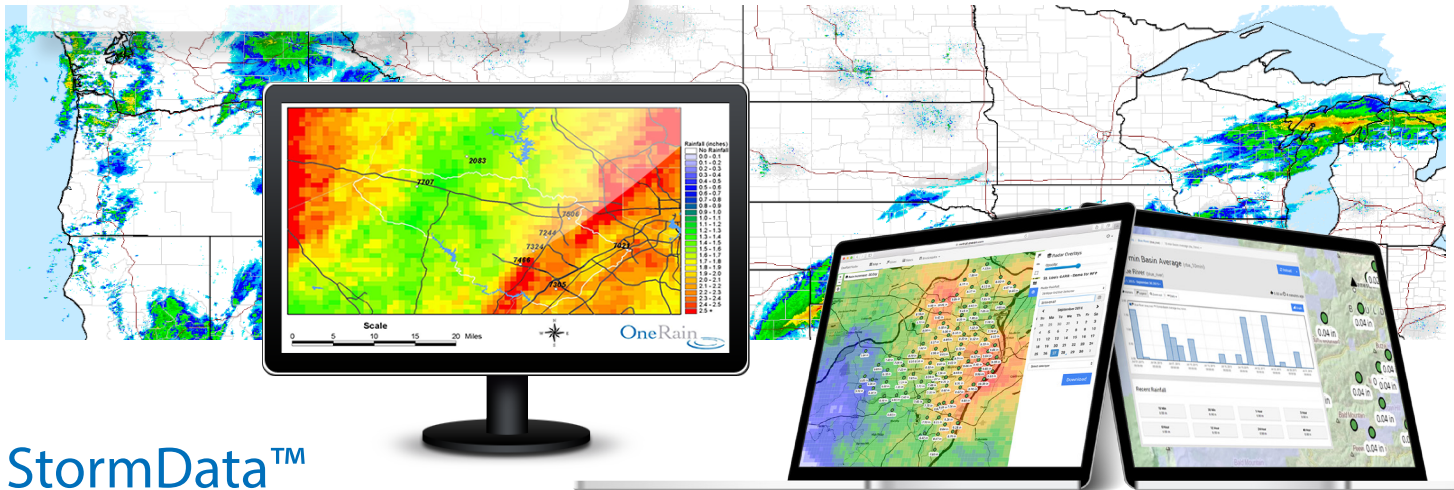


*National mosaic archive
starting in 1993 up to present*

OneRain
The Rainfall Company



StormData™

Gauge-Adjusted Radar Rainfall

Gauge-Adjusted Radar Rainfall (GARR) marries rain gauge measurement at a point with the spatially distributed information from NEXRAD radars to give you ground truthed, spatially distributed rainfall information over your area of interest.

SERVICES

- Real-time Gauge-Adjusted Radar-Rainfall data, basin-average rainfall and forecast rainfall
- End-of-month archive quality Gauge-Adjusted Radar Rainfall data
- Historical and post-event analysis using archived rainfall estimates
- Web delivered data
- StormProperties™ Analysis

BENEFITS

- Mosaic of radars over your area
- Historical data from 1993 to present
- Multiple file delivery formats including delimited files, Excel spreadsheets, ArcView shape files, NetCDF, and more
- Innovative quality control procedures
- Quick turnaround for an analysis

Real-time, Future, and Historical Radar Data Services

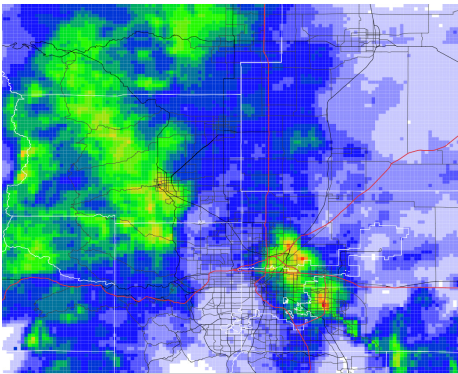
OneRain uses an innovative approach to derive rainfall rates from each 1-km² or 2-km² radar pixel and calibrates these rates using rain gauge data to deliver ground-truthed rainfall estimates. **StormData** radar processing has evolved continuously since 1994 into the data quality management system required to produce archive quality data for flood warning, runoff modeling, I/I studies, litigation, real-time control, design storms and National Pollutant Discharge Elimination System (NPDES) compliance activities.

Historical Radar Data Services

OneRain maintains one of, if not the most complete record of historical, nationwide radar archive in the country. OneRain collects and stores this nationwide radar mosaic every five minutes. Historical records of the mosaics are maintained in OneRain's nationwide radar archive:

- 2-km², 15-minute data from 1993 to the present
- 1-km², 5-minute data from 2002 to the present

Either supplied by the customer or procured by OneRain, local rain gauge data are used to calibrate radar-estimates for specific customer applications using a spatially distributed adjustment process. This process can correct different spatial and temporal errors concurrently over the area of interest.



Storm Total for the 2013 Colorado Flood Event

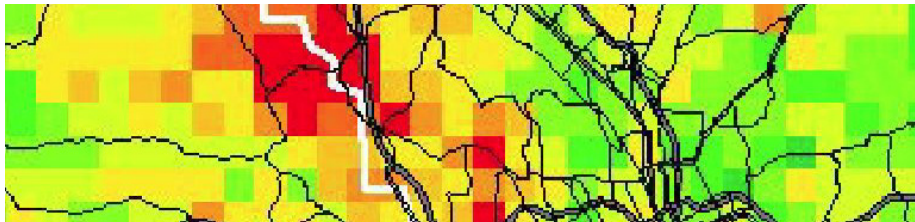
Our professional staff extract historical radar data, retrieve and/or locate gauge data for the appropriate study area, QA/QC both data sets, calibrate the radar, and deliver the results in the format(s) required for the analysis or model project. **StormData** delivery options include basin averages, animations, comma-delimited text, spreadsheets, reports and/or model-specific formatted data.

Real-time and Future Radar Rainfall Data Services

OneRain uses real-time radar rainfall estimates and real-time rain gauge data from its customers to calibrate the radar data and deliver the adjusted radar rainfall data immediately back to our customers in a variety of formats. With minimal latency, OneRain estimates and calculates these radar-derived and gauge-adjusted rainfall rates that can be used for real-time run-off modeling, decision support, and more.

OneRain can also calculate the average rainfall over a customer specified drainage basin for runoff modeling or monitoring for critical rainfall rates. Forecast radar data out to 4 hours can also be delivered for understanding approaching storms and their impacts.

OneRain also provides expert witness services for cases that rest on understanding the rainfall at a particular place and time.



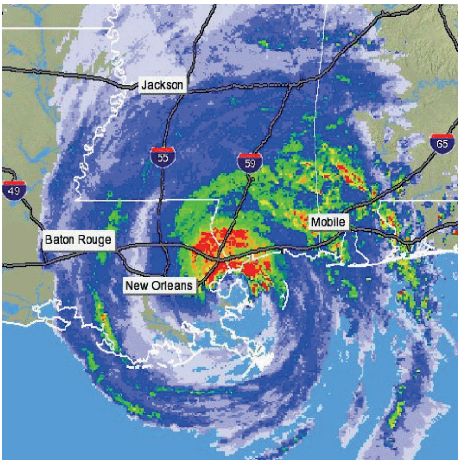
StormProperties™ Analysis

A particularly valuable service is the **StormProperties Analysis**. Using our data archive and **StormData™** data quality management processes, OneRain has developed a technique to accurately characterize real-world storms that have been experienced since the inception of NEXRAD radar. **StormProperties Analysis** enables our clients with critical, rainfall-dependent missions to track real storm behaviors that must affect their future planning.

Rainfall Properties

Rainfall properties derived using **StormProperties Analysis** include depth area reduction factors (DARFs), spatial intensity distribution, statistical properties of storm cells with respect to their size, speed and direction, births and deaths of storms, orographic effects, seasonal changes in behavior, and more. The underlying TITAN statistics in which **StormProperties Analysis** is grounded can be used to calculate and characterize many attributes of value to a variety of uses.

For example, most design storms are defined by a mathematical function that varies rainfall intensity across time but distributes it symmetrically spatially around a point.



Hurricane Katrina August 2005

We all know from real-life experience that storms don’t behave this way; they move, they have shape, speed and direction, and their length of life can vary tremendously. Consider the differences between a dynamic convective thunderstorm and a large-scale frontal event; we know their rainfall occurs in different ways, but most **Design Storms** in use don’t try to account for these differences.

In cases where traditional **Design Storms** improperly represent realistic distribution and behavior of rainfall and thus impact runoff models, we may risk either wasting money by overbuilding to unrealistic events, or damaging operations, lives and property by underbuilding facilities. Building to the right size will save dollars and lives.

Realistic Design Storms

A primary use of **StormProperties Analysis** is to create realistic **Design Storms**, in which the changes in intensity and the spatiotemporal distribution of rainfall used for modeling runoff reflect statistics that characterize real storms in real places.

StormProperties Analysis-created depth area reduction factors (DARFs) for the real world storms we’ve analyzed demonstrated higher peak intensities and shorter durations for given rainfall intensity thresholds than do traditional, theoretical design storms. The statistical analysis defines hundreds of thousands of storm cells that occurred over the area of interest to characterize the rainfall. Tools that can be left behind with our client end users include those to create 2D+ (two-dimensional, with movement) **Design Storms** for modeling.

Climate Change and the Behavior of Rainfall

Climate change has affected the current and expected behavior of rainfall. The actual effects depend on where in the world we are. Which hemisphere we’re in, whether we’re more polar, temperate or equatorial, coastal or inland, at higher or lower elevations, most places in the world are seeing very significant changes in rainfall. Storms are becoming more or less frequent, are tending globally toward larger annual accumulation, showing higher peak intensities and shorter durations. The southwestern U.S. is impacted by both increased drought and the tendency to experience more of our precipitation as rainfall rather than snow, foiling our attempts to make our water supply last all summer and fall.

There have been decades of hydrology and experience invested in **StormProperties Analysis** and many problems and opportunities are well addressed by the service. OneRain will continue to grow it to support our community in properly managing its water, given real-world conditions.

Contact Us

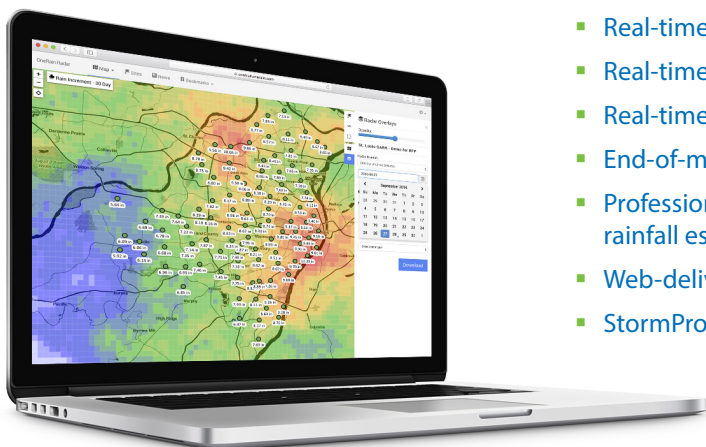
For more information about OneRain’s StormData and StormProperties products, visit onerain.com or call 1-800-758-RAIN (7246) or 303-774-2033.



StormData™ Products and Professional Services

For 25 years, OneRain's radar rainfall experts have focused on creating the best possible spatially distributed rainfall information, both historically and in real time. Our commitment to this process improves hydrologic design standards across the United States, affects decisions concerning billions of dollars of infrastructure, and supports mission critical operations.

Accurate estimation of the spatial distribution of rainfall is critical to successfully model hydrologic processes. OneRain has worked with engineering companies and organizations across the U.S. to provide radar rainfall data to help characterize storm events or flow problems in collection systems, and as a basis for both real-time and design-oriented modeling.



- Real-time Gauge-Adjusted Radar Rainfall (GARR) data
- Real-time basin-average rainfall
- Real-time forecast rainfall
- End-of-month archive quality Gauge-Adjusted Radar Rainfall data
- Professional historical and post-event analysis using archived rainfall estimates
- Web-delivered calibrated radar-rainfall data
- StormProperties™ Analysis



OneRain
The Rainfall Company

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Experts measuring rainfall and its consequences™