**Continuous Forcing data at SGP, 2012-2015**

**1. Overview**

The constrained variational objective analysis approach described in [Zhang and Lin [1997]](http://ams.allenpress.com/perlserv/?request=get-abstract&doi=10.1175%2F1520-0469%281997%29054%3C1503%3ACVAOSD%3E2.0.CO%3B2) and [Zhang et al. [2001]](http://ams.allenpress.com/perlserv/?request=get-document&issn=1520-0493&volume=129&issue=02&page=0295) was used to derive the continuous large-scale single-column/cloud resolving model forcing and evaluation data set for SGP site. The resulting products include both the large-scale forcing terms and the evaluation fields, which can be used for driving the Single-Column Models (SCMs) and Cloud Resolving Models (CRMs) and validating model simulations. Results from our studies are then used to improve cloud parameterizations in Global Climate Models (GCMs).

The continuous forcing data was derived using the hourly **Rapid Update Cycle** ([RUC)](http://www.arm.gov/instruments/ruc) (before May 2012) or **the Rapid Refresh** ([RAP](http://rapidrefresh.noaa.gov/)) (after May 2012) analysis archived by [ARM Archive](http://www.arm.gov/instruments/rap) as background, and constrained with the ARM ground surface measurements and the NOAA GOES-8 satellite data. **Note that sounding data were not used in this data set.**

# This is the second version (V2) of continuous forcing data. One major update comparing to the first version (V1) of continuous forcing (1999-2011) is the incorporation of Eddy Correlation Flux Measurement System ([ECOR](http://www.arm.gov/instruments/ecor)) data. The surface latent and sensible fluxes are merged from Best-Estimate Fluxes from Energy Balance Bowen Ratio (EBBR) Measurements and Bulk Aerodynamics Calculations ([BAEBBR](http://www.arm.gov/data/vaps/baebbr)) and Quality Controlled Eddy Correlation Flux Measurement ([QCECOR](https://www.arm.gov/data/vaps/qcecor)) value-added products (VAP).

Currently only the data for the whole year 2012 and June/July/August 2015 were processed. We will process the data for the remaining period between 2012 and 2015 in the near future, and then update the continuous forcing data before 2012.

For June/July/August 2015 continuous forcing data, the Kansas mesonet stations (KAM) data are not included due to the unavailability at the time of data development.

There are two ASCII data files for layered (2-d) variables and surface (1-d) variables. They are:

*sgp60varanaruclayerC1.c1.YYYYMM01.000000.dat  
sgp60varanarucsurfaceC1.c1.YYYYMM01.000000.dat*

The netCDF files that include all the variables contained in the two ASCII data files are also provided:

*sgp60varanarucC1.c1.YYYYMM01.000000.cdf*

**“*ruc*” is replaced by “*rap*” since May 2012.**

The interactive [**Quick Plots**](http://portal.nersc.gov/project/capt/ARMForcingData/tang32/ContinuousForcing/)of the data are available.

**2. References**

Cressman, G. P., (1959), [*An operational objective analysis scheme*.](http://ams.allenpress.com/perlserv/?request=get-abstract&doi=10.1175%2F1520-0493%281959%29087%3C0367%3AAOOAS%3E2.0.CO%3B2) *Mon. Wea. Rev., 87,* 367-374.

Xie, S., R. T. Cederwall, and M. Zhang (2004), [*Developing long-term single-column model/cloud system–resolving model forcing data using numerical weather prediction products constrained by surface and top of the atmosphere observations*](http://onlinelibrary.wiley.com/doi/10.1029/2003JD004045/abstract), J. Geophys. Res., 109, D01104, doi:10.1029/2003JD004045.

Zhang, M. H., and J. L. Lin (1997), [*Constrained variational analysis of sounding data bases on column-integrated budgets of mass, heat, moisture, and momentum: Approach and application to ARM measurements.*](http://ams.allenpress.com/perlserv/?request=get-abstract&doi=10.1175%2F1520-0469%281997%29054%3C1503%3ACVAOSD%3E2.0.CO%3B2) *J. Atmos. Sci., 54*, 1503-1524.

Zhang, M. H., J. L. Lin, R. T. Cederwall, J. J. Yio, and S. C. Xie (2001), [*Objective analysis of ARM IOP Data: Method and sensitivity.*](http://ams.allenpress.com/perlserv/?request=get-abstract&doi=10.1175%2F1520-0493%282001%29129%3C0295%3AOAOAID%3E2.0.CO%3B2) *Mon. Weather Rev., 129,* 295-311.

**3. Contacts**

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