tions with the same signal name allow separate state machines to coordinate actions: the conditions distributed across all state machines necessary to arm a particular signal are evaluated, and once found true, that signal is raised. The selected signal then causes all identically named transitions in all present state machines to be taken simultaneously.

VML 2.1 has relevance to all potential space missions, both manned and unmanned. It was under consideration for use on Orion.

This work was done by Joseph E. Riedel of Caltech and Christopher A. Grasso of Blue Sun Enterprises for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47696.

◎ Multi-Scale Three-Dimensional Variational Data Assimilation System for Coastal Ocean Prediction

A multi-scale three-dimensional variational data assimilation system (MS-3DVAR) has been formulated and the associated software system has been developed for improving high-resolution coastal ocean prediction. This system helps improve coastal ocean prediction skill, and has been used in support of operational coastal ocean forecasting systems and field experiments. The system has been developed to improve the capability of data assimilation for assimilating, simultaneously and effectively, sparse vertical profiles and high-resolution remote sensing surface measurements into coastal ocean models, as well as constraining model biases.

In this system, the cost function is decomposed into two separate units for the large- and small-scale components, respectively. As such, data assimilation is implemented sequentially from large to small scales, the background error covariance is constructed to be scale-dependent, and a scale-dependent dynamic balance is incorporated. This scheme then allows effective constraining large scales and model bias through assimilating sparse vertical profiles, and small scales through assimilating high-resolution surface measurements.

This MS-3DVAR enhances the capability of the traditional 3DVAR for assimilating highly heterogeneously distributed observations, such as along-track satellite altimetry data, and particularly maximizing the extraction of information from limited numbers of vertical profile observations.

This work was done by Zhijin Li, Yi Chao, and P. Peggy Li of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov.

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47768.

◎ Pandora Operation and Analysis Software

Pandora Operation and Analysis Software controls the Pandora Sun- and sky-pointing optical head and built-in filter wheels (neutral density, UV bandpass, polarization filters, and opaque). The software also controls the attached spectrometer exposure time and thermo-electric cooler to maintain the spectrometer temperature to within 1 °C. All functions are available through a GUI so as to be easily accessible by the user. The data are automatically stored on a miniature computer (netbook) for automatic download to a designated server at user defined intervals (once per day, once per week, etc.), or to a USB external device. An additional software component reduces the raw data (spectrometer counts) to preliminary scientific products for quick-view purposes. The Pandora systems are built from off-the-shelf commercial parts and from mechanical parts machined using electronic machine shop drawings. The Pandora spectrometer system is designed to look at the Sun (tracking to within 0.1°), or to look at the sky at any zenith or azimuth angle, to gather information about the amount of trace gases or aerosols that are present.

This work was done by Jay Herman, Alexander Cede, and Nader Abuhassan of the University of Maryland for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16080-1