MOTIVATION

- To develop a **suite of software and data products** covering a wide range of GNSS user needs
- Including GNSS like **GPS**, **Galileo**, or **GLONASS**, as well as their local augmentation systems, both space-based (**SBAS**) and ground-based (**GBAS**)
- Supporting all the phases of GNSS projects and objectives, including service volume **simulations**, core **operational** functions, such as **orbit**, **clock** and **ionosphere** determination and prediction, added-value services like **integrity**, local **augmentation** developments, and all related performance and accuracy **analyses**
INTRODUCING magicGNSS BETA

- A free-of-charge online service for registered users
- You can apply for an account online
- Provides current and past data from a predefined set of 36 core stations
- User station data upload also possible (RINEX files)
- Features a fully-functional demo version of the ODTS algorithm to generate precise orbits, clocks, tropo and station coordinates

magicgnss.gmv.com
magicGNSS BETA

QUALITY DATA, ALGORITHMS AND PRODUCTS
FOR THE GNSS USER COMMUNITY

With magicGNSS you can:

- Use current or past data from a predefined set of core stations
- Process any available data to generate precise orbits, clocks, tropo and station coordinates
- Organize your processing scenarios and results in a simple way

Currently supports GPS data in RINEX format. Galileo (GIOVE) and Glonass available soon.

A product by

gmv
INSIDE THE USER ACCOUNT
### OUTPUT PRODUCTS

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<tr>
<td>Predicted satellite orbits</td>
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- Comparison with IGS final products (orbits and clocks)
- One week of data using 30 IGS stations
- Orbits: **4 cm** RMS
- Clocks: **0.15 ns** RMS
INPUT DATA

- **36 core stations** currently available
- Data shared with **IGS Real Time** pilot project in which GMV participates
- Data for the last 30 days available on the server
- Until current time with a typical latency of 2 hours
- The colour map indicates the number of stations in view of the satellite at the sub-satellite point and at the GPS height (Depth-of-Coverage or DOC)
- Core stations guarantee at least DOC=5 everywhere

- Automatic processing of **NANUs** and rejection of *bad* (unhealthy) satellites
- Earth Rotation Parameters (ERPs) from IERS
- A priori station coordinates from ITRF or IGS solutions
- All key input data **downloaded automatically** at the magicGNSS server and kept in a **database**
USER STATION DATA UPLOAD

- Upload via web through the magicGNSS user account
- Upload via ftp also possible (easy batch upload and automation)
- RINEX 2.10 and 2.11 format versions are supported
- Normal observation files and Hatanaka files
- Compressed files in .Z, .gz, and .zip formats
- The following data rates are supported, in seconds: 30, 15, 10, 5, and 1
- Daily, hourly and 15-min RINEX files are supported
- If RINEX file does not have P1, the C1 code is automatically converted to P1 using CC2NONCC
THE ODT S ALGORITHM

- **ODTS** stands for *Orbit Determination & Time Synchronization*
- The basic ODT S input measurements are pseudorange (code) and phase L1-L2 dual-frequency iono-free combinations
- Based on a **batch least-squares** algorithm that minimizes measurement residuals solving for **orbits**, satellite and station **clock** offsets, phase ambiguities, station tropospheric zenith delays, and station coordinates
- The satellite and Earth dynamics are based on **high-fidelity models** including a full Earth gravity model, Sun, Moon and planetary attractions, solid Earth tides, and solar radiation pressure, including eclipses
- The orbit fit is based on the estimation of the initial state vector (position and velocity) and 5 **empirical parameters** for Solar Radiation Pressure (SRP)
- Satellite and station clock offsets are estimated with respect to one **reference clock**, provided by one of the core stations (as selected by the user)
- Satellite **orbits and clocks** can be **predicted** into future time (clocks use a simple linear model)
THE ODTS REPORT

- Full report in PDF format with detailed information about measurement residuals, satellite orbits (eclipses, radiation pressure), satellite and station clocks, and station tropo and coordinates.
COMPARING RESULTS WITH COMP

- COMP is a module to compare ODTS results (orbits, clocks and coordinates)
- Orbits and clocks include estimations and predictions
- Orbits and clocks can be compared against IGS final, rapid, and ultra-rapid products
- Two ODTS scenarios can also be compared (orbits, clocks and coordinates)
- Detailed PDF reports are generated
CONCLUSIONS AND FUTURE WORK

- **magicGNSS Beta** available now at [magicgnss.gmv.com](http://magicgnss.gmv.com) featuring ODTS algorithm (Orbit Determination & Time Synchronization) using GPS data, including **core stations** and **user stations**

- **GLONASS** processing coming soon (intended before end of 2009)

- New products/modules coming this year: **Precise-Point-Positioning** (PPP) and a **SBAS** demonstrator

- Apply for an account, it is for free!
Thank you!

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