A global daily record of land parameter retrievals from AMSR2
Version 1.0

Contact Information:

Jinyang Du, Lucas A. Jones and John S. Kimball

Numerical Terradynamic Simulation Group (NTSG)

The University of Montana

Missoula MT, 59812

Email: jinyang.du@ntsg.umt.edu; lucas@ntsg.umt.edu; johnk@ntsg.umt.edu
URL: http://ntsg.umt.edu
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I. Data Description

This directory contains satellite retrieved geophysical land parameter files generated from the Advanced Microwave Scanning Radiometer 2 (AMSR2) onboard the GCOM-W1 satellite. The daily retrievals extend from day 185, 2002 to day 304, 2013 and include fraction of water (fw), daily air temperature minima and maxima (ta, ~2 m height), vegetation canopy microwave transmittance (tc), volumetric soil moisture (vsm) and integrated water vapor content of the atmosphere (V, total column). The global retrievals are derived over land for non-precipitating, non-snow-covered, and non-ice covered conditions.

The employed pre-screening classifications rely on input brightness temperature indices (Jones et. al. 2010; Njoku et. al. 2005; Grody 1988). After pre-screening, the primary algorithm inputs are daily AMSR2 dual polarized multi-frequency, ascending and descending overpass brightness temperature (Tb) data obtained in global 25-km EASE grid generated from L1R AMSR2 swath data.

Although extensive quality checking has been completed, these are research data. The user is responsible for quality checking and should be aware that spurious values may exist. Authors hold no responsibly for conclusions drawn from spurious data. We appreciate constructive and well-documented feedback to help make these data more useful. Questions and feedback should be sent to

Jinyang Du (jinyang.du@ntsg.umt.edu).

II. Data Format

Each retrieval file contains a 209091 element 1D binary array representing the global land area defined as containing <50% open water and <50% permanent ice according to the MODIS MOD12Q1 v4 IGBP 1-km land cover classification which was binned to the 25-km global EASE grid. The purpose of the 1D array format is to avoid allocating memory to placeholder values over the oceans. The full 586×1383 global EASE grid can be created from the 1D data arrays using ancillary row and column files. Each year's directory contains all the retrieved parameters in 8-byte double data type.

III. File naming convention

AMSR2_Mland_{year}{day of year}{overpass (A or D)}.{parameter}

The parameter prefix strings are listed below:

fw (8-bytes): open water fraction (dimensionless). Valid range: 0-1.

ta (8-bytes): surface air temperature in Kelvin. Daily temperature minima (maxima) generally occurs during the morning descending pass, 'D' (afternoon ascending pass, 'A'). Valid range: 240- 340 K.

**V** (8-bytes): vertically integrated atmospheric water vapor in mm. Valid range: 0-80 mm.

vsm (8-bytes): volumetric soil moisture in cm^3/cm^3 .Valid range: 0-1.0 .

tc10 (8-bytes) vegetation opacity (dimensionless) for 10.7GHz. Vegetation optical depth is calculated as -log(tc). The data were smoothed using a 30-day moving median filter. Valid range: 0-1.

IV. Accuracy

Total column water vapor and surface air temperature minima and maxima have been validated against AIRS water vapor product and in-situ temperature measurements over 200 WMO meteorological stations as shown below. The RMSEs for AMSR2 water vapor retrievals are 5.1 mm and 6.0 mm for the

ascending and descending pass respectively; and the RMSEs for AMSR2 daily maxima and minima surface air temperature is 3.45 and 3.32 Celsius, respectively.
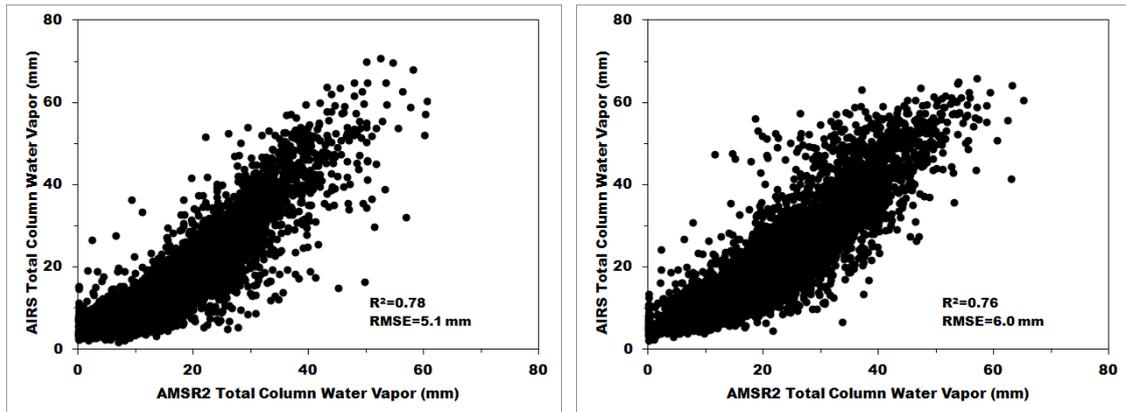
Fig.1 Comparisons between AMSR2 water vapor retrievals and AIRS water vapor products over 200 WMO sites (left: ascending pass; right: descending pass).
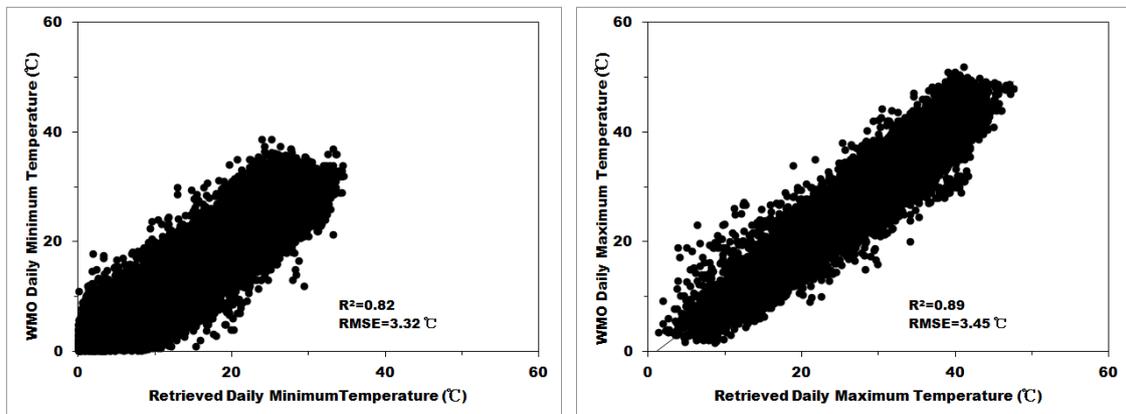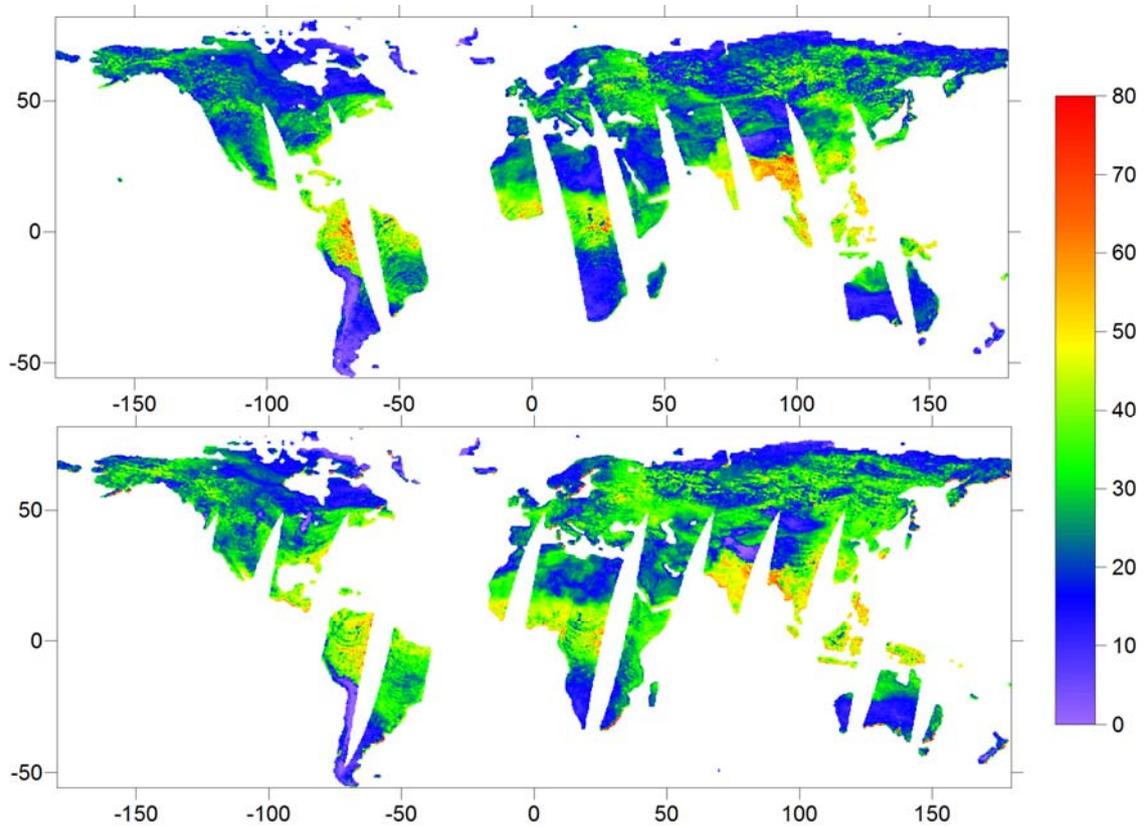

Fig.2 Comparisons between AMSR2 surface air temperature retrievals and in-situ measurements over 200 WMO sites (left: temperature minima; right: temperature maxima).
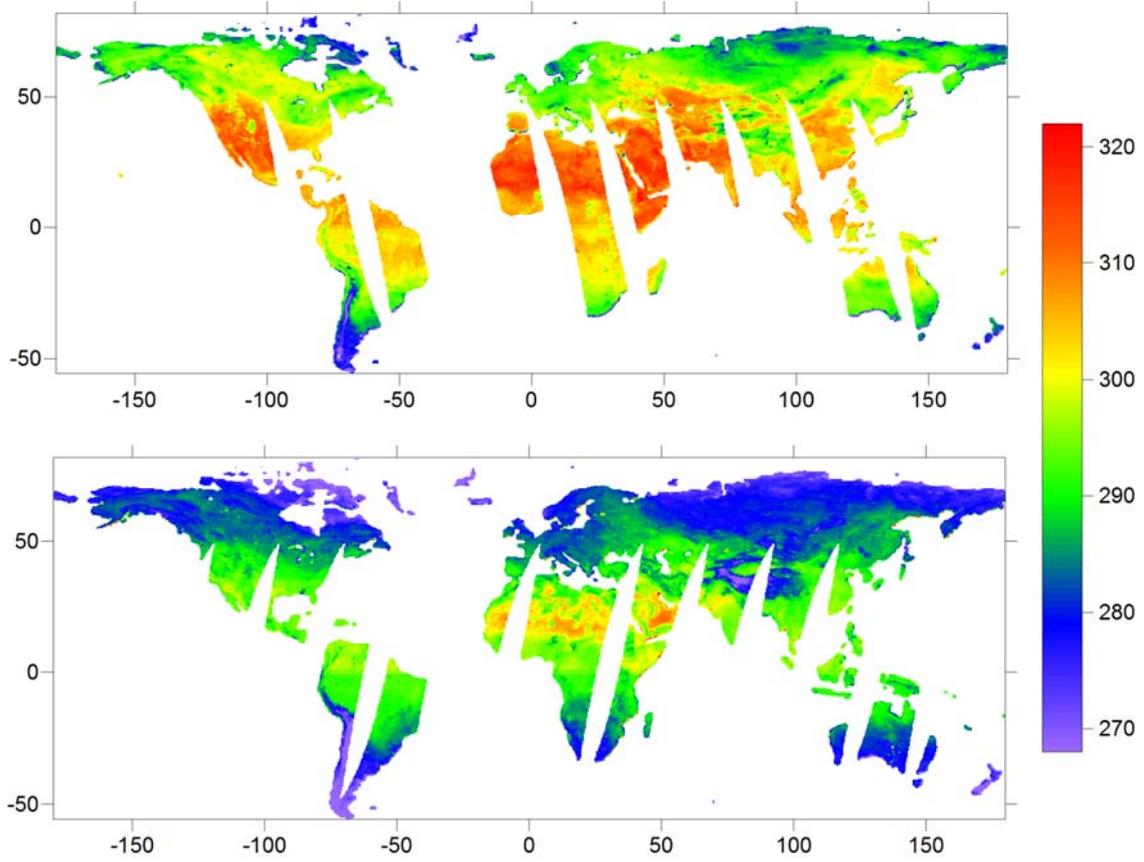
V. Sample Maps

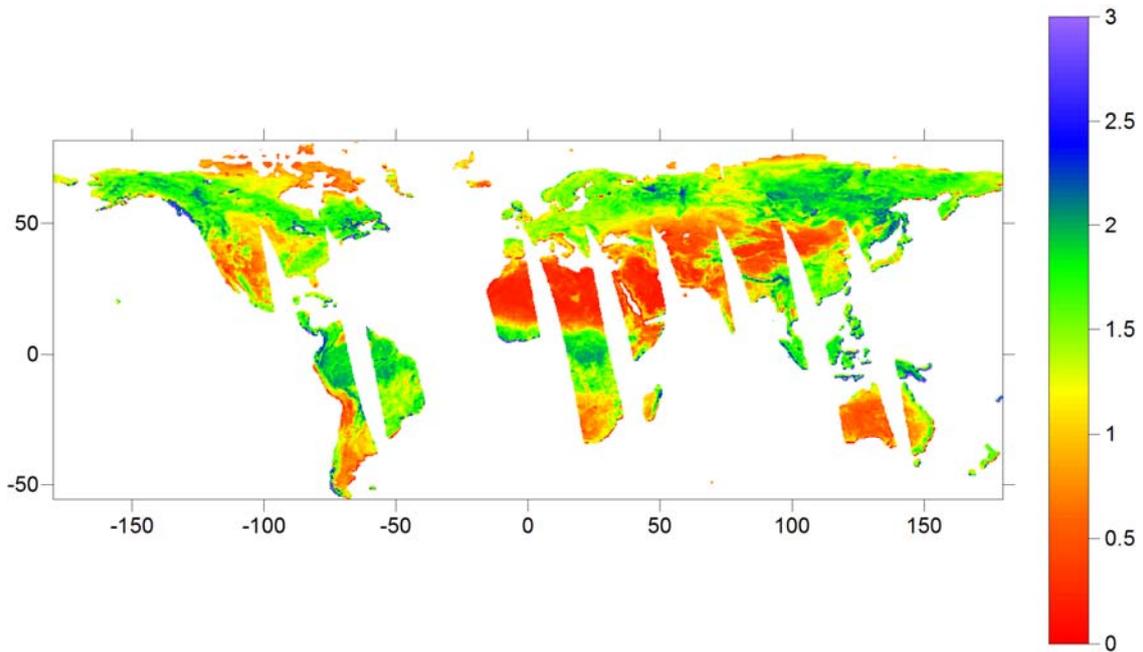Sample maps are plotted below showing the spatial distribution of the
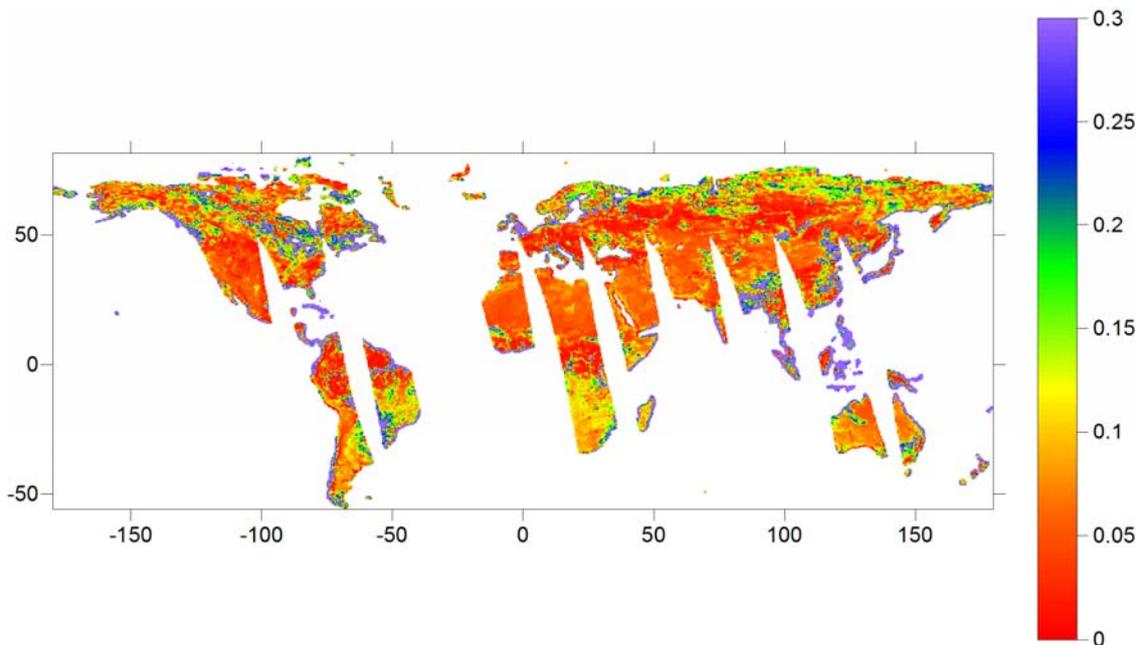
retrieved parameters.

Fig.3 Global Column Water Vapor over land in unit mm for DOY 180 of year 2013 (upper: ascending pass; lower: descending pass)
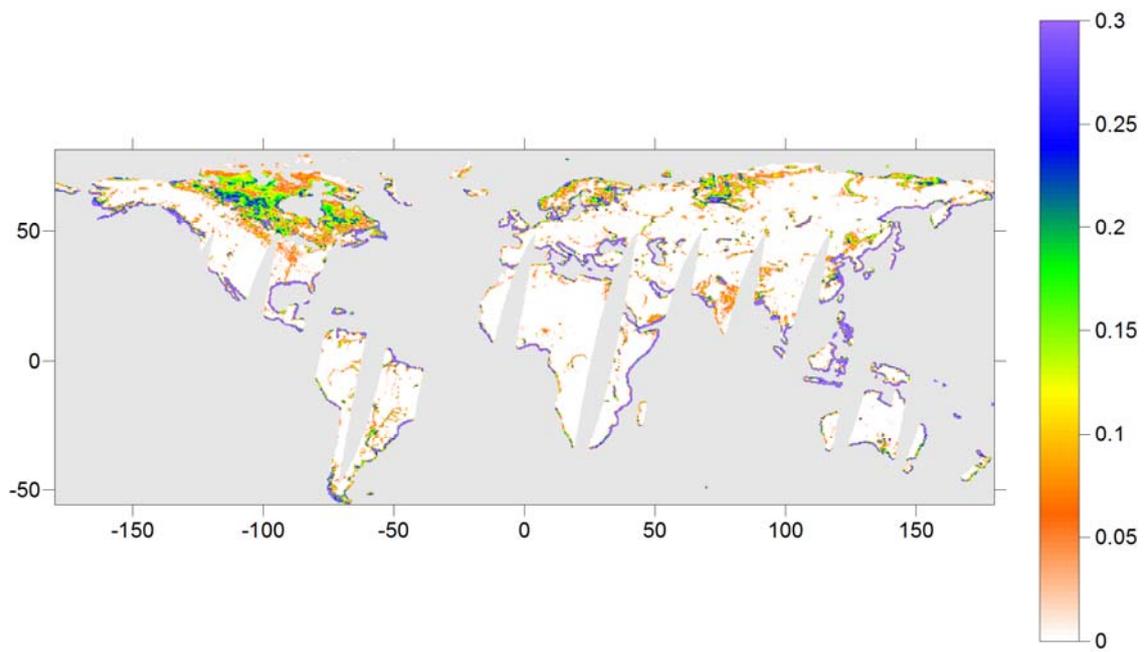
Fig.4 Surface Air Temperature Maxima and Minima in unit Kelvin for DOY 180 of year 2013 (upper: Maxima; lower: Minima)

Fig.5 X-band Vegetation Optical Thickness for DOY 180 of year 2013 based on ascending observations

Fig.6 Volumetric Soil Moisture (cm^3/cm^3)for DOY 180 of year 2013 based on ascending observations

Fig.7 Fraction of Water for DOY 180 of year 2013 based on descending observations