14.2.2 MEDOC Format.

A MEDOC (Multiscale Environmental Dispersion Over Complex terrain) file contains a header section followed by numerical data; multiple times require a complete header and data sections for each time for each time. A sample Fortran code that reads the data for a single time is illustrated in Figure 14-9. It should be noted that the MEDOC format was designed for other applications and therefore includes variables that are not used as SCIPUFF input. These are indicated as dummy variables in the figure. Also, some extensions to the original MEDOC format have been made, such as the staggered grid and spherical coordinate system options.

The first record must be either 'FFFFFFFF' for a formatted file or 'BBBBBBBB' for a binary file. The binary file is read with code identical to that shown in Figure 14-9, absent the format statements. The definitions of the input variables for the rest of the records are as follows:

CODENAME : Name of code used to generate data. Currently ignored in SCIPUFF.

STAGGER : Flag indicating if grid is staggered, i.e., the velocity components are shifted half a grid length from the center of the grid cell along their respective coordinate directions. If the first character of STAGGER is 'T', a staggered grid is assumed. Otherwise, or if a value for STAGGER is not given, an unstaggered grid is assumed.

IDAY, IMONTH, IYEAR, IHOUR, IMIN, ISEC : Day, month, year, hour, minute and seconds defining time of following data.

IMAX, JMAX, KMAX : Number of grid points in the (*x, y, z*) directions, respectively.

NREPER : Number of special points. This information is not used for the SCIPUFF input and can be set to zero.

NVAR3D : Number of three-dimensional fields.

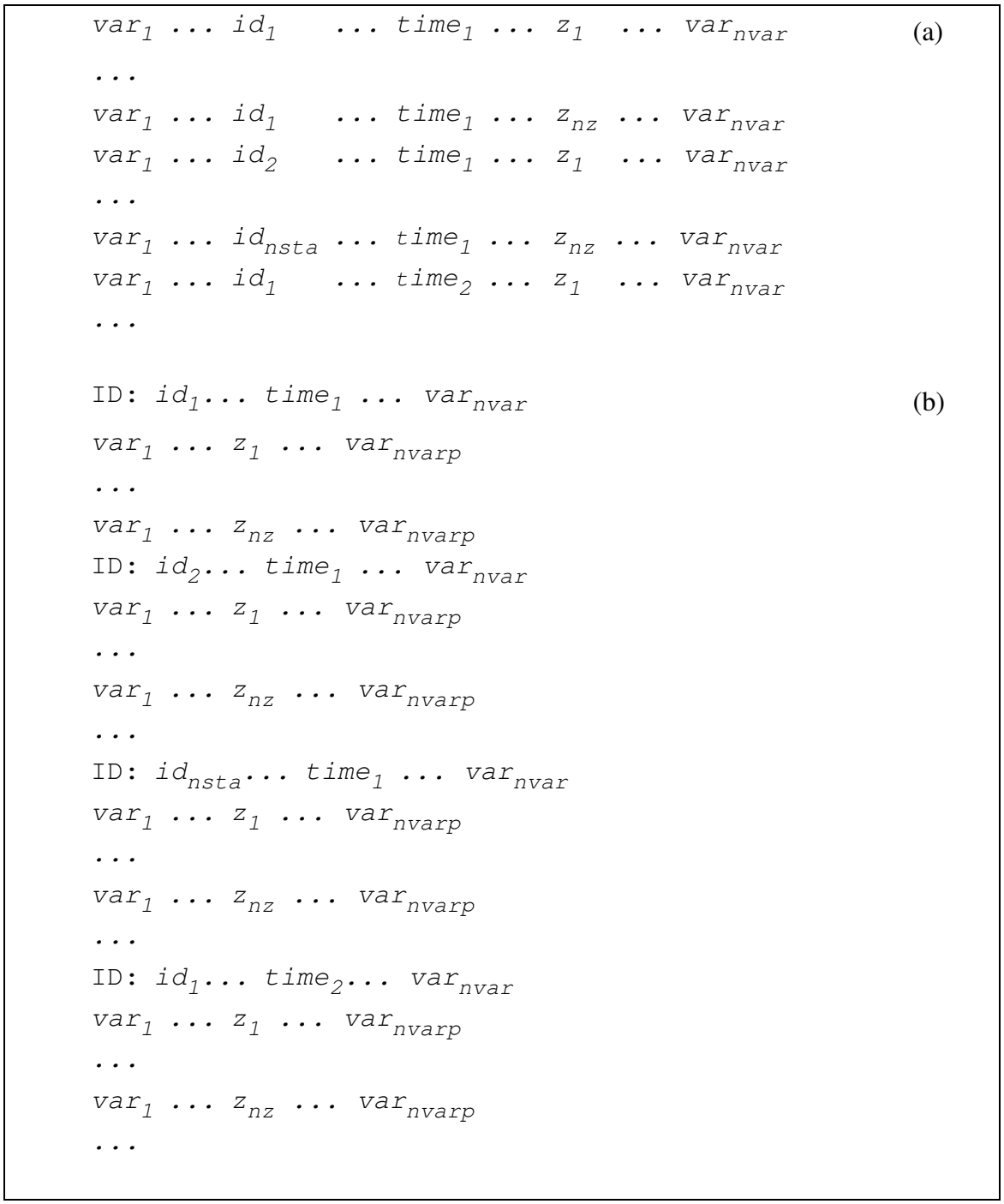

Figure 14-8. General structure of the numerical data in a meteorological observation file. (a) Without **nvarp** specified; (b) with **nvar** fixed variables and **nvarp** profile variables.

```
!     RECORD 1 - FILE FORMAT ('FFFFFFFF' or 'BBBBBBBB')
READ (1,9001) FFLAG
!
!     RECORD 2 - NAME OF CODE AND STAGGERED GRID FLAG
READ (1,9001) CODENAME, STAGGER
!
!     RECORD 3 - TIME
READ (1,9002) IDAY,IMONTH,IYEAR,IHOUR,IMIN,ISEC
!
!     RECORD 4 - INITIAL TIME OF CALCULATION - NOT USED IN SCIPUFF
READ (1,9002) JDAY,JMONTH,JYEAR,JHOUR,JMIN,JSEC
!
!     RECORD 5 - NUMBER OF GRID POINTS, KEY POINTS, VARIABLES
READ (1,9002) IMAX,JMAX,KMAX,NREPER,NVAR3D,NVAR2D
!
!     RECORD 6 - NOT USED FOR SCIPUFF
READ (1,9002) IDUM,IDUM,IDUM,IDUM,IDUM,IDUM
!
!     RECORD 7 - NOT USED FOR SCIPUFF
READ (1,9002) IDUM,IDUM,IDUM
!
!     RECORD 8 - GRID AND TIMING INFORMATION  (KMAX+11 VALUES)
READ (1,9003) (SZ(K),K=1,KMAX),DX,DY,XO,YO,LAT,LON, &
                   DUM,DUM,DUM,DUM,ZTOP
!
!     RECORD 9 - NAMES AND UNITS (NREPER+2*NVAR3D+2*NVAR2D VALUES)
READ (1,9001)  (NAMDUM,N=1,NREPER), &
               (NAM3D(N),N=1,NVAR3D),(NAMDUM,N=1,NVAR3D), &
               (NAM2D(N),N=1,NVAR2D),(NAMDUM,N=1,NVAR2D)
!
!     RECORD 10 - NOT USED IN SCIPUFF
READ (1,9003) (DUM,N=1,3*NREPER)
!
!     RECORD 11 - 3D VARIABLES  (NVAR3D SETS OF IMAX*JMAX*KMAX VALUES)
DO N=1,NVAR3D
  READ (1,9003) (((VAR3D(I,J,K,N),I=1,IMAX),J=1,JMAX),K=1,KMAX)
END DO
!
!     RECORD 12 - 2D VARIABLES  (NVAR2D SETS OF IMAX*JMAX VALUES)
DO N=1,NVAR2D
  READ (1,9003) ((VAR2D(I,J,N),I=1,IMAX),J=1,JMAX)
END DO
!
9001 FORMAT(6(A8,1X))
9002 FORMAT(6(I12,1X))
9003 FORMAT(6(F12.4,1X))
```

Figure 14-9. Fortran 90 pseudo-code for reading a formatted MEDOC input file.

NAM3D : Names of the three-dimensional variables. SCIPUFF requires at least the 2 horizontal velocity component fields, with the names 'U', 'V'. SCIPUFF will also read the vertical velocity component 'W' (required if terrain elevation is given as a two-dimensional field), potential temperature 'T' or absolute temperature 'TA', humidity ratio, 'H', pressure, 'P'. Meteorological uncertainty variance fields 'UUE', 'VVE', the cross-

correlation 'UVE', and associated length scale ‘SLE’ can be specified. Large-scale variance fields 'UUL', 'VVL' with the corresponding cross-correlation 'UVL' will also be recognized. Velocities are assumed to be in ms^{-1}, temperature in °K, humidity in grams moisture per grams dry air, pressure in millibars and variances in m^2s^{-2}. All other names are ignored.

NVAR2D : Number of two-dimensional fields.

NAM2D : Names of the two-dimensional variables. SCIPUFF recognizes the following two-dimensional fields: terrain elevation in meters (required if vertical velocity is given), 'REL' or 'TOPO'; planetary boundary layer height (above surface) in meters, 'ZI' or 'PBL_HITE'; surface heat flux in watts per square meter, 'HFLX' or 'SFC_HTFX'; roughness height in meters, 'ZRUF'; surface albedo, 'ALBEDO'; Bowen ratio, 'BOWEN'; canopy height, 'CANOPY'; and canopy flow index, 'ALPHA'. All other names are ignored.

SZ : Array of **KMAX** vertical grid coordinates in meters. The MEDOC terrain-following coordinate transformation is described in Section 10.3.2.

DX, DY : Horizontal grid spacing in meters or degrees, depending on the coordinate system.

XO, YO : Horizontal grid origin (SW corner) coordinates in km for Cartesian coordinate system; values of –999999 indicate a spherical coordinate system (latitude/longitude).

LAT, LON : Horizontal grid origin (SW corner) coordinates in degrees.

ZTOP : Vertical meteorology domain height in meters. If the parameter is not specified, the domain height is assumed to be **SZ(KMAX)**. For a staggered grid, the value of ZTOP indicates which of two vertical grids is used. If **ZTOP = SZ(KMAX)**, a “SWIFT” grid is assumed, where the first level of the vertical velocity component is at **SZ(KMAX)**/2. If **ZTOP** = [**SZ(KMAX) – SZ(KMAX)**]/2, a “MC-SCIPUFF” grid is assumed, where the first level of the vertical velocity component is zero (at the surface).