



Questions & Answers Part 3

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Jonathan Case: Jonathan.Case-1@nasa.gov, Kevin Fuell (UAH at SPoRT): kevin.fuell@nasa.gov, or Sean McCartney: sean.mccartney@nasa.gov

Question 1: Can you use this data outside of the USA?

Answer 1: The SPoRT-LIS from this course is primarily over the continental U.S. (i.e. CONUS) and is intended for use in the USA. However, it's possible to have a Land Information System (LIS) run/instance outside of the US, and this could be via your own installation of a LIS instance or via data from others who have configured LIS similarly to the "SPoRT-LIS." The LIS supports domains anywhere in the globe. In the Session 3 demo of the SPoRT-managed LIS runs on the [SPoRT-LIS Viewer](#), we highlighted some outside the CONUS runs over Africa, Alaska and the Caribbean regions. Many other organizations also run LIS in various domains across the world – Asia, South America, etc.

Question 2: Can you provide a few examples of where SPoRT-LIS data is available and how to find if data is available for my location?

Answer 2: Let's state upfront that when we say "SPoRT-LIS", this refers to primarily the LIS run configured for the Continental United States (CONUS), which includes adjacent parts of southern Canada and northern Mexico. SPoRT does manage a few LIS runs outside of the CONUS (eastern Africa, Alaska, Caribbean/Puerto Rico), which are available on the [SPoRT-LIS Viewer](#), under Dataset -> LIS (expand LIS to see available geographical regions). Also, geotiffs of the full 1-km Caribbean run can be found at <https://geo.nsstc.nasa.gov/SPoRT/modeling/lis/car1km/geotiff/>.

More broadly, the LIS software framework and input datasets support setting up a LIS domain anywhere in the globe. There are other organizations (e.g., NASA Goddard, NASA SERVIR, ICIMOD, etc.) that have established LIS runs for a variety of applications, e.g., the South Asia Land Data Assimilation System (SALDAS), the Famine Early Warning Systems Network (FEWS NET) over Africa, etc.



Question 3: From the different depths, can the relative soil moisture (RSM) or volumetric soil moisture (VSM) of the depth be calculated? Like 0-10 and 0-40 used to estimate 10-40?

Answer 3: In the Noah land surface model run within the LIS framework, the VSM is explicitly solved for each individual model layer (0-10, 10-40, 40-100, and 100-200 cm). From these calculations of VSM, other fields are derived such as the RSM, the percentiles, cumulative layered soil moisture fields/percentiles, etc. Please refer back to the Session 1 content (presentations and [online starter package microlesson](#)) as reference material on how these fields are obtained. So in essence, the order of operations is opposite of how the question is stated. Individual layers are used to compute VSM/RSM in cumulative layers and for soil moisture percentiles.

Question 4: Where can we download previous archived data or non-near time data?

Answer 4: We are in the process of preparing the entire SPoRT-LIS climatology and near real-time archives to NASA's Global Hydrometeorology Resource Center Distributed Active Archive Center (GHRC DAAC). We have a goal of completing this archive during the calendar year 2023, so stay tuned! If there are research projects that could benefit from a small subset of the SPoRT-LIS climatology, please contact NASA/SPoRT and/or send an email to one of the ETA Team members such as Kevin Fuell (kevin.fuell@nasa.gov). Individual, small requests may be possible depending on the given funded project tasks currently being worked by the SPoRT Program staff prior to the long term DAAC solution.

Question 5: Can you explain whether it's possible to always reference the most recent file in the Google Colab script?

Answer 5: From the existing Jupyter Notebook in Colab as it is currently written: No, since there are not any static "current" files on the geo.ndc.nasa.gov directory. You do have options to add to the notebook to either 1) query a directory and return the most recent file for each parameter/product, then use that as the filename in the provided notebook, or 2) read in the data from a Web Mapping Service (i.e. REST Service) like the NASA Disasters Web Mapping Portal. You can find much of the LIS data on the Near-Real Time section of the portal:

<https://maps.disasters.nasa.gov/arcgis/home/group.html?id=bf00cf637b654b4c99a147c13451f866#overview>



Keep in mind that you will need to import a package like OWSLib to read in directly from an online WMS.

Question 6: Can you do a time series analysis of the data?

Answer 6: Yes, and excellent question! There are several possibilities here: (1) Examine time-depth cross sections, (2) Examine time series of soil moisture percentiles, (3) Examine the areal coverage of soil moisture percentile thresholds corresponding to drought categories, and (4) Examine time series of the magnitude over time.

For (1), you could extend the capabilities demonstrated in the Google Colab session by reading in multiple SPoRT-LIS files for all layers (e.g., from the native SPoRT-LIS data that will be available later this year at the GHRC DAAC). Then a time-depth cross section can be plotted with time along the x-axis and depth along the y-axis (with the surface at the top of the y-axis), as in [Figure 1d of Case et al. 2011; Wea. Forecasting](#).

For (2), one could read in multiple soil moisture percentile files (e.g., daily or weekly), and then plot a time series of the soil moisture percentiles, as [Case et al. \(2021\) presented](#) in the National Weather Association *Journal of Operational Meteorology* manuscript (see Figures 11 and 12).

For (3), we presented in the Session 1 content a comparison of the SPoRT-LIS areal coverage of soil moisture percentiles, thresholded to drought categories, against the U.S. Drought Monitor areal coverage of D0 to D4 drought categories (see also the microlesson [SPoRT-LIS: Soil Moisture Percentile](#), sub-lesson titled “Relation to USDM Categories”). These time-series plots provide a quick visual comparison between the SPoRT-LIS soil moisture drought categories to the official U.S. Drought Monitor weekly product. We encourage course participants to review the materials in Session 1 on the SPoRT-LIS to see this time series example.

For (4), time series of the soil moisture values can be plotted in the same graph for each of the 4 layers. For example, we have plotted the relative soil moisture at all depths from the LIS instance over Alaska by SPoRT in a single image to see the soil moisture response to precipitation/temperature forcing and the lag in soil moisture changes that occurs for a given layer. See the [LIS-AK Starter Package training](#) for an example plot. Sharing or addition of code to the Jupyter Notebook may be possible. Send email with interests to the contacts listed in this document.



Application of NASA SPoRT-Land Information System (SPoRT-LIS) Soil
Moisture Data for Drought
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We are looking for user feedback on these solutions or products for suggestions on further development. Help us Help you!!!

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Question 7: Current LIS soil moisture CONUS resolution is 3km. Is there a plan to gather higher resolution maps for GVF and soil moisture?

Answer 7: We have plans to enhance the SPoRT-LIS with a geographically expanded and enhanced resolution solution of LIS. The LIS development team at NASA GSFC are actively developing a sophisticated configuration of LIS with multivariate data assimilation that SPoRT personnel will help to transition into real-time operations and manage on a cloud computing instance. This new solution will cover all of North America, including Alaska and Hawaii at 1-km resolution.