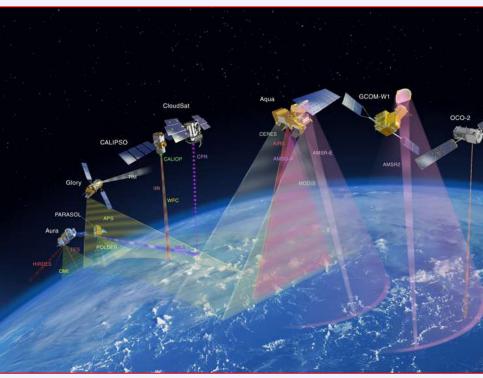
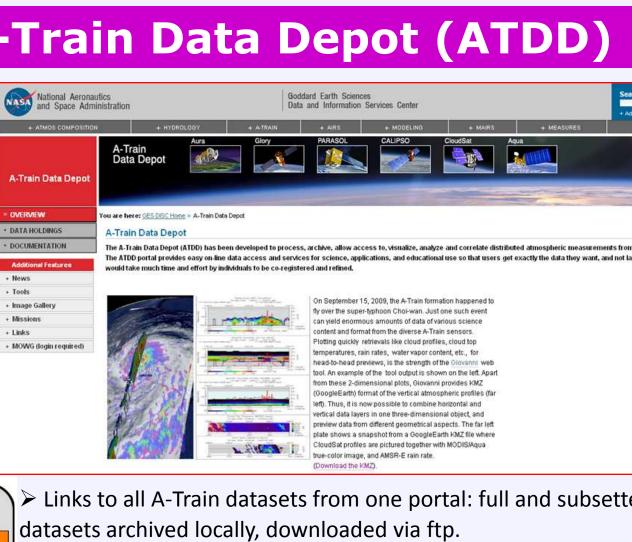


Email: Aijun.Chen@nasa.gov

- Aqua;
- CloudSat

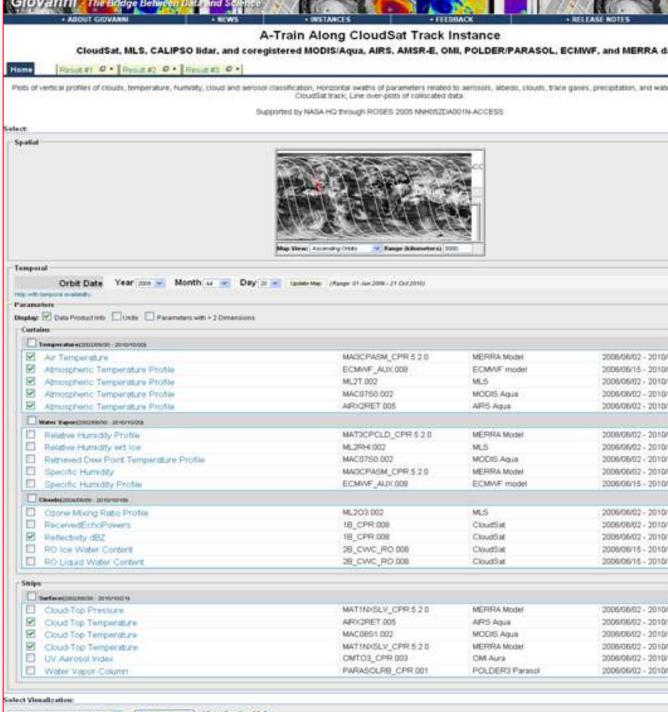


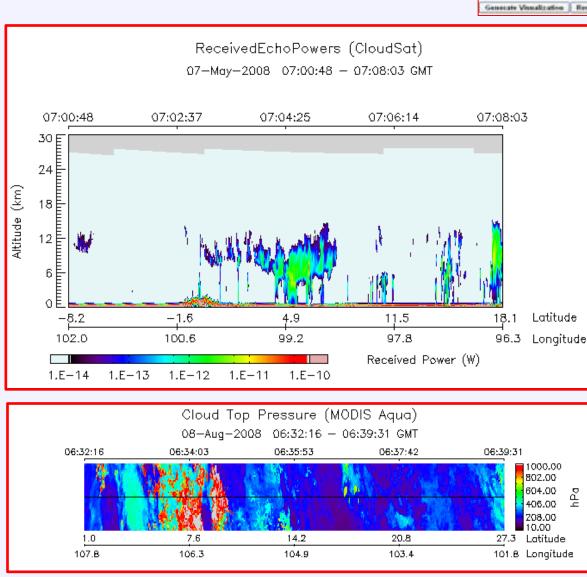
²Center for Spatial Information Science and Systems, George Mason University Integrating Google Earth Plug-in into Giovanni A-Train Instance **NASA A-Train Constellation Formation** Web Interface Design for integrating A-Train The NASA Afternoon A-Train Satellite Constellation is a succession of A-Train Data Depot Tab menu including the tab of "View in Google Earth" seven US & international sun-synchronous orbit satellites, consisting of: Data Depot with Google Earth Plug-in -- OCO-2 (Orbiting Carbon Observatory) (will launch in Feb. 2013); -- GCOM-W1 (Global Change Observation Mission); The interface is based on AJAX technology, and mainly consists of: (see left figure) A-Train Data Depot Caption -- CALIPSO (Cloud-Aerosol Lidar & Infrared Pathfinder Satellite Observations) **Design principles followed:** -- Glory (launched on Nov. 22, 2010 2:30am PST.); Web-based, no need to open new third - Aura. vendors' application /windows The A-Train makes possible synergy of information from multiple resources, so more information about earth condition is obtained from Seamlessly integrated into A-Train instance the combined observations than would be possible from the sum of the observations taken independently. Making interfaces between Giovanni hese KMLs require the Google Earth Plug-in . Please wait few seconds for loading kmz files in the left pane **NASA Goddard A-Train Data Depot (ATDD)** infrastructure and Google Earth "new stuff" **User Control Panel** as simple as possible The A-Train Data Depot (ATDD) National Aeronautics and Space Administration Goddard Earth Sciences Data and Information Services Center Uniform interface as A-Train instance -- http://disc.gsfc.nasa.gov/atdd processes, archives, allows access to, and Data view area of Google Earth Available data Data added visualizes distributed atmospheric Functions added and processes for user request measurements from various A-Train sensors, from ATDD into Google for analysis and correlation. Add new tab "View in Google Earth" in A-The ATDD Portal (right) provides easy on-line Train instance interface for user viewing and On September 15, 2009, the A-Train formation happene selected by Earth eld enormous amounts of data of various science data access and services for science, ent and format from the diverse A-Train sensor ng quickly retrievals like cloud profiles, cloud + MOWG (login required) comparing multiple parameters in multiple mperatures, rain rates, water vapor content, etc., fo applications, and educational use so that wiews, is the strength of the Giovai user users easily get exactly the data they want, Google Earth windows in one browser. with no need to download large volumes of Sat profiles are pictured together with MODIS/Agu whole data sets. A SHE -color image, and AMSR-E rain rate. <dataset scope="Curtains"> "items": -<datatype> **A-Train Data Depot** Links to all A-Train datasets from one portal: full and subsetted "source": "section:Vertical Profiles", <sensorName>MODIS Aqua</sensorName> "name": "A-Train Vertical & Strips Profiles", datasets archived locally, downloaded via ftp. <datasetName>MAC07S0.002</datasetName> "children": **A-Train Constellation Community** <shortName>MAC07S0</shortName> Subsets, archives and makes accessible parameters in HDF. "source":>"./MODIS_Aqua_" "name": "MODIS Aqua", Science Investigators <version>2</version> HDF read programs work for ATDD generated parameter subsets. - <url> "children": **Integrating Mediator** Users can dynamically specify and acquire subsetted data swaths http://gcmd.gsfc.nasa.gov/getdif.htm?GES_DISC_MAC07S0_v2 "source": "http://gdata1-ts1.sci.gsfc.nasa.gov/daac-> Allows users to co-register dataset parameters that have different bin/G3/kmz urlwrapper.cgi?filePathName=/ftp/incoming/G3/TS1/ws/1291641913 SciFlow XML file from A-Train • Parse SciFlow XML file 16130/kmz 11 0/20101106 06 Retrieved Temperature Profile 4923.kmz", formats, resolutions, and scales. 'name": "Atmospheric Temperature Profile-MODIS Aqua", 0 -<parameterSet></parameterSet></parameterSet> Giovanni Portal ► Using Giovanni, provides quick dynamic visualization and exploration • Invoke KMZ generator ⊘dataset> "source": "http://gdata1-ts1.sci.gsfc.nasa.gov/daacof data from different instruments to determine the desirability of the dataset scope="Curtains"> bin/G3/kmz urlwrapper.cgi?filePathName=/ftp/incoming/G3/TS1/ws/1291641913 MODIS & OMI 16130/kmz 8 0/20101106 06 Cloud Optical Thickness 4923.kmz", • Create & update JSON file -<datatype> data prior to their downloading. "name": "Cloud Optical Thickness-MODIS Aqua", o-location w/ <sensorName>AIRS Aqua</sensorName> Provides online multiple data products comparison and analysis in CloudSat & **JSON** file <datasetName>AIRX2RET.005</datasetName> based on available KMZ files Mirador CALIPSO Archive multiple Google Earth windows. <shortName>AIRX2RET</shortName> S4PM S4PA Search Provides easy downloading of co-registered data and multiple 'source"? "./AIRS_Aqua_", <version>5</version> "name": "AIRS Aqua", -<ur⊳ CloudSat and CALIPSO Science Teams lownloadable files. "children": http://gcmd.gsfc.nasa.gov/getdif.htm?GES_DISC_AIRX2RET_V005 "source": "http://gdata1-ts1.sci.gsfc.nasa.gov/daac-</urb A-Train Data online analysis and visualization system bin/G3/kmz urlwrapper.cgi?filePathName=/ftp/incoming/G3/TS1/ws/1291641913 </datatype> 16130/kmz 8 0/20101106 06 PCldTopStd 4923.kmz", "name": "Cloud Top Pressure-AIRS Aqua", <parameterSet></parameterSet></parameterSet> /dataset> **Right**: A-Train data online analysis and dataset scope="Curtains"> Giovanni The Bridge Between Distand State of Concession Conce <datatype> "source": "./CloudSat " A-Train Along CloudSat Track Instance "name": "CloudSat" <sensorName>Calipso - Lidar</sensorName> CloudSat, MLS, CALIPSO lidar, and coregistered MODIS/Aqua, AIRS, AMSR-E, OMI, POLDER/PARASOL, ECMWF, and MERRA data. "children": <datasetName>VFM.002</datasetName> Giovanni provides a convenient and obs of vertical profiles of clouds, temperature, humoty, cloud and aerosol classification, Honzontal swaths of parameters related to aerosols, albedo, clouds, trace gases, precipitation, and water vapor, colocated with CloudSat track; Line over-posts of colocated data. Supported by NASA HQ through ROSES 2005 NNH052DA001N-ACCES A-Train Data Collocated Along the CloudSat Track b. New function for automatically for bridging the platform Cloud\$at, MLS, CALIPSO lidar, and coregistered MODIS/Aqua, AIRS, AMSR-E, OMI, POLDER/PARASOL, ECMWF, analyzing workflow XML file from Aand MERRA data. science and explicitly visualizing the Train to obtain details of the data that Result#1 🛛 × Results #2 😵 Remove All Home user selected, e.g. sensorName, sualization Results Download Data Product Lineage View in Google Earth Acknowledgment Policy Orbit Date Year mas - Month as -Day 21 - Iguide Mas Marge 21 day 2008 - 21 Cot 2010 These KNLs require the Caselo Forth Div w seconds for loading kmz files in the left panel. datasetName, etc. Display Control Panel A-Train Vertical & Deploy: Data Productinto Dute D Parameters with + 2 Devansion 🚯 🔍 🔍 🗘 c. KMZ generator is invoked to produce 1 by 1 1 by 2 2 by 2 MODIS Aqua engres also e(2000/0/01) - 2010/10/05 1/6/2010 1:05:28 am MAGCPASM CPR 520 MERRA Mod 2006/06/02 - 2010/07/30 ECMAF_AUX 008 ECM/VF model 2026/06/15 - 2010/09/01 S Atmospheric Te Atmospheric Temperature Prof 1:12 am Adminispheric Temperature Prof ML27.002 2006/06/02 - 2010/10/18 KMZ files for each data user selected S Cloud Optical T Atmospheric Temperature MAC0750.002 MODIS Aque 2006/06/02 - 2010/10/20 Atmospheric Temperature Profile AROGRET 005 006/06/02 - 2010/10/20 Atmospheric Temperature F ARS Aqua Cloud Top Pres Profile-MODIS Aqua X Value Wag-org/Distantinites - 20-Orioldia d. Create and dynamically update JSON Cloud Optical Thickness-MODIS AIRS Agua MATOCPCLD_CPR § 2 MERRA Mode 2006/06/02 - 2010/07/36 ML2FH6.002 006/06/02 - 2010/10/18 Hat the vibimum Humidity with S Atmospheric Te Aqua X MODIS Aqua 2006/06/02 - 2010/10/20 MAC0750.002 Retrieved Dew Point Temperature Profil S Cloud Top Pres MARCPASM CPR 5.2.0 MERRA Model 006/06/02 - 2010/07/30 file based on produced KMZ files. CMAY AUX 808 ECM/VF mod 2006/06/15 - 2010/09/01 Service-Orientec CloudSat Anterior of cardination of the second 2006/06/02 - 2010/10/18 2006/06/02 - 2010/10/17 2006/06/02 - 2010/10/17 ML2O3.002 18_CPR.008 e. Utilize AJAX to automatically update Atmospheric Temperature S ReceivedEchoF 18_CPR 008 Cloud5at that data Profile-AIRS Aqua X S Reflectivity dBZ Architecture 28_CWC_R0.000 2008/06/15 - 2010/10/02 CloudSat) Ice Water Conten Cloud Top Pressure-AIRS Aqua AMSR-E Aqua 28_CWC_R0.000 006/06/15 - 2010/10/02 the control panel based on updated D Liquid Water Contr S Rain Rate-AMS ReceivedEchoPowers-CloudSat entered and a second se JSON file for user-selected data of MATINDOLV_CPR520 MERIRA Mod 006/06/02 - 2010/07/01 AFOGRET 005 ARS Aqua 006/06/02 - 2010/10/20 Cloud Top Temperature MODIS Aqua 006/06/02 - 2010/10/19 MAC0651.003 Cloud Top Temperature Reflectivity dBZ-CloudSat X MERIRA Model 2006/06/02 - 2010/07/31 MATSNOSLV_CPR.528 Cloud-Top Temperature interest OMTO3_CPR 003 006/06/02 - 2010/10/21 CMLAura UV Aerosol Index POLDER3 Paraso 006/06/02 - 2010/01/31 PARASOLRE_CPR.001 Water Vapor Colum Track user operations to display data where Vissialization: Subset Parameters Along Onto Track - Edit Preferences Visualization Help Generate Visualization | Rein multiple Google Earth window. ReceivedEchoPowers (CloudSat) **URL for A-Train system with new functions and simple example** 07-May-2008 07:00:48 - 07:08:03 GMT 07:06:14 + HELP http://gdata1-ts1.sci.gsfc.nasa.gov/daac-bin/G3/gui.cgi?instance_id=atrain



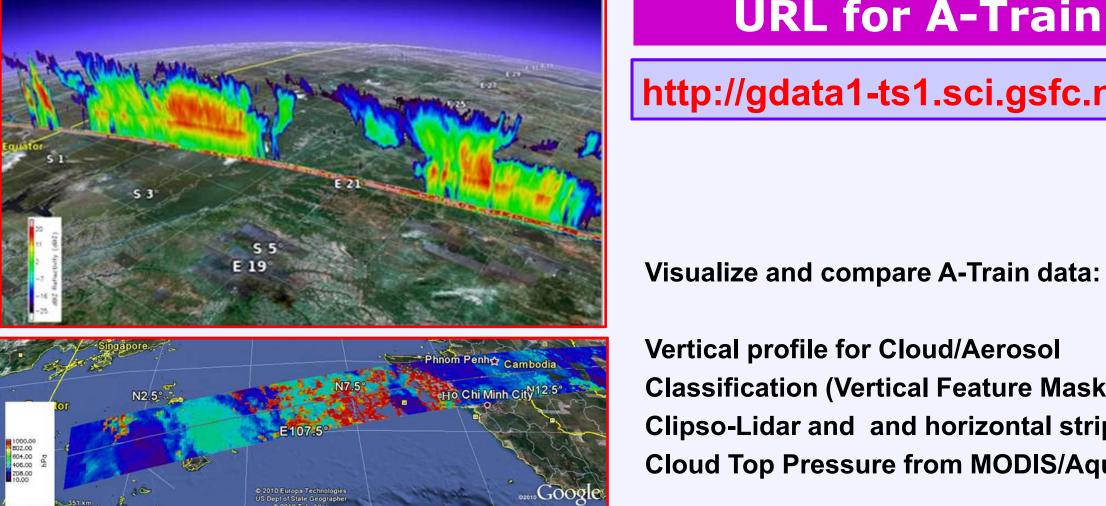
visualization system web interface:

geospatial imagery data with implied results for the scientific community. Giovanni Version 3 (G3) adopts serviceand workflow-oriented asynchronous architecture and uses standard protocols, such as FTP, OPeNDAP, GrADS Data Server to transparently access local and processing and rendering modules are implemented through standard web services.





Above: 3D Vertical profiles of cloud from CloudSat satellite and 2D swath data of Cloud Top Pressure from MODIS/Aqua were rendered by G3 A-Train instance.

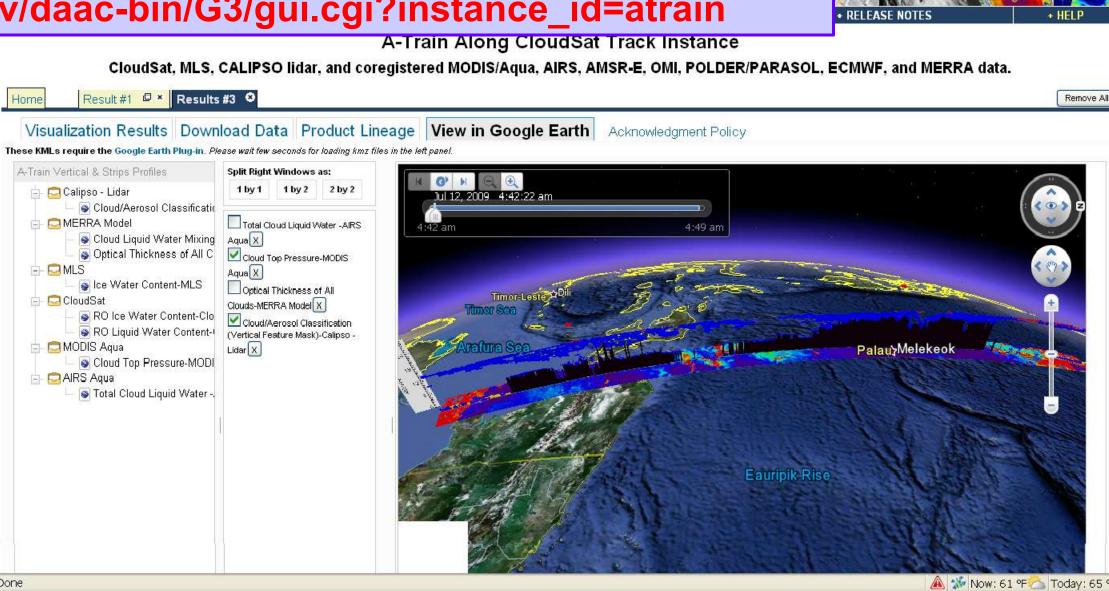


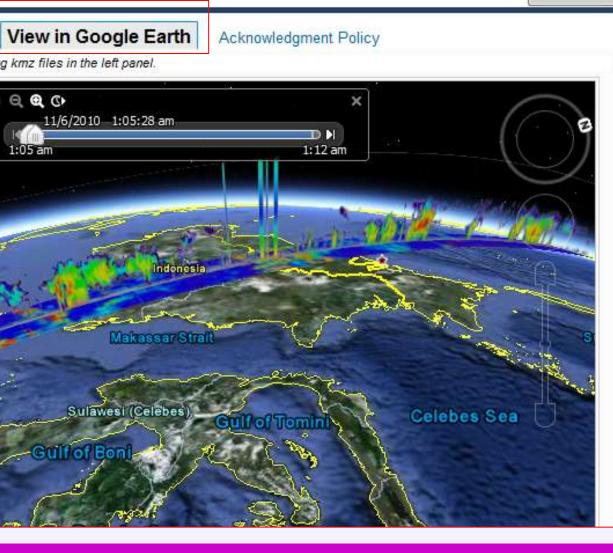
Above: 3D Vertical profiles of cloud from CloudSat satellite and 2D swath data of Cloud Top Pressure from MODIS/Aqua are visualized in Google Earth after processing and rendering by G3 A-Train instance.

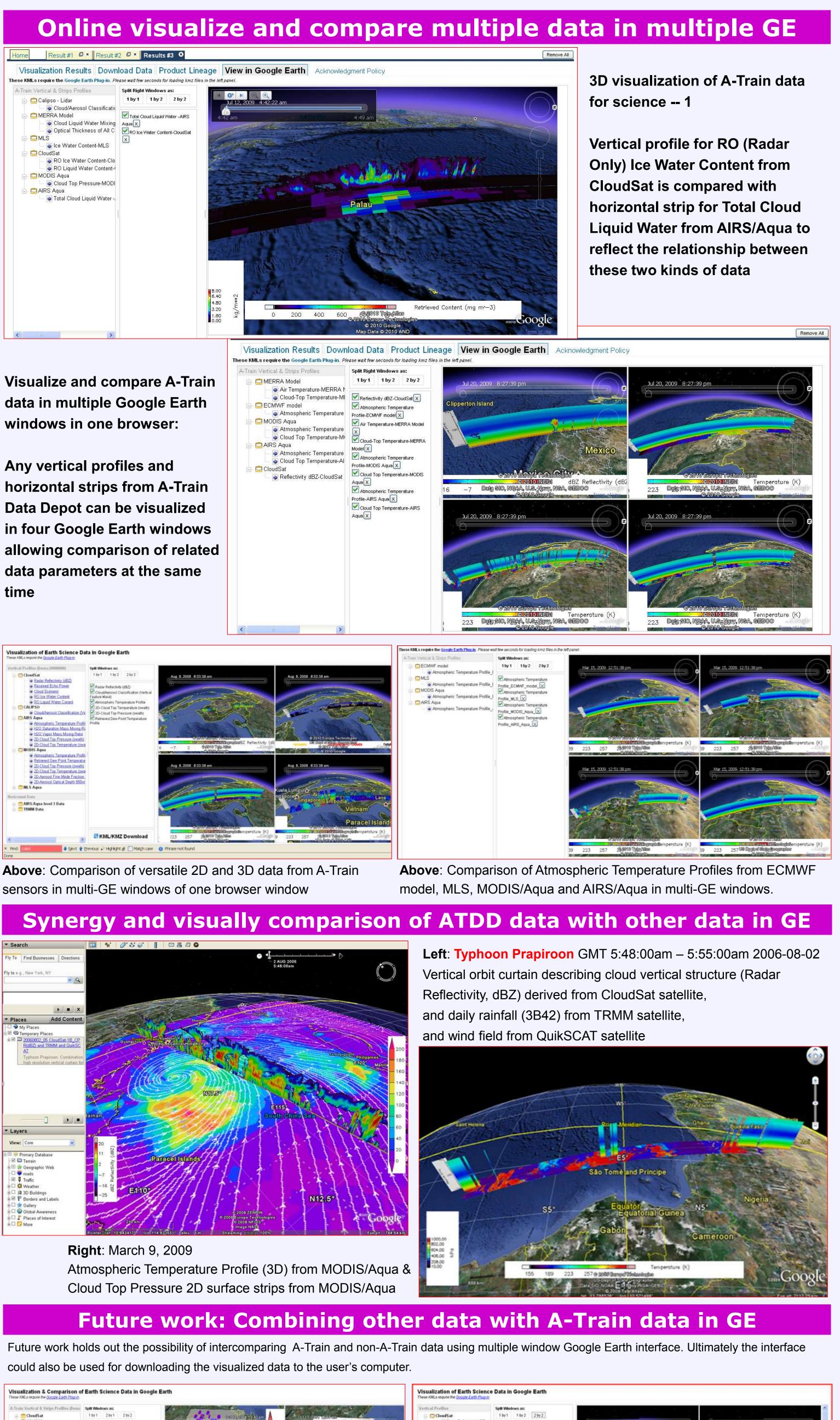
3D Online Visualization and Synergy of NASA A-Train Data using Google Earth

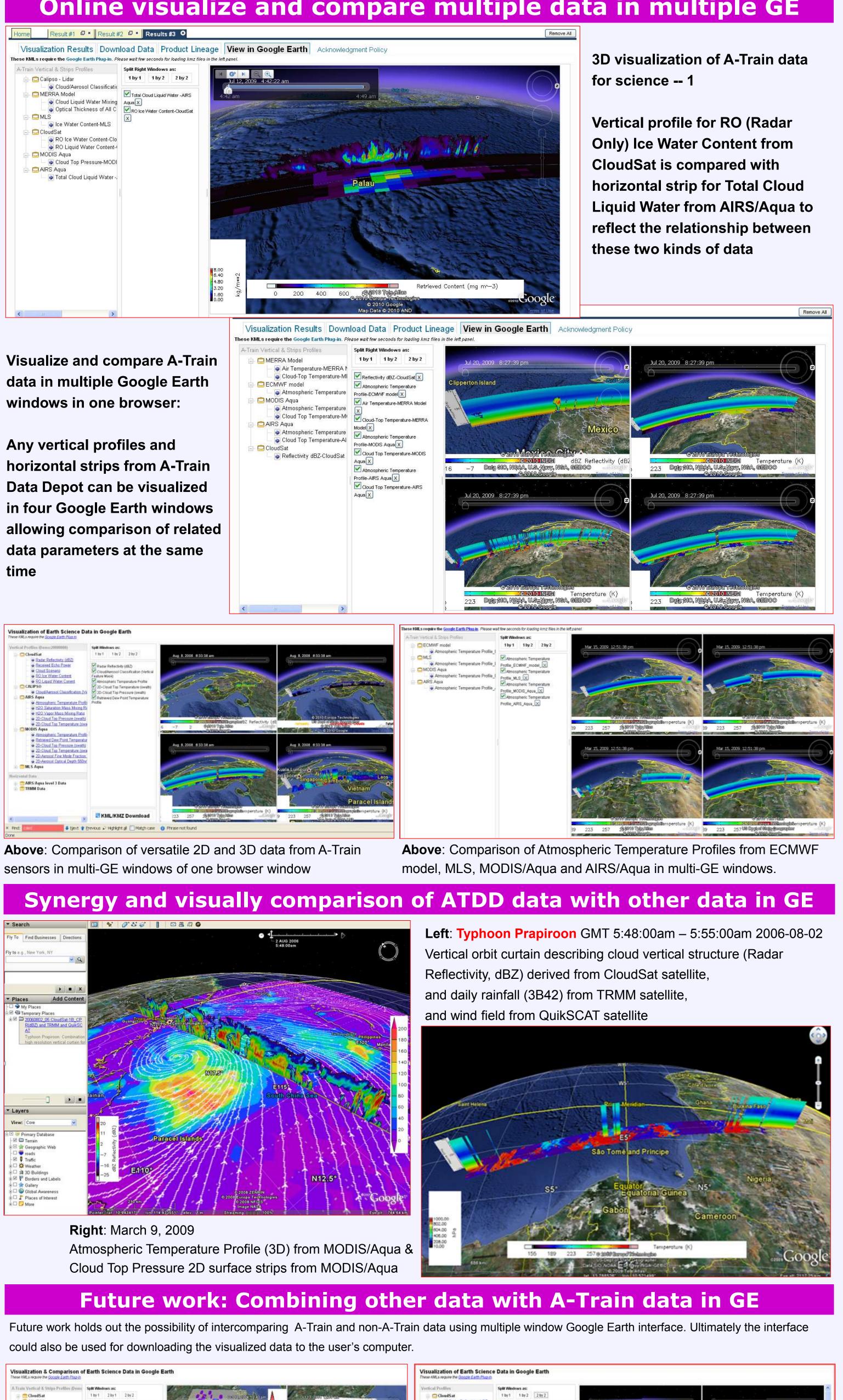
Aijun Chen^{1,2}, Steven Kempler¹, Gregory Leptoukh¹, Peter Smith¹ ¹NASA Goddard Earth Sciences (GES) Data & Information Services Center (DISC);

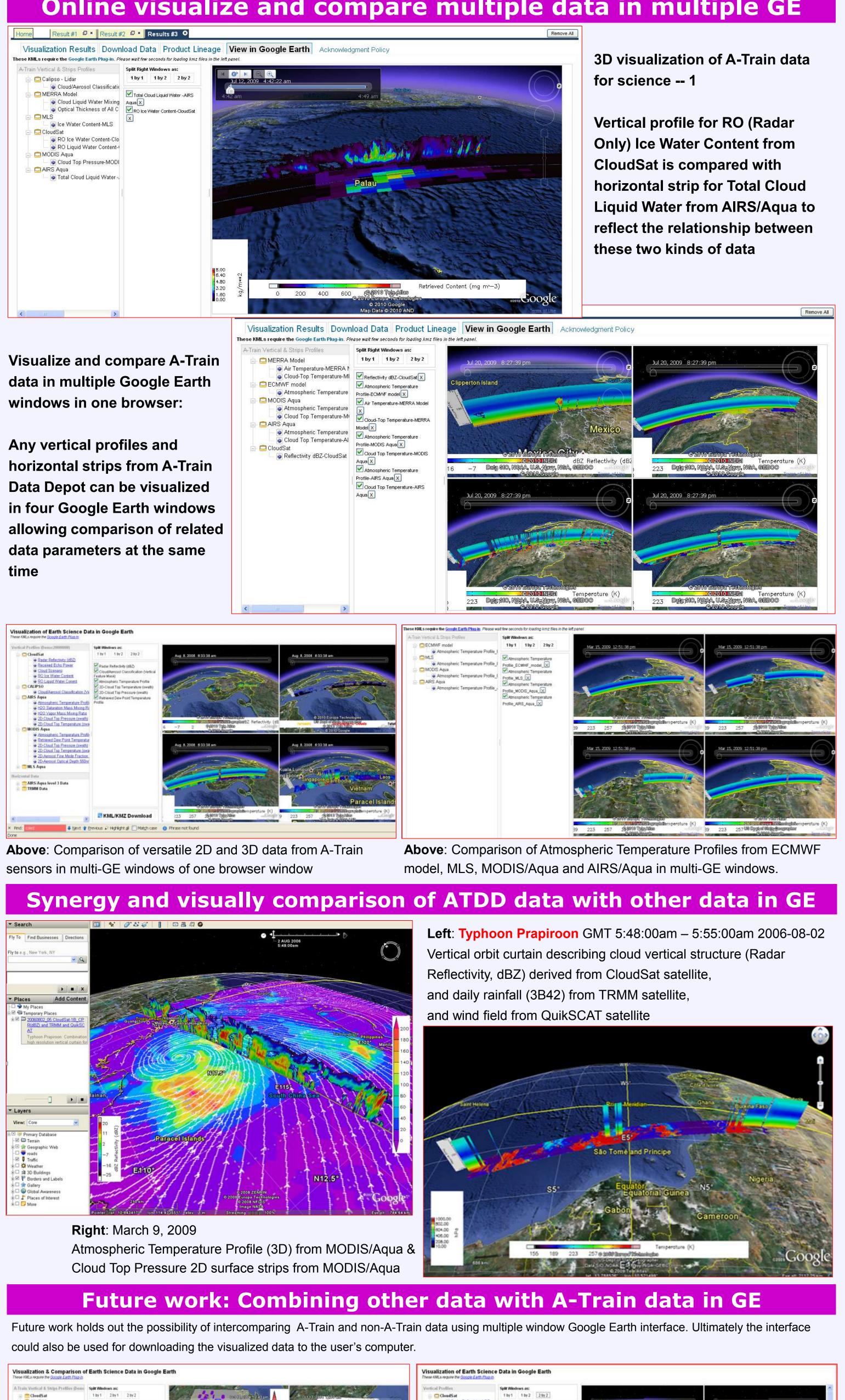
Classification (Vertical Feature Mask) from Clipso-Lidar and and horizontal strip for **Cloud Top Pressure from MODIS/Aqua**

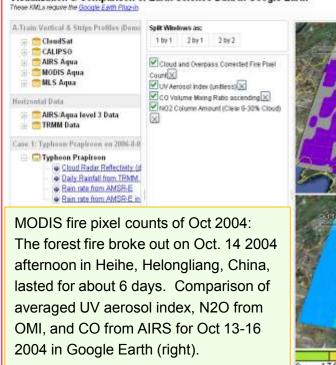


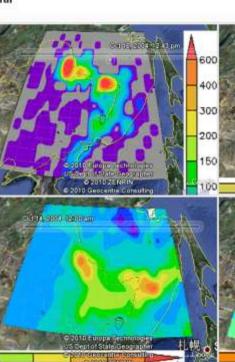












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NASA/GES DISC ATDD Portal http://disc.gsfc.nasa.gov/atdd **NASA/GES DISC Google Earth Portal** http://disc.gsfc.nasa.gov/googleearth/

