CLPX NOAA FSL Rapid Update Cycle 20 km (RUC-20) Dataset, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Cline, D., G. Fall, and A. Nilsson. 2004. *CLPX NOAA FSL Rapid Update Cycle 20 km (RUC-20) Dataset, Version 1.* [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/KWMXY3NFHZOH. [Date Accessed].

National Snow and Ice Data Center

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1   DETAILED DATA DESCRIPTION

The main operational runs of RUC20 are performed at the National Centers for Environmental Prediction (NCEP). RUC20 is a further development on the RUC40 model that produced output at a 40 km horizontal resolution. An Adobe Acrobat® document (RUC20-tpb.pdf) provides a detailed analysis of the RUC20 model in reference to its RUC40 predecessor.

Incoming solar radiation data products are not included in these RUC20 files. Consequently, hourly solar insolation data have been acquired over the same time period from the GOES (geostationary operational environmental satellite) Surface and Insolation Products (GSIP) generated by the National Environmental Satellite, Data, and Information Service (NESDIS). The files contain instantaneous surface radiation fluxes, as well as cloud and surface temperature data gathered by GOES-east and GOES-west imagers, at a horizontal resolution of 0.5 degrees. Nighttime values are left as zeroes.

1.1 Format

RUC20 data files are in GRIB format (Gridded Binary). Two files are available for each hourly time-step: an analysis file and a one-hour forecast file. These files can be manipulated, inventoried, and decoded using a program such as WGRIB, which can be freely accessed at http://www.cpc.ncep.noaa.gov/products/wesley/wgrib.html.

NESDIS solar insolation data files are in binary format.

1.2 File Naming Convention

This data set consists of two data types: RUC-20 data and NESDIS solar insolation data. RUC-20 data and NESDIS solar insolation data.

File naming structure for RUC-20 data is `YYDDDruc2.t##z.bgrb20xxx.gz`, where

Y = Year
DDD = Day of Year
= Hour in GMT
xxx = either 'anl' for analysis, or f01, f02, f03, f06, f09 or f12 for forecasts.

File naming structure for NESDIS data is `HRYYDDDHH.gz`, where

YY = Year

DDD = Day of Year

HH = Hour in GMT

1.3 File Size

All files are zipped. The size of the entire data set is approximately 570 GB. Approximate individual file sizes are:

GRIB (zipped): up to 35 MB per day

GRIB (unzipped): up to 55 MB per day

NESDIS (zipped): 1 MB per day

NESDIS (unzipped): 2.1 MB per day

1.4 Spatial Coverage and Resolution

RUC20 data covers the lower 48 United States and adjacent areas of Canada, Mexico, and oceanic areas. The 20-km grid is 301 by 225 and is a subset of the Advanced Weather Interactive Processing System (AWIPS) Lambert conformal grid used by the National Weather Service.

Each NESDIS file has information for 7,381 (0.5 by 0.5 degree, equal-angle) cells (61 latitudes and 121 longitudes). All cells are present even when data are missing. Missing data are left as zeros. Cells are written sequentially, proceeding eastward through the latitude zone, then southward to the next latitude zone. The center latitude/longitude coordinates of the first cell (top left) are 54°N, 66°W and the last cell (bottom right) 24°N, 126°W.

1.5 Temporal Coverage and Resolution

Data were downloaded by the National Operational Hydrologic Remote Sensing Center (NOHRSC) between 30 September 2002 and 30 September 2003. Two files are available for each hourly time-step: an analysis file and a one-hour forecast file.

For one-hour forecasts, the snow accumulation parameter (parameter 47 in the list below) only represents accumulation for the hour between the time of analysis and forecast. Every 24 hours at 0600Z (i.e., 06:00 GMT), five extra files are available containing two-, three-, six-, nine-, and twelve-hourly forecasts. At 0600Z, when calculating the snow accumulation parameters for six-, nine- and twelve-hourly forecasts, the parameter only represents snow accumulations in the three hours prior to the forecast time. One-, two- and three-hourly forecasts only represent snow accumulation for the hours between 0600Z and the forecast time. Another snow accumulation parameter (parameter 55 in the list below) describes a value of snow water equivalent at the time

of the forecast rather than an accumulated total of precipitation over a series of hours preceding the forecast.

Because NOHRSC operations do not depend upon these files being available for every hour of every day, occasional data retrieval failures associated with server or client outages are expected; therefore, archived RUC20 data may not exist for every hour of every day. There are known periods of missing data between 26 November and 10 December 2002; 26 December 2002 and 11 January 2003; and 24 April and 10 May 2003. There are two data files missing between 28 May and 12 June 2003.

The same temporal coverage exists for NESDIS data as for RUC20 data although, as with RUC20 data, there is no guarantee that archived NESDIS data exist for every hour of every day. NESDIS data files consist of instantaneous hourly measurements (not hourly averages) with no accompanying analysis or forecast files.

1.6 Parameter or Variable

Parameters presented in this data set are taken from the native grid (hybrid-b) which has 50 native coordinate levels. Although every effort has been made to accurately list the available parameters, abrupt undocumented changes may have been made within the collection period during model runs at FSL. Consequently, future investigators are strongly advised to verify file parameters using the WGRIB software that is used for decoding GRIB files.

Of the following 60 parameters, the first 14 are 3-dimensional parameters and the second 46 are 2-dimensional parameters:

1.   pressure [Pa]
2.   height [gpm]
3.   virtual potential temperature [K]
4.   water vapor mixing ratio [kg/kg]
5.   u-component of wind [m/s]
6.   v-component of wind [m/s]
7.   vertical velocity [Pa/s]
8.   cloud water mixing ratio [kg/kg]
9.   rain water mixing ratio [kg/kg]
10. ice mixing ratio [kg/kg]
11. snow mixing ratio [kg/kg]
12. graupel mixing ratio [kg/kg]
13. cloud ice number concentration [m-3]
14. turbulence kinetic energy [J/kg]
15. MAPS mean sea level pressure [Pa]
16. soil temperature at surface [K]
17. sensible heat flux [W/m2]

18. latent heat flux [W/m2]
19. net longwave radiation at surface [W/m2]
20. precipitation rate [kg/m2/s]
21. resolvable (large) scale precipitation [kg/m2]
22. sub-grid (convective) scale precipitation [kg/m2]
23. precipitable water [kg/m2]
24. pressure at tropopause [Pa]
25. potential temperature at tropopause [K]
26. u-component of wind at tropopause [m/s]
27. v-component of wind at tropopause [m/s]
28. convective available potential energy [J/kg]
29. convective inhibition [J/kg]
30. soil temperature at 5 cm below surface [K]
31. soil temperature at 20 cm below surface [K]
32. soil temperature at 40 cm below surface [K]
33. soil temperature at 160 cm below surface [K]
34. soil temperature at 300 cm below surface [K]
35. soil volumetric moisture content at surface [wfv]}
36. soil volumetric moisture content at 5 cm below surface [wfv]
37. soil volumetric moisture content at 20 cm below surface [wfv]
38. soil volumetric moisture content at 40 cm below surface [wfv]
39. soil volumetric moisture content at 160 cm below surface [wfv]
40. soil volumetric moisture content at 300 cm below surface [wfv]
41. soil type [0..9 (Zobler)]
42. vegetation type (simple biosphere model) [0..13, as in SiB]
43. icing potential SIGMET/AIRMET [non-dim]
44. lightning [non-dim]
45. rate of water dropping from canopy to ground [-]
46. net short wave radiation at surface[W/m2]
47. snow accumulation [m depth, 100 kg/m2]
48. snow depth [m]
49. surface runoff [kg/m2]
50. sub-surface runoff [kg/m2]
51. canopy water [kg/m2]
52. snow temperature - 5 cm below surface or top soil level[K]
53. snow temperature - 10 cm below surface or top soil level [K]
54. water vapor mixing ratio at surface [kg/kg]
55. snow accumulation [m depth, 100 kg/m2]
56. snow density 5 cm below snow surface [kg/m3]
57. air temperature, 2m above ground [K]
58. water vapor mixing ratio, 2m above ground [kg/kg]
59. u-component of wind, 10m above ground [m/s]
60. v-component of wind, 10m above ground [m/s]

NESDIS Solar Insolation Parameters:

Each NESDIS data product cell has 71 fields, of which two are actively used. Surface downwards flux (Wm-2) for clear and cloudy sky is used as the source of direct solar radiation (field number 41 in the NESDIS file) and the source of diffuse solar radiation (field number 46 in the NESDIS file).

2 SOFTWARE AND TOOLS

2.1 Software and Tools

The RUC 20 GRIB files can be manipulated, inventoried, and decoded using a program such as WGRIB, which can be freely accessed at http://www.cpc.ncep.noaa.gov/products/wesley/wgrib.html.

3 REFERENCES AND RELATED PUBLICATIONS

GCIP links:

http://www.atmos.umd.edu/~srb/gcip/project.htm
http://www.atmos.umd.edu/~srb/gcip/backgrd.htm
http://www.atmos.umd.edu/~srb/gcip/readmec.htm
http://www.atmos.umd.edu/~srb/gcip/person.htm

3.1 Related Data Collections

All CLPX Data Sets

3.2 Related Data Collections

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4 DOCUMENT INFORMATION

4.1 Publication Date

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4.2 Date Last Updated

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