ADAS Subroutine casszd

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      SUBROUTINE CASSZD( IBSEL  , IZ0IN  ,
     &                   ITVAL  , TVAL   ,
     &                   BWNO   , IZ     , IZ1  ,
     &                   METI   , METF   ,
     &                   SZDA   , LTRNG  ,
     &                   TITLX  , IRCODE , DLPATH
     &                 )

C-----------------------------------------------------------------------
C
C  ******************* FORTRAN77 SUBROUTINE: CASSZD *********************
C
C  PURPOSE: TO EXTRACT AND  INTERPOLATE  ZERO-DENSITY  IONIZATION  RATE-
C           COEFFICIENTS FOR GIVEN ELEMENT NUCLEAR CHARGE AND DATA-BLOCK
C           FOR AN INPUT SET OF ELECTRON TEMPERATURES (eV).
C
C           - USES THE SAME ROUTINES USED BY SSZD, EXCEPT FOR:
C
C           'CAFILE' - WHICH OPENS THE REQUESTED FILE.
C           'CACHKB' - WHICH CHECKS INPUT  VALUES  ARE  CONSISTENT  WITH
C                      THE SELECTED DATA-BLOCK 'IBSEL' AND   'IBSEL'  IS
C                      IN RANGE.
C
C            THE FIRST OF THESE FUNCTIONS IS CARRIED  OUT  IN  'ADAS502'
C            VIA ISPF PANELS USING THE ROUTINE 'E2SPF0'  -  ADAS502 DOES
C            NOT REQUIRE THE ROUTINE 'CACHKB' AS THE USER CANNOT  SELECT
C            AN INVALID VALUE FOR 'IBSEL' OR 'IBSEL'/ELEMENT COMBINATION
C
C
C  CALLING PROGRAM: NSUPH1
C
C  SUBROUTINE:
C
C  INPUT : (I*4)  IBSEL   = INDEX OF DATA-BLOCK SELECTED FOR ANALYSIS
C  INPUT : (I*4)  IZ0IN   = NUCLEAR CHARGE OF REQUIRED ELEMENT
C
C  INPUT : (I*4)  ITVAL   = NUMBER OF ELECTRON TEMPERATURE VALUES
C  INPUT : (R*8)  TVAL()  = ELECTRON TEMPERATUIRES (UNITS: EV)
C                           DIMENSION: ELECTRON TEMPERATURE INDEX
C  INPUT : (C*80) DLPATH  = PATH NAME TO THE RELEVANT DATA FILES
C                           (PASSED THROUGH TO CAFILE TO BUILD FILENAME)
C
C  OUTPUT: (R*8)  BWNO    = INPUT FILE - SELECTED DATA-BLOCK:
C                           EFFECTIVE IONIZATION POTENTIAL (cm-1).
C  OUTPUT: (I*4)  IZ      = INPUT FILE - SELECTED DATA BLOCK:
C                           IONIZING ION - INITIAL CHARGE
C  OUTPUT: (I*4)  IZ1     = INPUT FILE - SELECTED DATA BLOCK:
C                           IONIZING ION - FINAL   CHARGE
C
C  OUTPUT: (I*4)  METI    = INPUT FILE - SELECTED DATA-BLOCK:
C                           INITIAL STATE METSTABLE INDEX
C  OUTPUT: (I*4)  METF    = INPUT FILE - SELECTED DATA-BLOCK:
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C                             FINAL   STATE METSTABLE INDEX
C
C  OUTPUT: (R*8)  SZDA()  = ZERO-DENSITY IONIZATION RATE-COEFFICIENTS
C                            DIMENSION: ELECTRON TEMPERATURE INDEX
C  OUTPUT: (L*4)  LTRNG() =.TRUE.  => OUTPUT 'SZDA()'  VALUE WAS INTER-
C                                     POLATED  FOR  THE  USER  ENTERED
C                                     ELECTRON TEMPERATURE 'TVAL()'.
C                           .FALSE. => OUTPUT 'SZDA()'  VALUE WAS EXTRA-
C                                     POLATED  FOR  THE  USER  ENTERED
C                                     ELECTRON TEMPERATURE 'TVAL()'.
C                            DIMENSION: ELECTRON TEMPERATURE INDEX
C
C  OUTPUT: (C*80) TITLX   = INFORMATION STRING (DSN ETC.)
C  OUTPUT: (I*4)  IRCODE  = RETURN CODE FROM SUBROUTINE:
C                            0 => NORMAL COMPLETION - NO ERROR DETECTED
C                            1 => DATA SET MEMBER FOR IONIZING ION WITH
C                                 NUCLEAR CHARGE  'IZ0IN'  CAN  NOT  BE
C                                 FOUND/DOES NOT EXIST.
C                            2 => DISCREPANCY BETWEEN REQUESTED CHARGES
C                                 AND THOSE IN INPUT FILE.
C                            3 => THE SELECTED DATA-BLOCK 'IBSEL' IS OUT
C                                 OF RANGE OR DOES NOT EXIST.
C                            4 => INVALID VALUE FOR 'IZ0IN' ENTERED.
C                                 ('IZ0MIN' <= 'IZ0IN' <= 'IZ0MAX')
C                            9 => ERROR ENCOUNTERED WHEN TRYING TO OPEN
C                                 INPUT DATA-SET.
C
C          (I*4)  NSTORE  = PARAMETER= MAXIMUM NUMBER  OF  DATA-BLOCKS
C                                      WHICH CAN BE READ FROM THE INPUT
C                                      DATA-SET.
C          (I*4)  NTDIM   = PARAMETER= MAXIMUM NUMBER OF ELECTRON TEMP-
C                                      ERATURES THAT CAN BE READ  FROM
C                                      AN INPUT DATA-SET DATA-BLOCK.
C          (I*4)  IZ0MIN  = PARAMETER: MIN. ALLOWED VALUE FOR 'IZ0IN'
C          (I*4)  IZ0MAX  = PARAMETER: MAX. ALLOWED VALUE FOR 'IZ0IN'
C
C          (I*4)  IZ0LST  = LAST VALUE OF 'IZ0IN' FOR  WHICH  INPUT
C                           DATA WAS READ.
C          (I*4)  IUNIT   = UNIT TO WHICH INPUT DATA SET IS ALLOCATED
C          (I*4)  NBSEL   = TOTAL NUMBER OF DATA-BLOCKS READ FROM INPUT
C                           DATA SET.
C          (I*4)  IZ0     = INPUT FILE - EMITTING ION - NUCLEAR CHARGE
C
C          (L*4)  LOPEN   = .TRUE.  => INPUT DATA SET OPEN.
C                           .FALSE. => INPUT DATA SET CLOSED.
C
C          (C*2)  ESYM    = INPUT FILE - IONIZING ION - ELEMENT SYMBOL
C          (C*3)  EXTIN   = CURRENT ADAS SOURCE DATA FILE EXTENSION
C          (C*3)  EXTLST  = ADAS SOURCE DATA FILE EXT. USED LAST TIME
C                           DATA WAS READ.
C          (C*6)  UIDIN   = CURRENT ADAS SOURCE DATA USER ID.
CA         (C*80) UIDIN   = CURRENT ADAS SOURCE DATA FILE PATH
CA         (C*80) UIDLST  = ADAS SOURCE DATA FILE PATH USED LAST TIME
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C                             DATA WAS READ.
C          (C*8)  GRPIN   = CURRENT ADAS SOURCE DATA GROUPNAME
C          (C*8)  GRPLST  = ADAS SOURCE DATA GROUPNAME USED LAST TIME
C                             DATA WAS READ.
CA         (C*80) TYPIN   = CURRENT ADAS FILE SUBDIRECTORY( OPTIONAL)
CA         (C*80) TYPLST  = ADAS FILE SUBDIRECTORY USED LAST TIME (OPT)
C                             DATA WAS READ.
CA    (C*80) DSNREQ  = DATAFILE NAME UNDER UNIX INCLUDING PATH
C                             (MAY OR MAY NOT EXIST)
CA         (C*80) DSNAME  = DATAFILE NAME UNDER UNIX INCLUDING PATH
C
C          (I*4)  ISELA() = INPUT DATA FILE: DATA-BLOCK ENTRY INDICES.
C                             DIMENSION: DATA-BLOCK INDEX
C          (I*4)  ITA()   = INPUT DATA SET-NUMBER OF ELECTRON TEMPERA-
C                             TURES.
C                             DIMENSION: DATA-BLOCK INDEX
C          (I*4)  IZOUT() = INPUT DATA FILE: IONIZING ION INITIAL CHARGE
C                             DIMENSION: DATA-BLOCK INDEX
C          (I*4)  IZ1OUT()= INPUT DATA FILE: IONIZING ION FINAL   CHARGE
C                             DIMENSION: DATA-BLOCK INDEX
C
C          (R*8)  BWNOUT()= INPUT DATA FILE: EFFECTIVE IONIZATION POT.
C                             (UNITS: cm-1).
C                             DIMENSION: DATA-BLOCK INDEX
C          (R*8)  TETA(,) = INPUT DATA SET -
C                             ELECTRON TEMPERATURES (UNITS: eV)
C                             1st DIMENSION: ELECTRON TEMPERATURE INDEX
C                             2nd DIMENSION: DATA-BLOCK INDEX
C          (R*8)  SZD(,)    =INPUT DATA SET -
C                              FULL SET OF IONIZATIONS RATE-COEFFICIENTS
C                              1st DIMENSION: ELECTRON TEMPERATURE INDEX
C                              3rd DIMENSION: DATA-BLOCK INDEX
C
C          (C*2)  CICODE()= INPUT DATA FILE - INITIAL STATE META. INDEX
C                             DIMENSION: DATA-BLOCK INDEX
C          (C*2)  CFCODE()= INPUT DATA FILE - FINAL   STATE META. INDEX
C                             DIMENSION: DATA-BLOCK INDEX
C          (C*6)  CIION() = INPUT DATA FILE - INITIAL ION
C                             DIMENSION: DATA-BLOCK INDEX
C          (C*6)  CFION() = INPUT DATA FILE - FINAL   ION
C                             DIMENSION: DATA-BLOCK INDEX
C
C
C ROUTINES:
C          ROUTINE    SOURCE    BRIEF DESCRIPTION
C          ------------------------------------------------------------
C          CAFILE     ADAS      OPEN DATA SET FOR SELECTED ELEMENT
C          XXDATA_07  ADAS      FETCH INPUT DATA FROM SELECTED DATA SET
C          CACHKB     ADAS      CHECK VALIDITY OF ELEMENT AND 'IBSEL'
C          E2SPLN     ADAS      INTERPOLATE DATA WITH ONE-WAY SPLINES
C          E2TITL     ADAS      CREATE DESCRIPTIVE TITLE FOR OUTPUT
C          XXUID      ADAS      FETCHES/SETS ADAS SOURCE DATA USER ID
C          XXSPEC     ADAS      FETCHES/SETS ADAS SOURCE DATA FILE NAME+
```

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C
C AUTHOR:  PAUL E. BRIDEN (TESSELLA SUPPORT SERVICES PLC)
C          K1/0/37
C          JET EXT. 6023
C
C DATE:    07/06/91
C
C UPDATE:  06/12/91 - PE BRIDEN: 'NSTORE' INCREASED FROM 10 TO 100
C
C UPDATE:  28/02/92 - PE BRIDEN: 'NSTORE' INCREASED FROM 100 TO 160
C
C UPDATE:  10/03/93 - PE BRIDEN: INTRODUCED CALL TO XXUID TO ESTABLISH
C                                IF USERID OF INPUT DATASET CHANGES
C                                BETWEEN CALLS.
C                                SAVE NAME OF LAST READ DATASET.
C                                (ADDED VARIABLES UIDIN,UIDLST,DSNREQ)
C
C UPDATE:   2/09/93 - HPS      : INTRODUCED CALL TO XXSSZD TO ESTABLISH
C                                IF USRGRP, USRTYP AND USREXT OF INPUT
C                                DATASET CHANGES BETWEEN CALLS.
C                                SAVE NAME OF LAST READ DATASET.
C                                (ADDED VARIABLES GRPIN,GRPLST,TYPIN,
C                                 TYPLST, EXTIN, EXTLST)
C
C UPDATE:   10/11/94 - L. JALOTA: MODIFIED TO RUN UNDER UNIX, SIZE OF
C   DSNAME AND DSNREQ INCREASED TO 80
C   CHARACTERS
C
C UPDATE:   21/11/94 - L/ JALOTA: TIDIED UP CHARACTER LENGTHS.
C
C UNIX-IDL PORT:
C
C
C VERSION: 1.1                          DATE: 25-1-96
C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C               - CREATED FROM SSZD.FOR WITH SPECIFIC USE IN ADAS 310
C                 AS GOAL. ALL FUNCTIONALITY IS MAINTAINED, BUT
C                 ROUTINE CALLS A NEW FILE CAFILE.FOR TO OPEN
C                 THE REQUESTED FILE IF IT IS AVAILABLE, THIS
C                 HAS ALSO NECESSITATED BRINGING IN THE VARIABLE
C                 DLPATH WHICH HOLDS THE PATH TO THE DATA FILES.
C
C
C VERSION : 1.2
C DATE    : 20-10-2003
C MODIFIED: Martin O'Mullane
C           - Extend TITLX to 120 to match e2titl routine.
C           - Save essential variable between calls.
C
C VERSION : 1.3
C DATE    : 17-05-2007
C MODIFIED: Allan Whiteford
C           - Updated comments as part of subroutine documentation
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C             procedure.
C
C VERSION : 1.4
C DATE    : 26-03-2008
C MODIFIED: Allan Whiteford
C           - Changed call from E2DATA to XXDATA_07
C
C-----------------------------------------------------------------------
C-----------------------------------------------------------------------
C
C-----------------------------------------------------------------------
      CHARACTER*80        DLPATH
      CHARACTER*120       TITLX
      INTEGER             IBSEL,        IRCODE,      ITVAL,        IZ
      INTEGER             IZ0IN,        IZ1,         METF,         METI
      LOGICAL             LTRNG(ITVAL)
      REAL*8              BWNO,         SZDA(ITVAL), TVAL(ITVAL)
```