Standards and Conventions

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GGOS Bureau for Standards and Conventions

- Successor of the GGOS Working Group on Conventions Models Analysis (CMA, Chair: Hermann Drewes)

- Hosted by
  - Institut für Astronomische und Physikalische Geodäsie (IAPG) of Technische Universität München Munich, Germany
  - Deutsches Geodätisches Forschungsinstitut (DGFI), Munich, Germany under the umbrella of the Forschungsgruppe Satellitengeodäsie (FGS).

- Director: Urs Hugentobler (IAPG), Secretary: Detlef Angermann (DGFI).

- Members: Johannes Bouman (DGFI), Michael Gerstl (DGFI), Thomas Gruber (IAPG), Burghard Richter (DGFI), Peter Steigenberger (IAPG).

- Corresponding Members: Mike Craymer (liaison to ISO/TC211, Registry Control Body, Registry for geodetic codes and parameters), Jozef Adam.
GGOS Bureau for Standards and Conventions

Objectives of the BSC are

• to *keep track of the strict observance* of adopted geodetic standards, standardized units, fundamental physical constants, resolutions and conventions in the generation of the products issued by the IAG Services;

• to *review, examine and evaluate* all standards, constants, resolutions and conventions adopted by IAG or its components and recommend their use or propose the necessary updates;

• to *identify gaps, inconsistencies, and deficiencies* in standards and conventions and to initiate steps to remove them;

• to *propose the adoption* of new standards and conventions where necessary;

• to *propagate standards and conventions* to the wider scientific community and promote their use.
Handling of Mean Pole for Pole Tide

GIB – DGFI (consistent with IERS Conventions)
GSFC – DGFI (inconsistent with IERS Conventions)

GGOS-D
Hydrostatic Delay, ECMWF vs. GPT

Steigenberger et al., 2008
Mapping Functions, VMF1 vs. GMF

ΔZTD [mm]

Steigenberger et al., 2008
Thermal Deformations for VLBI

- Scale variations

Ampl = 0.795 ± 0.014 [mm]  
Phase = 73.651 ± 0.576 [deg]  
Offset = 0.003 ± 0.007 [mm]  
Rate = -0.008 ± 0.001 [mm]
## Constants

<table>
<thead>
<tr>
<th>Quantity</th>
<th>GRS80</th>
<th>IERS2003</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>GM</td>
<td>398.600 5 · 10^{12}</td>
<td>398.600 441 8 (8) · 10^{12}</td>
<td>m^{3}s^{-2}</td>
</tr>
<tr>
<td>J2</td>
<td>1082.63 · 10^{-6}</td>
<td>1082.635 9 (1) · 10^{-6}</td>
<td></td>
</tr>
<tr>
<td>ae</td>
<td>6 378 137</td>
<td>6378 136.6 (1)</td>
<td>m</td>
</tr>
<tr>
<td>1/f</td>
<td>298.25722</td>
<td>298.25642 (1)</td>
<td></td>
</tr>
<tr>
<td>ω</td>
<td>7.292 115 · 10^{-5}</td>
<td>7.292 115 · 10^{-5}</td>
<td>rad s^{-1}</td>
</tr>
<tr>
<td>W_0</td>
<td>62 636 860.85</td>
<td>62 636 856.0 (5)</td>
<td>m^{2}s^{-2}</td>
</tr>
</tbody>
</table>

Best estimates, consistent set of constants, uncertainties.

Galileo OS SIS ICD Draft
Time and Tide Systems

- Time System TT (practice) vs TCG (IAU & IUGG Resolutions, 1991)
  \[ GM = 398.6004418 \cdot 10^{12} \, \text{m}^3\text{s}^{-2} \] (TCG value, IERS 2003)
  \[ 398.6004415 \cdot 10^{12} \, \text{m}^3\text{s}^{-2} \] (TT value, EGM96, EIGEN, ...)
  Use of other constants consistently!

- Tide system, IAG Resolution 16 of 18th General Assembly (1983):
  - zero-tide for geopotential quantities
  - mean-tide for station displacement quantities

In practice for geometrical quantities: tide-free (ITRF)
  → source for confusion when combining geometric and gravimetric quantities
Conclusions

• Compile an *inventory* of used constants, standards, conventions:
  – BSC to collect available information
  – polling of Services with standardized form
• S/W comparisons, benchmark tests.
• All GGOS products, i.e. all products of IAG services, shall be accompanied with a *standards sheet* → metadata.
• *SINEX*: mandatory keyword
  – TIME_SYSTEM: TT_SCALE, TCG_SCALE
  – TIDE_SYSTEM: MEAN_TIDE, ZERO_TIDE, TIDE_FREE
• SINEX conventions block?