.
A3/	(**KX**, **KX**); local input array that holds a variable used for matrix operations.
ALLARR/	(**IHUGE**, **MAXNES**); stores all arrays for all variables needed in memory.
AM/	(**MKX**, **NSPLIT**); = **DSIGMA*A**, where **A** is a 2-D matrix operator defined in VMODES.
AN/	(**NSPLIT**); = **DSIGMA*ZMATX.**
ANAME	(8); character string to describe field having flagged errors in the split-explicit scheme.

ANEW (**MIX**, **MJX**); interpolated (coarse to nest) values at nested location after move.

AOLD (**MIX**, **MJX**); nested values before nest is moved.

ARR (**MIX**, **MJX**, **KZZ**); nested input array used for overwriting array **ARRN**.

ARRAY (**IX**, **JX**, **NSPLIT**); local input array (3-D in PRINTSP, 2-D in MAXIMI and MINIMI, 1-D in MAXIM and MINIM).

ARRB (**MIX**, **MJX**, **KZZ**); nested input array used for overwriting array **ARRNB**.

ARRBB (**MIX**, **KZZ**, **NSPG**); nested boundary values (**MJX** = **MIX** in EXCHANI).

ARRBT (**MIX**, **KZZ**, **NSPG**); nested boundary tendencies (**MJX** = **MIX** in EXCHANI).

ARRN (**MIX**, **MJX**, **KZZ**); nested input/output array being overwritten by array **ARR**.

ARRNB (**MIX**, **MJX**, **KZZ**); nested input/output array being overwritten by array **ARRN**.

ATEN (**MIX**, **MKX**); general model tendency for **UTEN**, **VTEN**, **TTEN**, and **QVTEN**.

AX (**MKX**); the main diagonal array in GAUSS and CADJMX.

AX value of updraft cloudwork function (J kg^{-1}) in CLOUDW and CLOUDWS.

AXD value of downdraft cloudwork function (J kg^{-1}).

B (**MKX**); coefficient arrays in GAUSS and CADJMX.

B an array used in ZX4LP.

BDYTIM/ time (min) after which the boundary conditions are needed.

BLDUM2D/ (**MIXF**, **MJXF**); scratch array used for analysis nudging.

BLPSOC (**MIXF**, **MJXF**); observed p* (cb) on cross points and used for surface analysis nudging.

BLPSOD (**MIXF**, **MJXF**); observed p* (cb) on dot points and used for surface analysis nudging.

BLWNV (**NVAR**, **MIXF**, **MJXF**); storage array for horizontal weighting function based on surface data density and used for surface analysis nudging within the PBL.

BLWXY (**MIXF**, **MJXF**); horizontal weighting function based on surface data density and used for surface analysis nudging within the PBL.

BZ/ (**MKX**, **MKX**); used in the transformation of geopotential from sigma space to vertical mode space (J kg^{-1} K^{-1}).

C (**MKX**); coefficient arrays in GAUSS and CADJMX.

C an array used in ZX4LP.

C201/ = (100-**PTOP**)/(**DX*DX**).

C203/ = 1./(**DX*DX**).

CD (**MKX, KNUM**); detrainment rate (m^{-1}) in updrafts.

C0 conversion rate (m^{-1}) of liquid water to rain.

CONST constant subtracted from array **FLD**.

CZ/ (**MKX**, **MKX**); used in the transformation of geopotential from sigma space to vertical mode space (J kg^{-1}).

D (**MKX**); working array in GAUSS and CADJMX.

D local variable in INVMTX.

DA (**IA**, **MINP**); working array filled with kernels.

DB (**MBOTH**); working array containing kernels (large-scale forcing).

DC (**NIMSL**); working array containing kernels (large-scale forcing).

DDSOL (**MBOTH**); output from ZX4LP (not needed).

DDSUM (**MIX, MJX**, **NSPLIT**); summation of **DELD** over the split-explicit short time steps.

DELD (**MIX**, **MJX**, **NSPLIT**); divergence (cb s^{-1}) in vertical mode space.

DELD (**MIX**, **MJX**, **NSPLIT**, 3); time-step difference of divergence (cb s^{-1}) in vertical mode space

DELH (**MIX**, **MJX**, **NSPLIT**); geopotential (m^2 s^{-1}) in vertical mode space.

DELH (**MIX**, **MJX**, **NSPLIT**, 3); time-step difference of geopotential (m^2 s^{-1}) in vertical mode space

DELLA	(**MKX**); change of any thermodynamic variable due to a unit amount of cloud.
DELQ	(**MKX**, **KNUM**); change of a moisture variable due to a unit amount of cloud (kg kg^{-1} mb^{-1}).
DELT	(**MKX**, **KNUM**); change of a temperature variable due to a unit amount of cloud (K mb^{-1}).
DELTSM	time step (s).
DHSUM	(**MIX**, **MJX**, **NSPLIT**); summation of **DELH** (m^2 s^{-1}) over the split-explicit short time steps.
DPSOL	(**NIMSL**); mass fluxes from ZX4LP.
DRW	(**IWW**); local working array.
DSIGMA/	(**MKX**); thickness of the sigma layer.
DSOL	an array used in ZX4LP.
DT	model time step (s).
DTAU/	(**NSPLIT**); short time step (s) for the split-explicit scheme.
DTB	elapsed time (s) from the initial boundary values.
DTHDPC	critical lapse rate (K cb^{-1}).
DTIME	time step (s) over which cumulus parameterization is applied.
DTL	= **DT** (standard time step for model).
DTMIN/	**DT**/60 (min).
DX/	grid length (m).
DX2/	= 2***DX**.
DXX	the horizontal distance (= **DX4**, **DX**, **DX16**, when **IND**= 1, 2, 3 respectively).
EDT	(**KNUM**); variable relating the strength of the downdraft mass flux to the updraft mass flux.
EI	(**MKX**); local input array that is checked for negative and non-real eigenvalues in the VMODES calculations.

ENT	entrainment rate (m^{-1}).
ER	(**MKX**); local input array that is checked for negative and non-real eigenvalues in the VMODES calculations.
F	(**MIX**, **MKX**); local working array in VADV.
F	(3, **MIX**, **MKX**); input array in HADV.
F	(**MKX**); large-scale forcing (J kg^{-1} s^{-1}) in ARAMB).
FA	(**MIX**, **MJX**, **KZZ**); input array p***F** at time t.
FB	(**MIX**, **MJX**, **MKX**); local name for an input array.
FBSCAT	(**MIX**); backscattering coefficient (0 - 1).
FCOEF	coefficient for the Newtonian term.
FDTIM	model time (min) at time t-1.
FEB	(**MIX**, **KD**, **IP**+1); observed boundary values at time **TBE** on the east boundary.
FEBT	(**MIX**, **MKX**, **IP**+1); large-scale or observed tendencies at east boundary.
FIN	(**MIX**, **MJX**, **MKX**); input array.
FLD	(**JXX**, **IYY**); array to hold the data field to be printed.
FNB	(**MIX**, **KD**, **IP**+1); observed boundary values at time **TBE** on the north boundary.
FNBT	(**MIX**, **MKX**, **IP**+1); large-scale or observed tendencies at north boundary.
FOUT	(**MIX**, **MJX**, **MKX**); output array.
FSB	(**MIX**, **KD**, **IP**+1); observed boundary values at time **TBE** on the south boundary.
FSBT	(**MIX**, **MKX**, **IP**+1); large-scale, or observed tendencies at south boundary.
FTABS	(**MIX**); absorption transmissivity (0 - 1).
FTEN	(**MIX**, **MKX**); local tendency of **F**.
FTEST	scratch variable.

FTSCAT	(**MIX**); scattering transmissivity (0 - 1).
FWB	(**MIX**, **KD**, **IP**+1); obs boundary values at time **TBE** on the west boundary.
FWBT	(**MIX**, **MKX**, **IP**+1); large-scale, or obs tendencies at west boundary.
FYX	(**IMAX*JMAX**); local working array.
G/	{PARAMETER} gravitational acceleration (= 9.8 m s^{-2}).
GCOEF	coefficient for the diffusion term.
GMT/	Greenwich Mean Time of the initial data (hours).
GNUHF	constant used in Asselin time filter for all prognostic variables (= 0.1).
GP/	(**MAXSES**, 2); analysis-nudging coefficient (s^{-1}) for p*.
GR/	(**MAXSES**); analysis-nudging coefficient (m^2 s^{-1}) for vorticity.
GX	(**MAXSES**, 2); general analysis nudging coefficient for FDDA.
GX	(**MIX**, **MJX**, **KL**); gradient of **PHI** (m s^{-2}) in vertical mode space in the x-direction.
GY	(**MIX**, **MJX**, **KL**); gradient of **PHI** (m s^{-2}) in vertical mode space in the y-direction.
H	(**MKX**); environmental moist static energy.
HBAR/	(**MKX**); equivalent depths (m^2 s^{-2}) of the vertical modes.
HC	(**MKX**, **KNUM**); updraft moist static energy (m^2 s^{-2}).
HCD	(**MKX**, **KNUM**); downdraft moist static energy (m^2 s^{-2}).
HE	(**MKX**); environmental moist static energy (m^2 s^{-2}).
HES	(**MKX**); saturation moist static energy (m^2 s^{-2}).
HKB	moist static energy at cloud base (m^2 s^{-2}).
HSAT	(**MKX**); saturation moist static energy (m^2 s^{-2}).
HSC1	(**IYY**, **JXX**); local working array.
HSCR1	(**IYYN**, **JXXN**); terrain height times gravity (m^2 s^{-2}).

HT/ (**MIX**, **MJX**); terrain height times gravity (m^2 s^{-2}).

HTNO (**IYYN**, **JXXN**); g*terrain (m^2 s^{-2}) from old nest before moving.

IA {PARAMETER}; = **MBOTH**+2 in ARAMB.

IA a variable used in ZX4LP.

IA initial sampling point in the first dimension in MAPSMP.

IARG beginning **I**-index value in arrays **ARR**, **ARRB** for the exchange.

IARGN beginning **I**-index value in overwritten arrays for the exchange.

IARR (**NUMVAR**); address location.

IB local name for **IBOUDY** (0 - 4) or last sample point in MAPSMP.

ICHOS flag denoting type of array.

ICOARS integer used as dimension index denoting nest level.

ICOMPS integer flag used for optimization.

ICRSDOT integer used for denoting whether dot or cross point.

ID local name for **IDRY** in CONADV and CONMAS.

ID array dimension in **I**-direction in NUDGE and SPONGE.

ID flag denoting type of nudging in BLNUDGD and NUDGD:
= 0; surface-analysis nudging for U, V, T, or q_v.
= 1; surface-analysis nudging for p*.
= 2; vorticity nudging.
= 3; surface-analysis nudging for q_v using precipitation analysis.

ID3 local first dimension for arrays.

ID4 local second dimension for arrays.

IDARST on/off (1, 0) switch to indicate restart with observation nudging and at least one observation available in time window.

IDCHK/ (**NCHA**, **NVAR**); array identifying what variables at **IDDATE** dates to exclude from surface-analysis nudging.

IDDATE/	(**NCHA**); array identifying what dates to exclude from surface-analysis nudging.
IDHK/	(**NVAR**); data-quality flag array used by the **INOPRO** option.
IDIM	used locally as first dimension of an output array.
IDRY/	(**MAXSES**); flag denoting whether this run is a moist or dry forecast, (0=moist; 1=dry).
IE	number of points in the **I**-dimension (= **ID** for dot point, **ID**-1 for cross point).
IEN	local name for maximum **I**-value.
IEND	local name for the maximum **I**-index.
IENDN	ending **I**-index of array being overwritten.
IER	flag (if non zero) indicating an error in linear algebra routines used for model calculations.
IERRT	flag (if non zero) indicating an error in linear algebra routines for the Arakawa-Schubert convection scheme.
IEXEC	number of times a subroutine has been called (1=first, >1=subsequent).
IFREST/	is this run is a restart, (.T. or.F.).
IHUGE	{PARAMETER} see definition given in PARAMETER list (section 3).
IINC	**I**-increment for printing (= 6).
IL/	number of grid points in the **I**-direction (= **IX**).
ILX/	= **IL**-1.
ILXM/	= **ILX**-1.
IM	local name for variable **IMOIST**.
IMAX	maximum number of points in **I**-direction.
IMIN	beginning **I**-index in the **I**-direction.

IMOIST/ (**MAXSES**); indicates if cumulus parameterization or explicit moisture:
= 0; dry case with passive, moist variables.
= 1; no explicit moisture.
= 2; explicit moisture.

IN integer for mesh (1, 2, 3... is coarse, nest, second nest etc.).

IN1 (**MIX**, **MJX**, **MKX**, 3); local input array holding the **DELD** or **DELH** arrays.

IN2 (**MIX**, **MJX**, **MKX**, 3); local input array holding the **DELD** or **DELH** arrays.

IND have **UA** and **VA** been multiplied by **MSFD** (0, 1) in DIFFU.

IND index = 1 for T, 2 for (q_v, q_c, q_r, q_i, q_s,), 3 for (U, V) 4 for (W) in HADV, 4 for (U, V), 5 for W, 6 for p' in VADV.

IND flag for type of input in JULGMT (0= **MDATE**, 1=**TIMANL**, 2=**JULGMTN**).

INEST integer (1, 2, 3...) defining domain for which tendencies are computed.

INFR = **IONF***$(\mathbf{IRATIO}^{\mathbf{LEVIDN(INEST)}})$. Determines the time-step frequency for calling certain observation-nudging subroutines.

INSTES integer specifying whether nest is to be moved and will it overlap.

INVAR (**MAXSES**, 2); general on/off analysis-nudging switch for variable **IVAR**.

INY sampling interval in the first dimension.

IOVE number of points to be exchanged.

IP number of slices affected by sponge and relaxation boundary condition in SPONGE and NUDGE.

IP (**NK**); working array in INVMTX.

IQCHK/ (**NTIM**, **NVAR**); flag denoting quality of data (density) for analysis nudging in PBL (if = 0, data are not used for FDDA).

IS1 local maximum index value in the **I**-direction.

IS2 local maximum index value in the **J**-direction.

ISKIP number of files or records to skip.

ISOUTH/ **I**-coordinate (large domain) for south boundary of nest (= **NESTI**).

ISOUTHO	old **ISOUTH** before moving nest.
IST	local name for beginning **I**-value.
ISTART	local name for the starting **I**-index.
ISTART	beginning **I**-index of overwriting array in EXCHANJ.
ISTARTN	beginning **I**-index of array being overwritten.
ISTOP	number of corner grid points not being overwritten
ITEST	(**KNUM**); scratch array for testing.
ITEST2	(**KNUM**); scratch array for testing.
IUNIT	unit number from which the data are read.
IUNITH	unit number of initial condition input file.
IUTL	unit number of standard model output.
IUTSAV	output unit number in OUTSAV and input unit number in SAVREAD.
IVAR	variable code where **IVAR** = 1, 2, 3, 4, 5 denotes U, V, T, q_v, p^* respectively.
IW	(**IW1**); working array needed for ZX4LP.
IW1	{PARAMETER} = 2*(**NIMSL**+**MEQU**)+3.
IWW	{PARAMETER} = **IA***(**IA**+2)+2*(**NIMSL**+**MEQU**).
IX	number of points in **I** (y) direction.
IXI	first dimension for input array.
IXO	first dimension for output array.
IY	number of points in **I** (y) direction.
IYWANT	**I**-index for which interpolation is to be performed.
IYY	standard first dimension for variables.
IYYM	dimension for p^*q_c and p^*q_r.
IYYN	standard first dimension for variables (nest).
IYYNM	**I**-dimension of nested domain.

J	index for **J**-slice currently being calculated.
JA	initial sampling point in the second dimension.
JARG	beginning **J**-index value in arrays **ARR**, **ARRB** for the exchange.
JARGN	beginning **J**-index value in overwritten arrays for the exchange.
JB	final sampling point in the second dimension.
JDIM	used locally as second dimension of an output array.
JE	number of points in the **J**-dimension (= **JD** for dot point, **JD**-1 for cross point).
JEN	local name for the maximum **J**-index.
JEND	local name for the maximum **J**-index value.
JENDN	ending **J**-index of array being overwritten.
JINC	**J**-increment for printing (= 6).
JL/	the total number of grid points in the **J**-direction (= **JX**).
JLX/	= **JL**-1.
JLXM/	= **JLX**-1.
JMAX	maximum number of points in **J**-direction.
JMIN	beginning **J**-index in the **J**-direction.
JNX	sampling interval in the second dimension.
JOVE	number of points to be exchanged.
JST	local name for the starting **J**-index.
JSTART	beginning **J**-index of overwriting array.
JSTARTN	beginning **J**-index of array being overwritten.
JULDAY/	Julian day of the initial data set.
JULGMTN	Julian day times 100 plus the **GMT** of the observed analysis used for nudging.

JWEST/	**J**-coordinate (large domain) for west boundary of nest (= **NESTJ**).
JWESTO	old **JWEST** before moving nest.
JX	number of points in **J** (x) direction.
JXI	second dimension for input array.
JXO	second dimension for output array.
JXX	standard second dimension for variables.
JXXM	dimension for p^*q_c and p^*q_r.
JXXN	standard second dimension for variables (nest).
JXXNM	**J**-dimension of the nested domain.
JXWANT	**J**-index for which interpolation is to be performed.
K	vertical level.
KB	lower limit of unstable layers in CADJMX.
KB	updraft originating level in the cumulus parameterization routines.
KBC	level of free convection.
KBCON	level of free convection.
KBEG	updraft originating level.
KBMAX	highest possible cloud base level.
KD	array dimension in the **K**-direction.
KDET	(**MIX**); level where downdraft detrainment begins.
KDIM	{PARAMETER} = **MKX**.
KE	upper limit of unstable layers in CADJMX.
KE	ending do-loop index in the vertical in MAXIM and MAXIMI.
KEND	ending do-loop index in the vertical.
KEPBLH	(**MIX**); **K**-level where the PBL top is located in east boundary slice.
KL/	= **MKX**, except in split-explicit routines where it sometimes = **NSPLIT**.

KLEV = **KDIM**.

KMIN (**MKX**); downdraft originating level.

KNUM {PARAMETER} number of cloud types (= 6 in ARASCH and 1 in SHALLOW).

KPBLT (**MIXF**); vertical layer index for PBL top.

KREF = 1.

KS (**MIX**); beginning index in the vertical.

KT (**MIX**); flagged level from MIMIMI and MINIM.

KTAU/ counter for time steps.

KTAUR/ counter for time steps when restarting.

KTOP (**KNUM**); cloud top level.

KV1 = **KXP1**.

KWPBLH (**MIX**); **K**-level where the PBL top is located in west boundary slice.

KX {PARAMETER} = **MKX**, except in PRINTSP where **KX** = **NSPLIT**.

KXI third dimension for input array.

KXO third dimension for output array.

KZZ standard third dimension for variables.

KZZM dimension for p^*q_c and p^*q_r.

KZZN standard third dimension for variables (nest).

KZZNM **K**-dimension of the nested domain.

L nested domain number.

L1 cloud type.

LM order of the matrix and local name for **NADJ**.

LP index of cloud-type loop.

LSTAND use standard atmospheric temperature for the thermodynamic matrix, (.T. or .F.).

M/	(**NSPLIT**); ratio (long time-steps/short time-steps) in SPSTEP2.
M/	second dimension of 3-D working array in SINT, SINTX, and SINTY.
M1	a variable used in ZX4LP.
M2	a variable used in ZX4LP.
MAX	(**MIX**); output level in MAXIMI and MAXIM.
MBDT	arbitrary unit mass flux * time-step (kg m^{-2}).
MBOTH	{PARAMETER} = **MEQU**+**MNEQU**.
MC	local name for variable **MASCHK**, the frequency in timesteps that the mass conservation information will be printed.
MCHA	number of **IDDATE** files to check.
MDATE/	time and date of initial data set in yymmddhh format.
MDATES	dates (as in **MDATE**) of surface analyses.
MINP	{PARAMETER} = **MEQU**+**NIMSL**+2.
MIX	{PARAMETER} maximum dimension (all domains) in the y-direction.
MJX	{PARAMETER} maximum dimension (all domains) in the x-direction.
MKX	{PARAMETER} maximum dimension (all domains) in the vertical direction.
MSD	(**MIXF**, **MJXF**); map-scale factor at dot points.
MSF	(**MIX**, **MJX**); local map scale factor.
MSFD/	(**MIX**, **MJX**); map-scale factor at dot points.
MSFX/	(**MIX**, **MJX**); map-scale factor at cross points.
MSX	(**MIXF**, **MJXF**); map-scale factor at cross points.
MTIM	= **NTIM**.
MVAR	= **NVAR**.
N	a variable used in ZX4LP.
N	= **MJX** in SINT, SINTX, and SINTY.

N	= **NK** in INVMTX and VPRNTV.
N	nest number in OUTPRT.
N1	{PARAMETER} = **MJX**, except in VPRNTM where **N1** = **NSPLIT**.
N1END	ending loop index.
N1STAR	starting loop index.
N2	{PARAMETER} = **MIX**, except in VPRNTM where **N2** = **NSPLIT**.
N2END	ending loop index.
N2STAR	starting loop index.
NA	= **NK**.
NADJ	number of slices between **KB** and **KE**. (= **KE**-**KB**+1).
NAM	(8); character string describing field to be printed.
NAME	(5); character string describing field to be printed in MAPSMP.
NAME	(8); character string describing field to be printed in PRINTSP.
NESCOU	domain number.
NESCOUO	old domain number.
NESTII	= **ISOUTH**.
NESTJJ	= **JWEST**.
NI	= **IL**.
NI1	= **ILX**.
NIMSL	{PARAMETER} = 2*$*$**MNEQU**.
NJ	= **JL**.
NJ1	= **JLX**.
NK	{PARAMETER} = **KX**, except in XTDOT where **NK** = 1.
NK1	{PARAMETER} = **NK**+1.
NN	N’th time step for the nest from previous large domain forecast.

NPASS	number of smoothing passes.
NSPG	= **NSPGD** or **NSPGX** (PARAMETERS).
NST	N'th time step for the nest from previous large domain forecast.
NT	position counter from 1 to **NTIM** in CONV3 for surface analysis.
NT	fourth dimension index (1 or 3) for **OUT** array in SPDIFF.
NT1	fourth dimension index (1 or 2) for **IN1** array.
NT2	fourth dimension index (1 or 3) for **IN2** array.
NTB/	position counter from 1 to **NTIM** for **TIMB** of **SFCTIM** and **SFCOBS** arrays.
NTE/	position counter from 1 to **NTIM** for **TIME** of **SFCTIM** and **SFCOBS** arrays.
NUMERR	number of errors in the split-explicit calculations.
NUMN	nest number of lower-level nest.
NUMNE	nest number of nest being moved.
NUMNES/	integer (1, 2, 3...) defining domain for which addresses are computed.
NV	variable code where **NV** = 1, 2, 3, 4, 5 denotes U, V, T, q_v, p* respectively in FDDA routines.
NV	= **NK** in INVMTX.
OUT	(**MIX**, **MJX**, **MKX**, 3); output array holding the **DELD** or **DELH** arrays.
OUTQ	(**MIX**, **MKX**); output tendencies of q_v (kg kg^{-1} s^{-1}).
OUTTEM	(**MIX**, **MKX**); output tendencies of T (K s^{-1}).
P	(**MIX**, **MKX**); pressure (mb), not p*.
PATH	(**MIX**); normalized path length for incoming radiation.
PCUT	pressure (mb) at which all rain is removed.
PD	(**MIX**, **MJX**); = **PSDOT** (cb) in XTDOT.
PD/	= **PS** - **PTOP**, where **PS** is an average value of p* .
PHI/	(**MJX**, **MIX**, **KL**); = **DELH**.

PI	(**MKX**); Exner's function.
PIO	(**MKX**); pressure (mb) after large-scale forcing has been applied.
PO	(**MIX**, **MKX**); pressure (mb) after large-scale forcing has been applied.
PRE	(**MIX**); precipitation rate (mm s^{-1}).
PRW/	precipitable water (cm).
PS	(**MIX**, **MJX**); p* (cb).
PSA/	(**MIX**, **MJX**); p* (cb) at time t.
PSADOT	(**MIX**, **MJX**); **PSA** (cb) interpolated to dot points.
PSB/	(**MIX**, **MJX**); p* (cb) at time t-1.
PSBD	(**MIXF**, **MJXF**); model p* (cb) on dot points at time t-1.
PSBDT	(**MIX**, **MJX**); model p* (cb) on dot points at time t-1.
PSDOT	(**MIX**, **MJX**); **PSA** (cb) interpolated to dot points.
PSO/	(**MIXF**, **MJXF**); observed p* (cb) on cross points.
PSOC/	(**MIXF**, **MJXF**); observed p* (cb) on cross points interpolated in time.
PSOD/	(**MIXF**, **MJXF**); observed p* (cb) on dot points interpolated in time.
PSOL	an array used in ZX4LP.
PSOTEN/	(**MIXF**, **MJXF**); observed p* tendency (cb min^{-1}) on cross points.
PSTF	(**MIXF**, **MJXF**); model p* (cb) on dot or cross points.
PSTO	(**MIXF**, **MJXF**); observed p* (cb) on dot or cross points.
PSU	p_s (mb).
PSUR	p_s (mb).
PSURF	p_s (mb).
PSURO	p_s (mb) after large-scale forcing has been applied.
PT/	= **PTOP**.
PTEN/	(**MIX**, **MJX**); the tendency of p* (cb s^{-1}).

PTOP/	pressure (cb) at the top of the model.
PW	(**MKX**, **KNUM**); normalized condensate (kg kg^{-1}).
PWD	(**MKX**, **KNUM**); normalized evaporate (kg kg^{-1}).
PX	(**MIX**, **MJX**); = **PSA** (cb).
Q	(**MIX**, **MKX**); = q_v (kg kg^{-1}).
QC	(**MKX**); local working array.
QCA/	(**MIXM**, **MJXM**, **MKXM**); p^*q_c (cb kg kg^{-1}) at time t.
QCTEN	(**MIXM**, **MKXM**); tendency of p^*q_c (cb kg kg^{-1} s^{-1}).
QDOT/	(**MJX**, **MIX**, **KXP1**); vertical sigma-velocity (s^{-1}).
QE	(**MKX**); = q_v (kg kg^{-1}).
QES	(**MKX**); saturation q_v (kg kg^{-1}).
QI	(**MKX**); = q_v (kg kg^{-1}).
QIO	(**MKX**); **QI** (kg kg^{-1}) after large-scale forcing.
QITEN	(**MIXM**, **MKXM**); tendency of p^*q_i (cb kg kg^{-1} s^{-1}).
QKB	q_v (kg kg^{-1}) at cloud base.
QNITEN	(**MIXM**, **MKXM**); tendency of p^*q_{ni} (cb kg kg^{-1} s^{-1}).
QO	(**MIX**, **MKX**); **QI** (kg kg^{-1}) after large-scale forcing.
QRA/	(**MIXM**, **MJXM**, **MKXM**); p^*q_r (cb kg kg^{-1}) at time t.
QRC	(**MKX**, **KNUM**); q_v (kg kg^{-1}) in cloud in PRECIP.
QRCD	(**MKX**); q_v (kg kg^{-1}) in downdraft.
QRTEN	(**MIXM**, **MKXM**); tendency of p^*q_r (cb kg kg^{-1} s^{-1}).
QSATF/	(**MIXF**, **MJXF**); model saturation mixing ratio (kg kg^{-1}).
QTEN	(**MIX**, **MKX**); q_v tendency (cb kg kg^{-1} s^{-1}).
QVA	(**MIX**, **MJX**, **MKX**); p^*q_v (cb kg kg^{-1}) at time t.
QVB	(**MIX**, **MJX**, **MKX**); p^*q_v (cb kg kg^{-1}) at time t-1.

QVTEN	(**MIX**, **MKX**); tendency of p^*q_v (cb kg kg^{-1} s^{-1}).
R	cloud updraft radius (m) in the cumulus parameterization routines.
R/	gas constant for dry air in VTLAPS (= 287. J kg^{-1} K^{-1}).
RADS	radius of shallow cloud (m).
RAINC/	(**MIX**, **MJX**); accumulated convective rain (cm).
REGJ	(**MIXF**); model PBL regime.
RINBLW/	radius of influence (km) for surface analysis nudging where the weighting function depends on surface data density.
RW	an array used in ZX4LP.
S	(**MKX**); temperature (K) in CADJMX.
S	(**NK1**); **SIGMAF** input array in VNORML.
S	a variable used in ZX4LP.
SCR	(**MIX**, **MKX**); temporary storage array.
SCR1	(**MIX**, **MKX**); temporary storage array.
SCR2	(**MIX**, **MKX**); temporary storage array.
SCR2D/	(**MIXF**, **MJXF**); temporary storage array used for analysis nudging.
SCR9	(**MIX**, **MKX**); temporary storage array holding vertical motion.
SFCOBS/	(**NTIM**, **NVAR**, **MIXF**, **MJXF**); surface analysis array for each variable at each time used for surface-analysis nudging.
SFCTIM/	(**NTIM**); corresponding model time (min) for each observed surface analysis.
SIG	(**KZZ**); half-sigma levels.
SIGMA/	(**KXP1**); full-sigma levels, except half-sigma levels in VTLAPS.
SIGMAF	(**KXP1**); full-sigma levels.
SIGMAH/	(**MKX**); half-sigma levels.
SLAB	(**IMAX**, **JMAX**); local working array.

SLAB1	(**IYY**, **JXX**); local array used in cross-to-dot interpolation subroutines.
SLAB2	(**IYY**, **JXX**); local array used in cross-to-dot interpolation subroutines.
SLP	(**IYY**, **JXX**); sea-level pressure (cb) array.
T	(**MIX**, **MJX**, **MKX**); temperature (K) array except in VTLAPS where it is a 1-D array (**TBARH**).
T0/	(**IDIM**, **JDIM**); sea-level temperature (K) in SEAPRS. Also used as a PARAMETER in VTLAPS and as a reference temperature array in common block NHCNS.
TA/	(**MIX**, **MJX**, **MKX**); p*T (cb K) at time t.
TA	(**IYY**, **JXX**); local input array in EXAINT.
TAN	(**IYYN**, **JXXN**); local output array.
TB/	(**MIX**, **MJX**, **MKX**); p*T (cb m s^{-1}) at time t-1.
TBARH/	(**MKX**); the average temperature (K) on sigma half-levels.
TBDYBE/	initial time (min) of the present boundary conditions.
TBE	time (min) for boundary values **FEB**, **FWB**, **FSB**, and **FNB**.
TCMASS	total mass of cloud water (kg).
TDRYM	total mass of the dry air (kg).
TEMPP	(**MKX**); temporary array.
TER	(**MIX**, **MJX**); g$*$terrain (m^2 s^{-2}).
TFAC/	(**MAXNES**, 2); temporal weighting factor for analysis nudging.
TI	(**MKX**); temporary array.
TIMANL/	(**MAXSES**); model time (min) of observed analysis for analysis nudging.
TIMANLS	model time (min) of observed surface analysis.
TIMB/	(**NVAR**); beginning bracketing time (min) for temporal interpolation of observed surface analysis.
TIME/	(**NVAR**); ending bracketing time (min) for temporal interpolation of observed surface analysis.

TIO	(**MKX**); temporary array after large-scale forcing has been applied.
TN	(**MIX**, **MKX**); temporary array after large-scale forcing has been applied.
TQMASS	total mass of water substance (kg).
TRMASS	total mass of rain water (kg).
TS	(**IDIM**, **JDIM**); surface temperature (K) array.
TTEN	(**MIX**, **MKX**); tendency of p*T (cb K s^{-1}).
TVMASS	total mass of water vapor (kg).
U	(3, **MIX**, **MKX**); decoupled U (m s^{-1}) in DECPU.
U	(**MIX**, **MJX**, **MKX**); = **UA** or **UB** (cb m s^{-1}) in SPDIVG and DIVG.
UA/	(**MIX**, **MJX**, **MKX**); p*U (cb m s^{-1}) at time t.
UB/	(**MIX**, **MJX**, **MKX**); p*U (cb m s^{-1}) at time t-1.
UOB	(**MIXF**, **MJXF**, **MKXF**); storage array of observed analysis of p*U (cb m s^{-1}).
UOBTEN	(**MIXF**, **MJXF**, **MKXF**); storage array of observed tendency of p*U (cb m s^{-1} min^{-1})
UTEN	(**MIX**, **MKX**); tendency of p*U (cb m s^{-1}).
V	(3, **MIX**, **MKX**); decoupled V (m s^{-1}) in DECPU.
V	(**MIX**, **MJX**, **MKX**); = **VA** or **VB** (cb m s^{-1}) in SPDIVG and DIVG.
V	(**MKX**, **MKX**); inverted output matrix array from INVMTX.
VA/	(**MIX**, **MJX**, **MKX**); p*V (cb m s^{-1}) at time t.
VAR	(**MKX**); input variable for q (moisture) or H (moist static energy).
VB/	**MIX**, **MJX**, **MKX**); p*V (cb m s^{-1}) at time t-1.
VOB	(**MIXF**, **MJXF**, **MKXF**); storage array of observed analysis of p*V (cb m s^{-1}).
VOBTEN	(**MIXF, MJXF**, **MKXF**); storage array of observed tendency of p*V (cb m s^{-1} min^{-1})
VORDIF/	(**MIXF**, **MJXF**, **MKXF**); difference of observed and model vorticity (s^{-1}).

VSP	(**MIX**, **MKX**); wind speed (m s^{-1})
VTEN	(**MIX**, **MKX**); tendency of p*V (cb m s^{-1}).
WG	(**IP**); weights for sponge boundary conditions.
WH	(**MKX**, 2); local working array.
WORK	(**MIX**, **MJX**, 3); local working array.
WPBL	(**MIXF**, **MKXF**); analysis-nudging vertical weighting function based on model PBL height determining partitioning of types of nudging above and within the PBL.
WTTOP	(**MIX**, **MJX**); horizontal weighting array based on topography and optionally used to compute horizontal weighting function for surface-analysis nudging.
WXY	(**MIXF**, **MJXF**); general horizontal weighting function for analysis nudging.
WXY2	(**MIXF**, **MJXF**); horizontal weighting function for analysis nudging of mixing ratio based on observed precipitation analyses.
WZ	(**MKX**, **MKX**); local working array.
XB	(**MIX**, **MJX**, **MKX**); general model field at time t-1.
XF	(**MJX**, **MIX**, **NF**); input or output working array to be interpolated.
XHKB	moist static energy (m^2 s^{-2}) at cloud base.
XK	(**MIX**, **MKX**); horizontal diffusion coefficient (m^2 s^{-1}) in DIFFU and DIFFUT.
XK	(**KNUM**, **KNUM**); array containing kernels (J kg^{-1} mb^{-1} s^{-1}) in ARAMB.
XKAPPA	{PARAMETER} (= R/c_p = .287).
XMB	(**KNUM**); cloud base mass flux (kg m^{-2} s^{-1}).
XMC	(**MKX**); cloud mass flux (kg m^{-2} s^{-1}).
XOB	(**MIXF**, **MJXF**, **MKXF**); general observed analysis array at time t-1.
XOBJK	(**MIXF**, **MJXF**); general north-south slice array for observed variable, decoupled from p* and temporally interpolated to time t-1.
XOBTEN	(**MIXF**, **MJXF**, **MKXF**); general observed analysis tendency for period **DIFTIM**.

XT	time (min) for variable **FB**.
XTEN	(**MIX**, **MKX**); general model tendency field.
XTIME/	forecast time (min).
XVAR	(**MKX**); variable that has been changed due to the cloud.
Y	(**MKX**); right-hand side on input and the solution on output.
Z	(**MKX**); height (m).
Z	(**NK**, **NK**); = **ZMATX** in VNORML and VORDER.
Z	(**MIX**, **MJX**, **KL**); divergence (cb s^{-1}) in DIVG.
Z1	(**MIX**); terrain (m).
ZD	(**MKX**, **KNUM**); normalized downdraft mass flux.
ZFAC/	(**MAXNES**, 2, **MKXF**); vertical weighting factor for analysis nudging.
ZMATX/	(**MKX**, **NSPLIT**); a matrix used in the transformation of divergence from sigma space to vertical mode space.
ZMATXR/	(**MKX**, **NSPLIT**); matrix inverse of **ZMATX**.
ZNTJ	(**MIXF**); roughness length (m).
ZU	(**MKX**, **KNUM**); normalized mass flux for the cloud updraft.