

The Roles of Observing system simulation experiments at JCSDA and NCEP

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Data assessment using simulation experiments is the only method able to provide a quantitative evaluation of future observing systems and instruments. These experiments are known as Observing System Simulation Experiments (OSSEs). The National Centers for Environmental Prediction (NCEP) have demonstrated that carefully conducted OSSEs are able to provide useful recommendations which influence the design of future observing systems. The results from NCEP OSSEs are summarized at (<http://www.emc.ncep.noaa.gov/research/osse/ams2006>).

The schematic diagram for OSSEs is presented in Fig.1. Through the OSSEs, future observing systems will be designed to optimize the use of data assimilation systems and forecast models to improve weather forecasts. By using OSSEs, current operational data assimilation systems can be prepared to handle data from new sources and the operational use of data from future instruments and observing systems can be accelerated. Preparations include handling the volume of future data and the development of database, data processing (including formatting), and quality control systems. All of this development will accelerate the operational use of the data.

OSSEs conducted at NCEP have focused on evaluating data impacts on a global scale from the use of National Polar-orbiting Operational Environmental Satellite System (NPOESS) candidate instruments, particularly Doppler Wind Lidar (DWL). This effort will be continued by the Joint Centers for Satellite Data Assimilation (JCSDA) which will conduct sets of experiments that will have implications for NPOESS plans for future observing systems and instrument types. Various collaborations with NWS/NCEP, NASA/GSFC, NESDIS/ORA, OAR, and DOD are conducted by the JCSDA.

In addition, OSSEs to examine the impacts of the Cross Track Infrared Sounder (CrIS), the Advanced Technology Microwave Sounder (ATMS), and the Hyperspectral Microwave Sounding Instrument (HyMS) have been proposed. The OSSEs for AIRS, other AQUA instruments, and cloud motion vectors will be continued and compared with real time forecast experiments. Those results will be used as a reference to evaluate other instruments. Efficient data thinning and cloud handling methodologies will also be investigated. OSSEs for these instruments in combination with DWL will continue in order to evaluate the combined impact achieved with all these instruments.

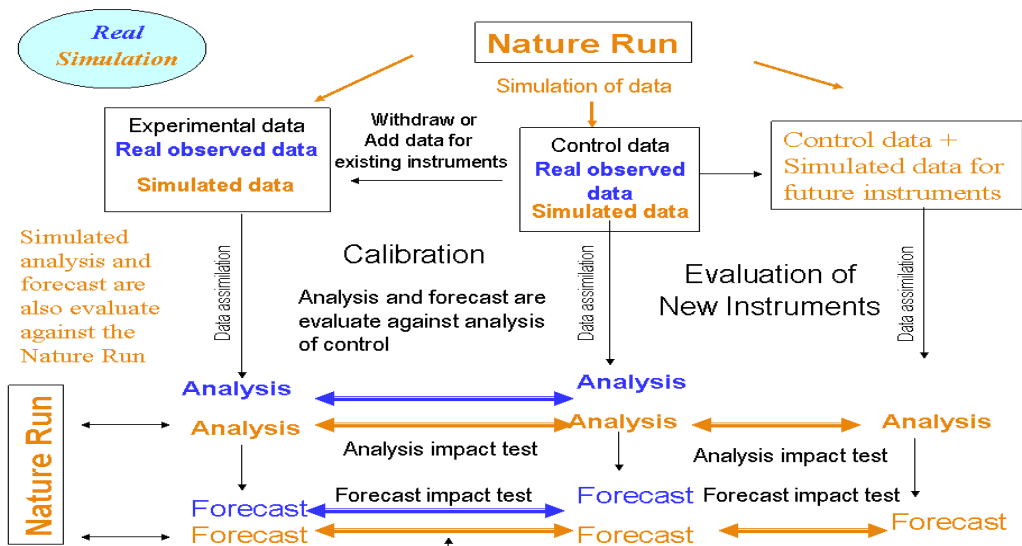


Fig.1 Schematic diagram for OSSEs. Blue colored items indicate real systems and orange indicates simulations. The simulated world has a known atmosphere with the Nature Run as truth so the analysis and forecast can be evaluated against the truth. In the simulated world future instruments can be evaluated as well as future observing systems.

Future plans for JCSDA OSSEs include the use of a new higher resolution nature run, as well as coordination with THORPEX research activities. Fig.2 shows one of the higher resolution nature runs proposed by ECMWF.

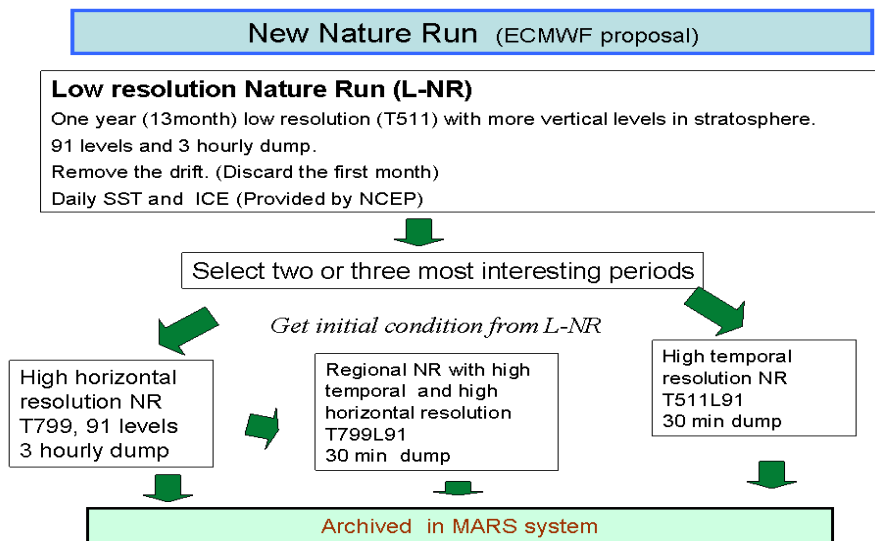


Fig.2 High resolution Nature run proposed by ECMWF.