

# Unified Analysis Workshop 2007

**Date:** December 5, 2007, 08:00 – December 7, 2007, 13:00  
**Location:** Beach Resort Monterey, Room PT Cabrillo  
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## Action Items (status April 15, 2008)

| AI No. | AI Description                                                                                                                                                                                                                                                           | Responsible                           | Deadline                   |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------|
| 1      | IERS CB to put all presentation on the web                                                                                                                                                                                                                               | IERS CB                               | 17-DEC-07                  |
| 2      | IERS CB to put all position papers online as well as the Action Items (AI) and program                                                                                                                                                                                   | IERS CB                               | 17-DEC-07                  |
| 3      | Inform IERS Convention PC about need of better documentation of IERS Convention software modules (input from Tim Springer)                                                                                                                                               | Tim Springer<br>IERS CB →<br>G. Petit | 20-DEC-07                  |
| 4      | Discuss and redefine the role of the IERS CRCs in the combination activities.<br>Will be reconsidered at IERS DB, April 13, 2008                                                                                                                                         | IERS DB                               | 11-DEC-07<br>13-APR-08     |
| 5      | SINEX Extension of Parameterization / Naming:                                                                                                                                                                                                                            | IERS ACoo                             | 10-DEC-07                  |
| 5a     | SINEX Proposal 2 will be distributed to all interested groups. The new version of SINEX should exclusively use new names. Old names are still supported for all older SINEX versions.                                                                                    |                                       |                            |
| 5b     | Feedback of groups until                                                                                                                                                                                                                                                 | All                                   | 18-FEB-08                  |
| 5c     | Distribution of final SINEX version description<br>Final details to be discussed at EGU 2008                                                                                                                                                                             | IERS ACoo                             | 25-FEB-08<br>15-APR-08     |
| 5d     | Ask Analysis Centers about their opinion<br>Make a distinction between SINEX files for combination purposes and other purposes in the file name → convention. Proposal by Axel Nothnagel.                                                                                | IERS ACoo<br>Nothnagel                | 30-APR-08<br>10-DEC-07     |
| 6      | Atmospheric Loading:                                                                                                                                                                                                                                                     |                                       |                            |
| 6a     | Reference pressure for atmospheric loading:<br>Johannes Böhm checks the deviations of GPT and ISO standard from a correct mean pressure field.<br>J. Böhm to compare mean pressure fields of the loading services                                                        | Böhm<br><br>Böhm                      | 31-JAN-08<br><br>15-MAY-08 |
| 6b     | Correction of atmospheric loading on the weekly, daily or on observation level? Check IERS WS 2007 recommendation.<br>Böhm, Tesmer, van Dam, MacMillan, Pavlis to perform tests to assess the difference between application on the obs. and SINEX level (daily/weekly). | Van Dam                               | 31-MAR-08                  |
| 7      | Algorithm/formulas for computation of the reference temperature field for VLBI telescope expansion to be defined by IVS<br>Action Item from IVS GM 2008 for IVS ACoo                                                                                                     | IVS ACoo                              | 08-MAR-08<br>15-JUL-08     |
| 8      | Generation of daily SINEX files:                                                                                                                                                                                                                                         |                                       |                            |

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| 8a  | Generation of daily SINEX files by VLBI (intensive sessions) and by GPS (rapid solutions). ACs are encouraged to submit daily SINEX files containing site coordinates, EOPs based on their rapid solutions. 24-hour data interval for GPS. ILRS/IDS will discuss how they could contribute.                                                                                                                                                    | IVS<br>IGS                                                                        | 01-MAR-08<br>01-MAR-08                                                                 |
| 8b  | Intra-technique combination of daily SINEX files as a pilot phase                                                                                                                                                                                                                                                                                                                                                                              | Ferland,<br>Nothnagel<br>GFZ, OP,<br>(IGN), (IGGB)<br>IERS ACoo,<br>IVS, IGS, IGN | 01-JUL-08                                                                              |
| 8c  | Combination of daily SINEX files by interested groups as a pilot phase based on individual ACs                                                                                                                                                                                                                                                                                                                                                 |                                                                                   | 01-JUL-08                                                                              |
| 8d  | Start the reporting of the troposphere parameters in the daily SINEX files (GPS, VLBI, IGN) using GMF dry for hydrostatic a priori delay, GMF wet for estimation and GPT for the hydrostatic zenith delay or better, at 2 hour resolution, piece-wise linear, using the new SINEX standard, at least co-location sites should be included. Binning to integer hours and daily gradients represented as piece-wise linear, a priori value zero) |                                                                                   | 01-OCT-08                                                                              |
| 8e  | Test SINEX file generation for the CONT'05 campaign time interval                                                                                                                                                                                                                                                                                                                                                                              | IERS ACoo,<br>IVS, IGS, IGN                                                       | 01-JUL-08                                                                              |
| 9   | Benchmarking of diverse models in the software packages, that are common to all techniques. Which models should be checked? Put together a list with priorities. Technique-specific effects should be checked by technique services, common models should be checked on the IERS/GGOS level. Use UAW exploder.                                                                                                                                 | Tim Springer                                                                      | 15-JAN-08                                                                              |
| 10  | Work towards a representation of parameters by piece-wise linear offsets (instead of offsets and rates):                                                                                                                                                                                                                                                                                                                                       | Services,<br>IERS                                                                 | 01-JUL-08<br><br>01-OCT-08<br>01-OCT-08                                                |
| 10a | Generate SINEX files for the test period of CONT'05 with piece-wise linear ERPs (using the new SINEX format version) and, if possible, with the old representation (offsets and drifts)                                                                                                                                                                                                                                                        | ACs: CODE,<br>ESA, DGFI,<br>IGGB, ...                                             |                                                                                        |
| 10b | ITRF CCs and other combination groups test the combination based on the new representation                                                                                                                                                                                                                                                                                                                                                     | ITRF CC,<br>others                                                                |                                                                                        |
| 10c | A priori representation of the ERPs: ACs should converge to a unique representation (interpolation) of the a priori ERP values as a linear function (linear interpolation) between the vertices. Further discussion by e-mail (UAW).                                                                                                                                                                                                           | IERS ACoo,<br>ACs                                                                 | 01-OCT-08                                                                              |
| 11  | Parameterization for ITRF20xx generation:                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                   | For the next<br>generation<br>of SINEX<br>time series<br>for ITRF<br>(ca. end<br>2008) |
| 11a | 1) Add quasar coordinates to the SINEX files                                                                                                                                                                                                                                                                                                                                                                                                   | IVS                                                                               |                                                                                        |
| 11b | 2) All techniques should include polar motion rates in the SINEX files                                                                                                                                                                                                                                                                                                                                                                         | All Services                                                                      |                                                                                        |
| 11c | 3) Low-degree harmonics of the gravity field from SLR (degree/order 2)                                                                                                                                                                                                                                                                                                                                                                         | ILRS                                                                              |                                                                                        |
| 12  | Modeling standards for next ITRF generation:                                                                                                                                                                                                                                                                                                                                                                                                   | Services                                                                          | See AI 11                                                                              |
| 12a | 1) Troposphere Mapping Functions: at least GMF wet and dry (or more complex functions from numerical weather models) should be used (GMF dry for the a priori dry delay; GMF wet for the troposphere                                                                                                                                                                                                                                           | IVS, IGS, IDS                                                                     |                                                                                        |

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| 12b | zenith delay estimation).<br>2) A priori dry troposphere delay: at least GPT is recommended together with the Davis model (1985).                                                                                                                                                                                                                                                                                                                                                                                                                            | IVS, IGS, IDS               |                                         |
| 12c | 3) FES2004 or GOT4.7b are recommended as ocean tide model for site displacements (Note: new values should be downloaded because of a model update of FES2004)                                                                                                                                                                                                                                                                                                                                                                                                | All Services                |                                         |
| 12d | 4) Atmospheric loading should be reconsidered after the tests by van Dam et al.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             |                                         |
| 12e | 5) Consistency with gravity (FES2004 etc.) should be considered as well.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | IGS ACoo                    |                                         |
| 12f | Check consistency of the above options with the IGS reprocessing options.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IGS ACoo                    |                                         |
| 13  | Documentation of AC modeling and parameterization standards:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                                         |
| 13a | Technique-specific forms (a template) are provided by IVS, IGS, ILRS, IDS. (ask Hermann Drewes about his activity here as GGOS WG Chair !!)                                                                                                                                                                                                                                                                                                                                                                                                                  | IVS, IGS, ILRS, IDS, CBs    | 20-DEC-07                               |
| 13b | Generation of a unified form, if not already done by H. Drewes (check also standards sheet by GGOS-D for completeness) and distribution to all ACs                                                                                                                                                                                                                                                                                                                                                                                                           | IERS CB                     | 15-JAN-08                               |
| 13c | Forms filled and returned by all ACs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | All ACs                     | 15-FEB-08                               |
| 14a | Recommendation to the IGS/IERS and the fundamental stations: at least 2 (better 3 GNSS receivers) with 2 resp. 3 antennas should be operated in parallel at least at all fundamental sites (co-location sites of more than one technique) to be able to monitor any discontinuities due to antenna and receiver changes. IGS and IERS to promote this recommendation. One master station (of the three) should be analyzed by the IGS. The 2 (or 3) antennas may never be changed at the same time. It is not yet clear who will process the local "network" | IGS, IERS                   | 09-DEC-07<br>11-DEC-07                  |
| 14b | Letter of the IGS/IERS to the fundamental sites (?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | IGS/IERS                    | 20-JAN-08                               |
| 15  | Need for a WG for the combination activities on the observation level. Options: 1) Renew the membership and scope of the IERS Combination WG, to include the most important groups working on rigorous combination. 2) Establish a new WG. 3) Organize this topic in the GGOS WG on Conventions, Modeling and Analysis. To be discussed by the IERS DB and GGOS SC. Reconsidered at the IERS DB, April 13, 2008                                                                                                                                              | IERS CB / GGOS SC           | 11-DEC-07<br>12-DEC-07<br><br>13-APR-08 |
| 16  | Make available quaternions for TOPEX and JASON-1 to IDS data centers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | IDS                         | 01-JUN-08                               |
| 17  | IDS to request CNES supply of SPOT satellite CoM histories due to fuel consumption                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | IDS CB                      | 01-JUN-08                               |
| 18  | Select/define a unique format for the exchange of the Earth gravity field spherical harmonics coefficients (e.g. = standard for GOCE???) and                                                                                                                                                                                                                                                                                                                                                                                                                 | Kusche, IGFS Advisory Board | 30-JUN-08                               |

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|                        | gridded values                                                                                                                                                                                                                                                                                                                                                                  |                        |           |
| 19                     | ICGEM gets the task to convert various gravity field formats to the unique standard format (spherical harmonics and grids) approval by IGFS AB.                                                                                                                                                                                                                                 | IGFS Advisory Board    | 30-JUN-08 |
| 20                     | Meta data exchange (two alternatives to be looked into):                                                                                                                                                                                                                                                                                                                        |                        |           |
| 20a                    | Definition of a meta data XML file to be generated together with each SINEX file. The proposal is distributed to all Services and ACs.                                                                                                                                                                                                                                          | IERS CB, CDDIS         | 31-JAN-08 |
| 20b                    | Generation of a SINEX meta data block (considering at the same time the SP3, RINEX, ...) to be the basis for meta data extraction into a XML meta data file by the data centers.                                                                                                                                                                                                | IERS CB, CDDIS         | 31-JAN-08 |
|                        | Proposal for SINEX Meta Data Block sent to Services with Service-specific keywords                                                                                                                                                                                                                                                                                              | IERS CB                | 09-MAY-08 |
|                        | Feedback by Services                                                                                                                                                                                                                                                                                                                                                            | Services               | 15-JUN-08 |
|                        | Final Information sent to Services and UAW                                                                                                                                                                                                                                                                                                                                      | IERS CB                | 30-JUN-08 |
|                        | Meta Data will be only provided for NEW files.                                                                                                                                                                                                                                                                                                                                  |                        |           |
| 21                     | Meteo data equipment/instrumentation coordinator, technique-independent → to be discuss at the next meeting of the GGOS Infrastructure WG<br>To be discussed at GGOS WG Meeting "Network and Comm.", April 16, 2008                                                                                                                                                             | Pearlman               | 12-DEC-07 |
|                        |                                                                                                                                                                                                                                                                                                                                                                                 |                        | 16-APR-08 |
| 22                     | Ensure consistency between recommendation and action items from UAW with the IERS WS on Conventions                                                                                                                                                                                                                                                                             | IERS ACoo and G. Petit | 11-DEC-07 |
| 23                     | Organizational topics:<br>Should such workshops be continued ? At what intervals (e.g. every two years) ? 2 years.<br>Consider Splinter meetings at EGU, AGU ...<br>Form a group consisting of the Analysis coordinators and, depending on issues, the IERS PCs → telecons, splinter meetings.<br>UAW exploder to be made more broad ? ACoo's to decide who to put on the list. |                        |           |
| <b>Recommendations</b> |                                                                                                                                                                                                                                                                                                                                                                                 |                        |           |
| 24                     | A clear distinction should be made between a solution (SINEX) as input for combination and an optimum solution of a specific technique: for the combination work the parameterization and time resolution of the most sensitive technique has to be used by ALL ACs. Therefore, it might be necessary to generate two types of solutions.                                       | All Services           |           |
| 25a                    | Investigate the reason for cut-off angle dependent effects and elevation-dependent weighting.                                                                                                                                                                                                                                                                                   | IVS, IGS, IDS, ILRS    |           |
| 25b                    | ACs should freeze their selection of processing options and models between two reprocessing activities                                                                                                                                                                                                                                                                          | IVS, IGS, IDS, ILRS    |           |
| 26                     | Continuous monitoring of the range biases by ILRS                                                                                                                                                                                                                                                                                                                               | ILRS                   |           |
| 27                     | IDS to investigate the addition of Jason-1 SAA corrected data to routine IDS combination                                                                                                                                                                                                                                                                                        | IDS                    |           |
| 28                     | Antenna models should not be changed between                                                                                                                                                                                                                                                                                                                                    | IGS, IDS               |           |

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|    | two reprocessing activities                                                                                                                                                                 |                |  |
| 29 | IDS should investigate the application of antenna correction models                                                                                                                         | IDS            |  |
| 30 | Further studies are required to understand the bias between SLR and microwave GPS orbits                                                                                                    | IGS, ILRS      |  |
| 31 | IDS and IGS to investigate improved radiation pressure models and parameterizations to reduce impact on the geocenter estimates, especially the new satellite box- and wing-models from UCL | IDS, IGS       |  |
| 32 | Study the influence of the arc length and orbit constraints on geocenter estimates                                                                                                          | IGS, IDS, ILRS |  |
| 33 | IGS should consider to apply the ionospheric corrections of higher order to be more consistent with the other Services' products                                                            | IGS, IDS (?)   |  |