D1 hourly data download, import, and merge workflow:

1. Download hourly D1 data from Niwot LTER FTP
   1. <ftp://niwotftp.colorado.edu/pub/climdat/>
2. Create format date range and header file for the \*.d1 files
   1. \*.d1 files are the earliest in the record and follow a different format than later files
   2. Their formats are based on the date on which data was collected
   3. The collection date is indicated in the file name (ddmonyy.d1)
      1. Ex: 07sep89.d1
         1. Meaning the file was collected on 1989-09-07
   4. Format date range file = d1\_hrly\_formatlist.csv
   5. Header file for \*.c1 files = nwt\_c1\_hrly\_headers\_oldformat.csv
3. Examine the \*.d1 files as some are not csv files, but rather space-separated tables with the column number indicated in each variable entry and the entries for one date spread over multiple rows
4. Later files were formatted manually because they were already chunked into yearly batches (i.e., all 1992 hourly data are in 1992.d1.hr)
5. Any files that were changed slightly were put into the “preprocessed” folder
   1. This includes:
      1. Split yearly files with headers added
6. New files from Hope added to subfolder files\_from\_hope (2016-01-19)
   1. See notes below
7. Run code to make sure all hours use the HHHH format (0000, 0100, 1000 instead of 0, 100, 1000)
8. Some files may have extra carriage returns (i.e. blank rows)
9. Make sure doy is always imported as integer (some doys have a 0 in front)
10. 1991 starts on doy32 (1 – 31 are missing; look for a jan91 file somewhere)
    1. Hope sent 31jan91.d1 file
    2. It was “wonky” format (see c1\_hrly\_import…)
    3. Processed and added to 1991 preprocessed file
11. 1993b.d1.pre.hr is missing solar rad. (doy 223 – 365)
12. 1994 is missing solar rad.
13. 1995 is missing solar rad.
    1. 1995 ends on doy 357 @ 1200
       1. Hope sent 22feb96.d1 file
       2. Processed and added to 1995 preprocessed file
14. 1996 is missing solar rad.
15. 1997a and b are missing solar rad.
16. 1998 is missing solar rad.
17. 1999 is missing solar rad.
    1. cvkAbove solar rad. Data is missing
    2. Will have to be estimated
18. 1999 has only 20 days of data (doy 1- 20)
    1. Hope sent missing .d1 files
    2. Processed and added to 1999b and 1999c preprocessed files
19. 2000 only runs from doy 187 to doy 366
    1. Hope sent missing .d1 files
    2. Processed and added to 2000a preprocessed file
    3. Days 182 through 186 are missing (gone, need to be infilled)
20. 2007 missing data from doy 1 0000 to doy 3 2200 (gone, need to be infilled)
21. Solar rad. Looks bad in 2008
22. 30jun87.d1has been removed, unsure of file contents
23. Run terminal script to extract the hourly date codes
    1. 122 or 120
    2. Might be slower than method use in C1 workflow (import into R)
    3. Example: grep '120,' 30sep87.d1 > 30sep87.d1.2
    4. If running the above code, check each file in TextMate to confirm all daily data were removed
24. Early files are 2 h timestep
25. File immediately following are 0.5 h timestep
26. Start date for file 31dec89.d1.2 changed from 10/11 to 10/10 so file has correct # of days
27. Import and aggregation
    1. Import all .d1 ASCII files and aggregate
       1. See d1\_import\_format\_aggregate for specifics
    2. Import preprocessed files
       1. Note: 1993 a and b files had weird carriage returns in the hour column
          1. R interpreted them as “\032”
          2. Located these issues in each file, deleted the carriage return, and reimported (seen as “^Z” in TextMate)