

Status and Plans of CMA Land Data Assimilation System (CLDAS) Project

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1. Introduction In recent years, frequent drought events have caused enormous losses. High quality space-time soil moisture products are urgent to support CMA in China drought monitoring services. Soil moisture retrieved from satellite observation or simulated from land surface models or from in-situ observations have different advantages and deflections. Merging all the soil moisture information together may have the ability to obtain high quality soil moisture continuously. Therefore, CLDAS(CMA Land Data Assimilation System) is proposed to meet the demand of drought monitoring and other meteorological, agricultural and hydrological requirements over China.

2. CLDAS development plan CLDAS consists of three stages. The first stage aims to realize STMAS operation for producing forcing data; to realize operational running of CLM; to evaluate forcing and CLM's output; and to publish the operational products for users. The second stage aims to build retrospective forcing data set since 1995 over China; to develop multi-LSMs operational system; and to develop multi-satellite merged soil moisture product. The third stage aims to assimilate multi-satellite merged soil moisture; to assimilate satellite radiance or brightness temperature.

CLDAS development plan

- ① CLDAS-V1.0: Single LSM
- ② CLDAS-V2.0: Multi-LSMs
- ③ CLDAS-V3.0: Observation Assimilation
- ④ CLDAS-V4.0: Satellite Data Assimilation

3. CLDAS-V1.0 components and products The CLDAS-V1.0 has operational run in NMIC(National Meteorological Information Center) of CMA on July 2013, and it released the official products of forcing data and soil moisture from 2009 to 2012 on Nov 2013. The product coverage is 70-150° E, 0-60° N and the spatial resolution is 1/16 (0.0625) degree. Hourly gridded forcing data, including air temperature, pressure, humidity, wind speed, downward shortwave radiation and precipitation, are used to drive CLM3.5. STMAS (Space-Time Multi-scale Analysis System) (Xie, Y., 2011) are used to combining NCEP/GFS data with regional automatic surface observation temperature (more than 30000) over China, and the result is validated using national automatic observation more than 2400. The result shows that the combined product is closer to surface observations than ECMWF, JMA and GFS products (As shown in Figure 2). The Downward shortwave radiation (DSR) is retrieved from FY-2(C-E) series geostationary meteorological satellites, operated by CMA. The DISORT method for radiation transfer calculations with the climatic data sets from the ISCCP C2 is used in the retrieval. The DSR is evaluated against ground-based observations from 94 stations over mainland China (Jia, B., 2013). Gridded precipitation is produced by merging more than 30000 rain gauge data and CMORPH product(Pan Yang, 2012; Joyce R J, 2004). Now, CLDAS-V1.0 product can be real-time obtained from the following websites: <http://cdc.cma.gov.cn:8081/home.do>.

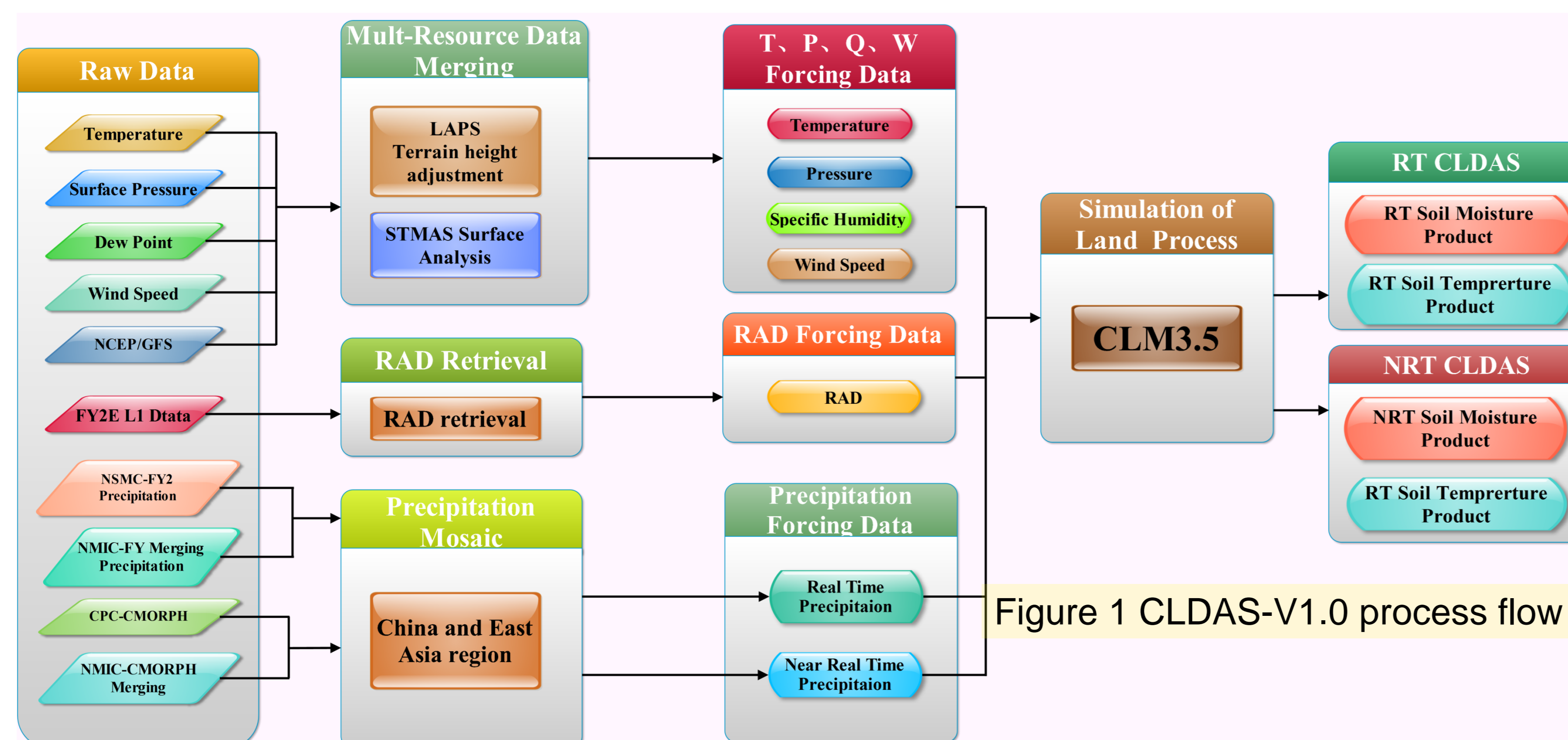


Figure 1 CLDAS-V1.0 process flow

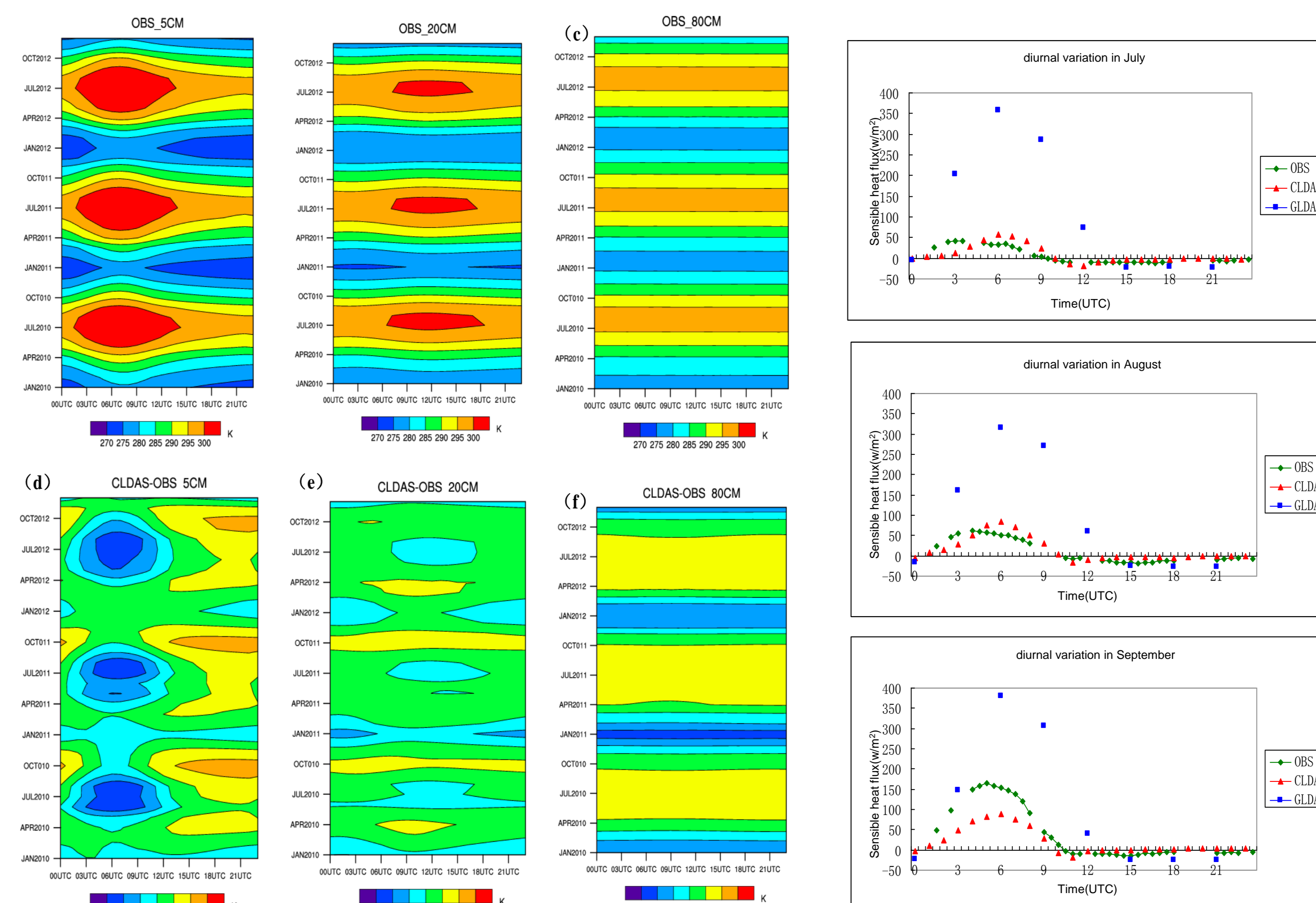


Figure 3 Validation of soil temperature and sensible heat flux

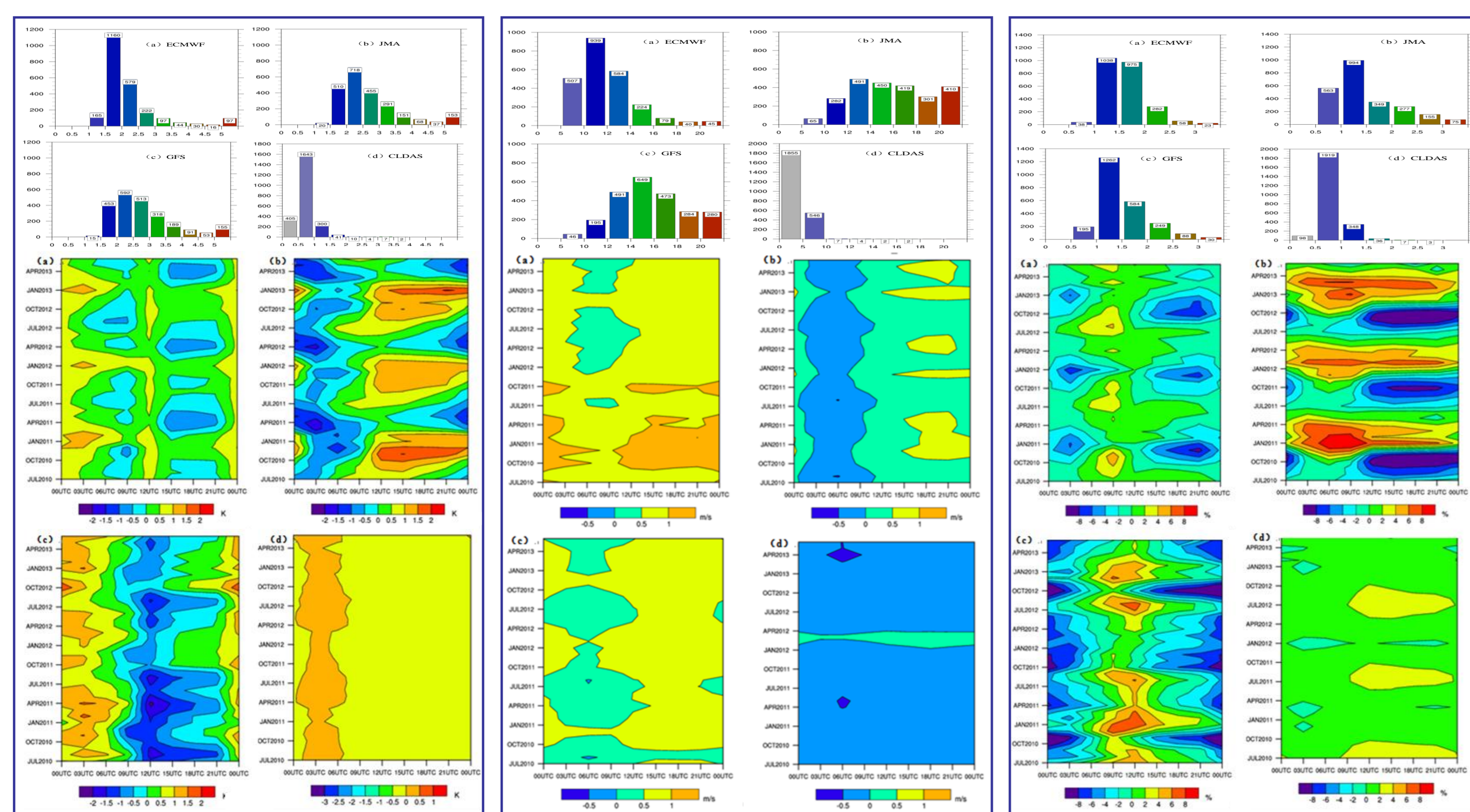


Figure 2 Compare CLDAS forcing data with ECMWF, JMA and GFS in air temperature(left), humidity(middle), wind speed(right)

4. CLDAS products validation

Figure 3 is the validation of different CLDAS products, such as soil temperature(left) and sensible heat flux(right). From all layers, compared with observations, the quality of CLDAS soil temperature is stability and good. And in the sensible heat flux comparison, CLDAS result is more similar to observations than GLDAS. When CLDAS soil moisture data was used to replace GFS soil moisture data in WRF-DA, O minus B of AMSR-A was reduced, especially channel 3 (Yuanhui Yang and Chunxiang Shi, 2013).

5. Reference

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