GSFC VLBI Analysis Center Activities

David Gordon[1], Karen Baver[1], Dirk Behrend[1], Sergei Bolotin[1], David Eriksson[2], John Gipson[1], Ed Himwich[1], Johanna Juhl[2], Karine Le Bail[1], Chopo Ma[3], Daniel MacMillan[1]

[1] NVI, Inc./NASA Goddard Space Flight Center, Greenbelt, MD, USA
[2] Chalmers Univ./NVI/NASA Goddard Space Flight Center, Greenbelt, MD, USA
[3] NASA Goddard Space Flight Center, Greenbelt, MD, USA

Introduction

The GSFC VLBI Analysis Center is located at NASA's Goddard Space Flight Center in Greenbelt, Md. GSFC is the oldest IVS analysis center, dating back to the 1970's. We maintain a web site at http://lupus.gsfc.nasa.gov.

The staff of the Analysis Center consists of 7 permanent members (Chopo Ma, John Gipson, David Gordon, Dan MacMillan, Karine Le Bail, Sergei Bolotin, and Karen Baver) and 2 temporary Swedish interns (Johanna Juhl and David Eriksson). Dirk Behrend (IVS coordinator) and Ed Himwich (IVS Network coordinator) are also occasional participants.
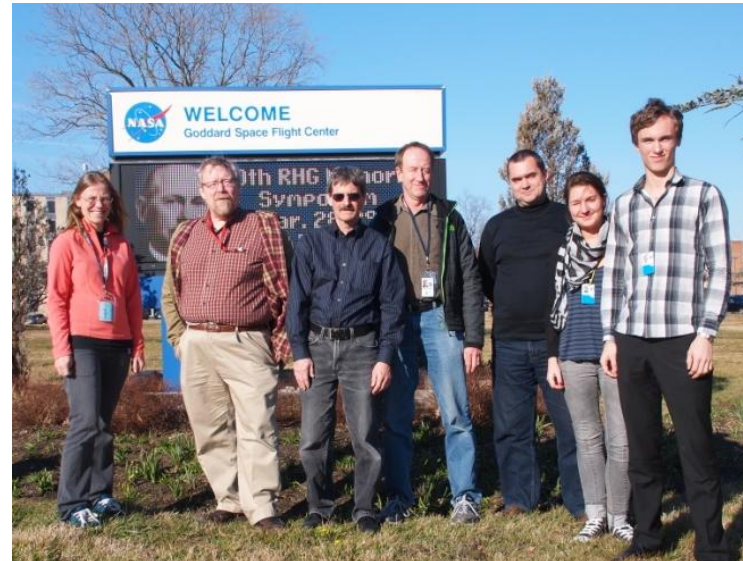
The analysis center is closely linked with the IVS Coordinating Center, the GSFC Technology Development Center, and the GGAO network station. GGAO is the home of the new 12 meter VLBI2010 antenna, GGAO12M, which recently participated in the first VLBI2010 broadband data taking sessions and is being used for VLBI2010 development.

Analysis Activities

The GSFC Analysis Center performs a number of routine analysis activities. These include:
• *Calc/Solve* analysis of all IVS 24-hr and Intensive sessions.
• Submission to IVS of all R1, RDV, R&D, APSG, CONT11, AUST, INT01, and INT03 analyzed sessions.
• Fringing of the RDV's using *difx2mark4* and *fourfit*; previously done using *AIPS*.
• Semi-annual updates of EOP, TRF, and CRF solutions and submission to IVS.
• EOP update submission to IVS for every new 24-hr and Intensive session.

Services

The GSFC Analysis Center provides the following services to the VLBI, geophysical and astronomical community:
• Astronomical source catalog, updated semi-annually, currently has positions for 3688 sources - http://lupus.gsfc.nasa.gov/dataresults_main.htm.
• Source time series, updated semi-annually, currently has time series positions of 1563 sources - http://lupus.gsfc.nasa.gov/dataresults_main.htm.
• Source positioning service, in cooperation with NRAO; RDV observations made of requested sources to obtain precise positions for use in phase referencing or other purposes.
• Pressure loading service – see http://gemini.gsfc.nasa.gov/results/aplo.
• NEW: Hydrology loading displacements service - see http://lacerta.gsfc.nasa.gov/hydlo/.
• NEW: Pressure and temperature service, derived from the ECMWF ERA interim model – see. http://lacerta.gsfc.nasa.gov/met/ .
• NEW: TSUKUB32 daily position service , 8-14 day latency - see ftp://gemini.gsfc.nasa.gov/pub/misc/dsm/tsukuba.
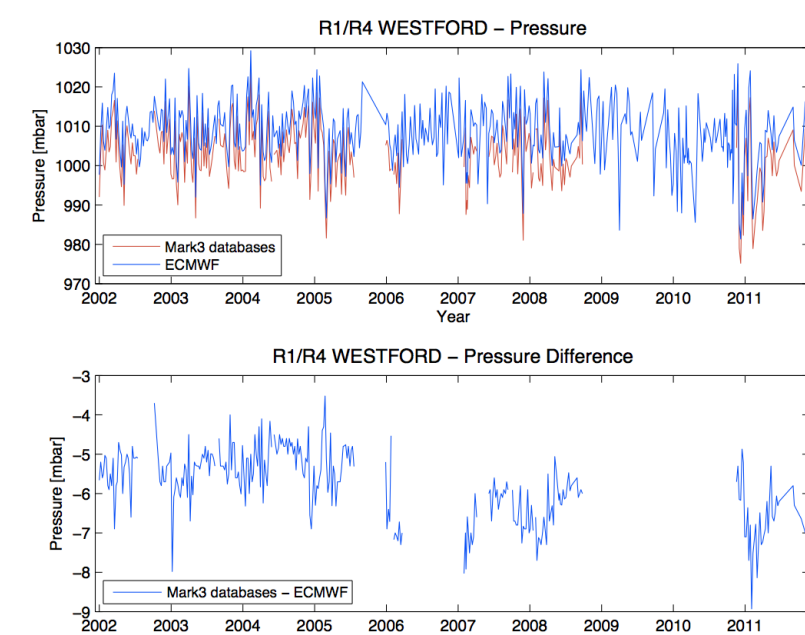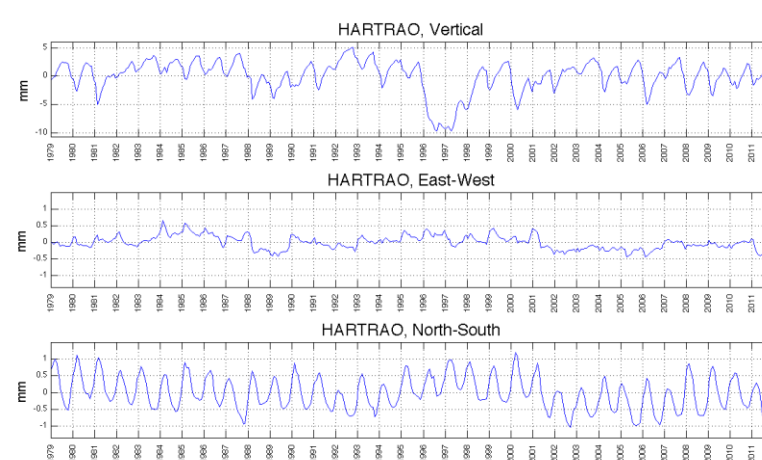
Software

The GSFC Analysis Center maintains and updates the *Calc/Solve* analysis package. We are currently working on a major upgrade of program *Calc* for compliance with the IERS 2010 Conventions and to include a finite distance model, and an upgrade of program *dbedit* (creates databases) to properly handle VLBI2010 broadband data.

vSolve, a new interactive analysis program, is being developed for initial database analysis. It is written in C++ and uses the Qt library for graphical user interface. It can read from Mark3 database files, resolve ambiguities, compute ionosphere corrections, determine clock breaks, edit outliers and save the results as Mark3 database files. It will be released soon and we expect it to replace interactive *Solve* in the data processing chain.

Research Activities

The Analysis Center performs research in numerous areas aimed at improving the VLBI technique. Current research activities include:
• VLBI2010 work in preparation for using broadband data from the new GGAO12M antenna and other VLBI2010 stations.
• VLBI2010 simulations.
• Effects on the TRF and EOP's of the Japanese and Chilean earthquakes.
• Geodetic technique combinations.
• Pressure loading studies.
• Hydrology loading studies.
• Non-tidal ocean loading studies.
• LOD time series studies.
• Nutation time series studies.
• Source stability time series studies.
• Troposphere ray tracing studies.
• Met data analysis and replacement.
• Source monitoring.
• Improving Intensive scheduling.
• GPS ionosphere application.
• ICRF2 expansion.

Future Plans

Future plans include:
• Integration of the new GGAO12M station into the VLBI network.
• VLBI2010 data analysis.
• *Dbedit* update to properly handle VLBI2010 broadband data.
• *Calc* update for IERS 2010 Conventions and to include a finite distance model.
• First release and further development of *vSolve.*
• Begin a VLBI site position time series service.

Contact author: **David Gordon**
NVI, Inc./NASA GSFC, Code 698.2
Greenbelt, MD 20771, USA
e-mail: David.Gordon-1@nasa.gov