

3 Reports of IERS components

3.1 Directing Board

The IERS Directing Board (DB) met twice in the course of each of the years 2008 and 2009. Summaries of these meetings are given below.

Meeting No. 46 April 13, 2008, Technical University of Vienna, Vienna, Austria

Introduction and approval of agenda The Chair, Chopo Ma, welcomed the guests and the members of the IERS Directing Board. The agenda was adopted with a slightly changed order of items.

Formalities The Directing Board accepted the minutes of IERS Directing Board Meeting No. 45.

Angie Moore left the Directing Board as IGS representative; Robert Weber was her substitute for this meeting.

Chopo Ma explained the new process for Action Items. These will be no longer postponed to the next IERS Directing Board meeting. They will get a date and the IERS Central Bureau will monitor the process and keep the Directing Board informed.

Action Items of Directing Board Meeting No. 44 C. Ma recalled the open Action Items from the IERS Directing Board Meeting No. 44.

Decision: In the future the Action Items will be better defined for responsibility and date.

Open Action Items:

44.01 Letter to stations asking for geodetic local tie measurement

44.04 Specifications for the next ITRF 200X

44.07 Prepare TN on new C04; outline will be provided by W. Wooden.

44.09 Application of UT1–UTC or TAI

Discussion on Leap Second The review of Action Item # 44.09 lead to a controversial discussion within the Directing Board. B. Luzum proposed to collect the pros and cons. J. Ray points out that for all tidal computations UT1 is necessary.

Decision: The IERS should have again a position whether the Leap Second is still necessary for the UT1 definition.

New Action Items:

46.01 Collection of pros and cons to keep the leap second and preparation of a draft report

46.02 IERS Central Bureau prepares a letter; consult Dennis McCarthy.

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Discussion on Action Items of IERS Directing Board Meeting No. 45

Most of the Action Items will be discussed and/or answered during the IERS Directing Board meeting.

45.02 ITRS/ITRF Web page should have links to other survey reports. Zuheir Altamimi asks for help. Item will be included in the “station letter”.

45.03 see Action Item # 44.01

45.04 Submit modified proposal for ICRS Centre.

ITRS/ITRF

Z. Altamimi reported about the status of a new ITRF2008. From IGS no reprocessed combined solution is available yet. Only the Potsdam Dresden Reprocessing (PDR) covering 6 years (2000 – 2005) is usable. More individual solutions from analysis centres like MIT, ESOC might be accessible at the end of 2008. IVS is ready with a reprocessed solution including the mean pole tide correction since last fall. The reprocessing within the ILRS is still under way; some experimental solutions from ASI, GRGS and GFZ exist.

When comparing the PDR with the ITRF2005 a scale change by 5 ppb is visible. The new DORIS solution is more stable. Presently the IGS solution is better than the single PDR. F. Lemoine informed that the new satellites Jason 2 and Gyrosat will have DORIS on board.

H. Drewes discussed the strategy of a new TRF developed within the GGOS-D project part of the R&D programme Geotechnologien, which is financed by the German Ministry of Education and Research. The improvements compared to the ITRF2005 are homogeneously processed data sets with identical standards, conventions, models and parameters. The absolute instead of the relative phase centre corrections are used which result in a smaller number of inconsistencies (jumps) for the station coordinate series weighed against the ITRF2005.

J. Ray referred to the special website <<http://www.ngs.noaa.gov/igsacc/reprocess/reprocess.html>> where more details are given concerning the reprocessing of GPS time series. The reprocessing will start in 2007 going backwards hopefully to 1994. He expects that the whole process will take several years and combined results might be available earliest in 2010.

E. Pavlis as ILRS Analysis Coordinator promised a trial version of a new combined series for end of June. F. Lemoine, IDS, expects a combined series for the end of this year. IVS will have a new combination for the ITRF200X.

New Action Items:

46.03 A combined DORIS series should be made available.

46.04 IGS Analysis Coordinator should report on progress of IGS reanalysis regularly.

ICRS/ICRF

A. Fey gave details concerning the progress of Working Group on ICRF-2. The overall goal is to have the ICRF-2 ready for adoption at the IAU General Assembly 2009. There were 4 meetings but the work has fallen far behind. Several dedicated Working Group meetings are needed within the next 12 months.

N. Capitaine informed the IERS Directing Board what is necessary to implement the IAU resolutions 2006 in the IERS Conventions and SOFA. Mainly the IERS Conventions Chapter 5 has to be updated.

The 2007 SOFA (Standards of Fundamental Astronomy) software release (a library of Fortran sub-programs implementing official IAU algorithms for fundamental astronomy computations) incorporates the 2006 precession. A “cookbook” that introduces the SOFA routines associated with precession-nutation and Earth rotation is available at http://iau-sofa.hmnao.com/2007_0810/sofa/sofa_pn.pdf.

Because the IERS has benefited significantly from informal collaborations with SOFA in the past, there have been some reflections about the future coordination between SOFA and IERS. The SOFA Board (chaired by P. Wallace and including B. Luzum) supports the idea of closer ties with IERS, while retaining the current IAU Division 1 link. Several options for such a rapprochement have been considered, on which IERS should be consulted; i.e. SOFA:

- becoming a new IERS product centre, with assuming responsibility for IERS software, or
- becoming one component of the IERS Conventions Centre, with assuming responsibility for the whole of the Conventions software, or
- keeping its own Division 1 role, but with more formal links with IERS, within e.g. Commission 19.

A formal letter will be sent to hear SOFA’s opinion on these suggestions.

N. Capitaine presented reduced models for the IAU 2006 X, Y series, out of which one can achieve the full accuracy that is available without EOP corrections. At present, users are obliged to first compute the full model and then add IERS corrections to the results. If the IERS would provide additional tabulations for corrections dX, dY values with respect to a shorter model, this would produce an identical final CIP X, Y at a fraction of the computing costs. N. Capitaine was asked to provide a report on this matter at the next IERS Directing Board meeting.

New Action Items:

46.05 Development of a plan of actions and milestones to realise the new ICRF II

46.06 Rewriting IERS Conventions 2003, Chapter 5

46.07 Formal approach on how SOFA could be included in the IERS Conventions and how they will respond / report to the IERS Conventions

46.08 Provision of a report on reduced models for the celestial pole offsets dX , dY and their applications

Earth orientation products

C. Bizouard presented the extended EOP Web Service that offers the Earth orientation parameters and the Earth orientation matrix at a given date. He demonstrated the tool, which allows the computation of the excitation function of the Earth rotation and the comparison with the geophysical excitation functions. The Directing Board did not accept the proposed changes of Bulletin B.

J. Ray contributed two presentations. The first dealt with the analysis effect in IGS polar motion estimates. The second was a presentation prepared for the EGU on the combination of VLBI UT1 with GPS LOD estimates by Kalman filter.

W. Wooden talked about the discrepancies between the 05C04 UT1 values and the Rapid Service/Prediction Centre UT1 values. His conclusion was that the problem occurs when VLBI data are missing and that 05C04 UT1 and 05C04 LOD do not agree well with the Rapid Service/Prediction Centre values, the SPACE2006 solutions as well as with the IGS finals LOD.

Decision: If there was no substantial reason for a change, the format for Bulletin B should remain the same.

New Action Items:

46.09 Jim Ray will cooperate with

- Daniel Gambis and Christian Bizouard on filtering.
- Brian Luzum and William Wooden to improve prediction considering the outcome of the prediction campaign.

A draft report will be prepared.

46.10 JPL will report on their experience to improve UT1 products.

45.06 The Earth Orientation Centre and the Rapid Service/Prediction Centre will investigate and resolve discrepancies in UT1 between both centres.

Role of Combination Research Centres

Starting with the Terms of Reference M. Rothacher explained the role of the Combination Research Centres (CRCs). Running for almost 8 years the present activities are very diverse and inhomogeneous. There is no flexibility and mechanism to redirect the work of the CRCs. As a result M. Rothacher proposed that the IERS Terms of Reference should be changed in such a way that the Research Centres (RCs) will contribute to the requested activity only for a limited period of 4 – 5 years. The present CRC activities should be closed at the end of 2008, while a new call for proposals should be launched to start with new, well-defined

activities in 2009.

The following discussion was very controversial: suggesting working groups instead of RCs, bring the RCs closer to the product centres, present CRCs do basic research and need a longer time span. Finally, it was decided that the Directing Board will follow M. Rothacher's proposal.

Decisions:

Terminate the present CRCs at the end of 2008.

Launch a call for RC with well define tasks in 2009.

New Action Items:

46.11 Notification of the CRCs about termination, IERS Message for the public

46.12 Change Terms of Reference to a limited time period, and generalise the name to Research Centres

46.13 Prepare a call for the new RCs

Progress on setting up a Working Group on Combination at Observation Level

R. Biancale presented his ideas to create a "Working Group on Combination at Observation Level". From his experience combination at observation level implies e.g. the processing of two or more space techniques, harmonizing the input models, evaluating appropriate weights between techniques, connecting techniques on ground or in space, searching for high frequency products, ... The major goals and objectives of the WG are the coordination of the Combination Pilot Project, to set standards for a rigorous combination, to study systematic biases, local ties and co-location, to validate combined products, to produce long-term series and to define future IERS products.

New Action Item:

46.14 Write a charter for the WG according to the IERS rules, compile a list of members, define a time schedule.

Review by Directing Board

Future of the GGFC structure, implementation

R. Gross summarized the present structure and the new one proposed by Tonie van Dam at the Directing Board Meeting No. 45. He felt that the structure in the proposal is too complicated whereas the existing structure is clear and simple. M. Rothacher started his presentation by a list of the products and repeated his idea how new components can be initiated. Most of the members of the Directing Board agreed that the Special Bureaus should be revitalised by new calls.

Decisions:

Revitalise the present Special Bureaus by new calls.

Add a new Special Bureau for Propagation Delays.

New Action Items:

45.09 List user requirements and available and/or necessary products, send to IERS Directing Board.

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46.15 Specify the products and operation scheme for the Special Bureaus and send out a draft for the calls to the IERS Directing Board members.

46.16 Review and comment on the calls, propose an evaluation process / group.

Consequences of the Unified Analysis Workshop

M. Rothacher reported on the progress of the Unified Analysis Workshop decided action items. He explained the extension of the SINEX format, the reference pressure field, the tests on atmospheric loading, the generation of daily SINEX files, the definition of meta data standards, and the documentation of Analysis Centres' modelling standards and parameterisation. Z. Altamimi was against the new SINEX format and proposed an extension without destroying the general format.

Results of the EOP Prediction Comparison Campaign, consequences

H. Schuh demonstrated the results of the EOP prediction comparison campaign. The objectives were the comparison of the various methods, models, techniques and strategies, which can be applied for EOP prediction with equal rules. In total 12 scientists participated with 20 prediction techniques in four categories: ultra short-term (10 days), short-term (30 days), medium term (500 days) and long term (20 years). The findings will result in a joint paper and cooperation with the IERS Working Group on Predictions. A direct comparison with the results of the IERS Rapid Service/Prediction Centre is still missing.

Report on GGOS and GEO

M. Rothacher informed about the recent developments in GGOS and GEO. In Bertinoro the GGOS Steering Committee arranged a GGOS retreat. Besides the discussion about the GGOS2020 document the major outcomes were the discussion and preparation of the Call for Proposals for the GGOS Coordination Office and GGOS Portal, the Bureau for Networks and Communication, the Bureau for Standards and Conventions and the Bureau for Satellite and Space Missions. In addition the Terms of Reference were revised, especially the vision and mission statements.

Reports of the Unions (IAU/FAGS)

N. Capitaine as the IAU representative in IERS and Federation of Astronomical and Geophysical Data Analysis Services (FAGS) gave details about the planned scientific meetings relevant to IERS. The focus of her presentation was on the development of FAGS. ICSU decided to reform the World Data Centres (WDC) and FAGS. In doing so ICSU established an ad hoc Strategic Committee on Information and Data (SCID). The Committee recommended the following: to create a new ICSU World Data System incorporating the WDC and FAGS as well as other state-of-the-art data centres and services. More details with a timeline were given.

IERS Conventions updates

The presentation by B. Luzum started with a summary about the latest updates and the work in progress of the introduction, terrestrial reference frame, transformation, site displacement, tidal variation in the Earth's rotation, tropospheric model and general relativistic models. B. Luzum continued to present a new template as an initial step in the process of software standardization. The last part was devoted to the comparisons of the Unified Analysis Workshop recommendations and the ones given at the IERS Workshop on Conventions. The next edition of the Conventions will be published in late 2008 or early 2009.

New Action Item:

46.17 Comments on Software template

IERS Rapid Service/Prediction Centre Status Report and Activities of the IERS Working Group on Prediction

W. Wooden reported that the Rapid Service/Prediction Centre modified the weighting for the polar motion contributors, added IGS ultras to combination, modified code to handle e-VLBI, increased AAM forecast from 5 to 7.5 days, and will migrate to a new operational machine. Near-term actions are investigations on the quality of UTGPS data and AAM studies to improve the AAM combination.

The Working Group builds on the foundation laid by the Prediction Comparison Campaign and the Combination Pilot Project and creates the potential for new EOP products. Presently the survey is being analysed and tasks are being set up to understand the fundamental properties of input data sets and prediction algorithms.

Report of the Central Bureau

B. Richter reported that the IERS Annual Report 2006 was completely ready since 4 weeks, was available in electronic form, and that the paper print was on the way. The deadline for Annual Report 2007 is May 31, so far no contributions have been received, reminders will be sent after the EGU assembly. Contributions not available at the due date will be marked in the Annual Report as "not available".

According to the Terms of Reference working groups are limited to a term of two years with a possible one-time re-appointment. Decisions have to be made whether and how to continue with

- Working Group on Site Survey and Co-location (established in Feb. 2004),
- Working Group on Combination (established in Jan. 2004).

New Action Items:

46.18 Reminder for Annual Report 2007

46.19 Final Reports of chairs of Working Group on Site Survey and Co-location, Working Group on Combination for Annual Report 2008

3.1 Directing Board

Miscellaneous	Z. Altamimi is one of the members of the “US national requirement for geodetic infrastructure” committee. The 12 committee persons will prepare a report at the end of the year.
Next IERS Directing Board meeting / workshops	<p>To avoid the meeting conflicts before and during major assemblies it is proposed to hold the fall IERS Directing Board meeting separately. As a compromise for the American and European colleagues Washington D.C. was suggested as the meeting place, and the date should be October 27, 2008.</p> <p>Presently there is no proposal for an IERS Workshop.</p> <p><i>Decision:</i> Next IERS Directing Board meeting in Washington DC on October 27, 2008</p> <p><i>New Action Items:</i></p> <ul style="list-style-type: none"># 46.20 Check meeting places# 46.21 Proposal for an IERS Workshop
Meeting No. 47	October 27–28, 2008, US Naval Observatory, Washington D.C., USA
Introduction and approval of agenda	The Chair, Chopo Ma, welcomed the guests and the members of the IERS Directing Board. The agenda was adopted.
Formalities	The Directing Board accepted the minutes of IERS Directing Board Meeting No. 46.
ITRS/ITRF Report from the ITRS Centre and ITRS Combination Centres	<p>To prepare the ITRF2008 Z. Altamimi performed a lot of detailed investigations to analyse the discrepancies between the techniques. New local ties in Tahiti and Herstmonceux are available. In both cases differences at the centimetre level are present. As a local effect the change of the event timer in Herstmonceux was demonstrated, where the main effect in the analysis is in the z-component. He also compared the SLR combination of ASI and GRGS as well as the effect of the mean pole tide correction on the IVS scale, which results in an overall scale shift by -0.5 ppb. So the scale difference between SLR and VLBI still exists. From 1995 on DORIS shows similar scale behaviour like VLBI and the reprocessed GPS series from MIT follow the same line. The single new and closed stations in the SLR network do not show a direct effect on the SLR scale but in general the scale is affected by the network degradation.</p> <p>Because the scale is one to one affected by the vertical velocities a detailed study was presented to monitor the vertical velocities of the core stations with respect to geophysical processes. In conclusion Z. Altamimi stated that the scale drift between SLR and VLBI is most probably due to the two different networks, the scale stability is critical to avoid internal distortions and biased</p>

vertical velocities, and the IGS reprocessing makes significant improvements.

Specifications for the ITRF2008

M. Rothacher explained that for the ITRF 2008 the same strategy will be used as for ITRF2005. The Technique Centres will submit combined time series, for SLR and VLBI since the 1980ies, DORIS from 1993 on, and the IGS will provide reprocessed time series from 2000 till 2008. No correction for any geophysical fluid loading effects will be applied.

The following schedule to realize the ITRF2008 is foreseen:

November 10, 2008	Dissemination of the Call
February 10, 2009	Deadline for submissions by Technique/Analysis Centres
April 19–24, 2009	EGU: Preliminary results
until May 10, 2009	Analysis by the ITRS Combination Centres and agreement on one solution
June 15, 2009	Final ITRF2008 solution

Report on the recent co-location survey at Herstmonceux

H. Fagard demonstrated the results of the re-observation of the local ties at Hermonceux between the SLR 7840 marker, the GPS HERS and the GPS HERT. Differences of up to 11 mm compared to the old measurements were found.

Report from IDS

F. Lemoine gave a status report about the JASON-2 mission launched on June 20, 2008 with DORIS on board for tracking. Four more missions are planed with DORIS as tracking system, Jason-3 and more possible missions are under discussion.

Presently 6 analysis centres handle the data and the combination is performed in Toulouse. Gilles Tavernier left the Governing Board, the new Chairperson is Pascal Willis. Pascale Ferrage became a member of the Governing Board. Due to the Terms of Reference positions have to be renewed, the process should be finished by the end of the year.

IDS plans to contribute to the ITRF2008 by a combined and validated product. 2–4 Analysis Centres will process the full series from 1993 to 2008 and partial solutions from the others.

Because DORIS is an active tracking system the station network is continuously renewed and well distributed. Most of the stations are co-located by other geodetic space techniques.

ILRS Analysis Working Group Report

E. Pavlis presented the current activities of the ILRS AWG. The results of the re-analysis 1993 – 2007 are very homogenous for the Analysis Centres GFZ, ASI, GRGS, and GA, the historical data (1983 – 1992) are reprocessed by ASI and GFZ.

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Decisions:

The schedule of ITRF2008 was accepted, but more time should be given for evaluation. The final ITRF2008 should be ready for the IAG meeting in Buenos Aires.

Pierguido Sarti was appointed as head of the Working Group on Site Survey and Co-location.

New Action Items:

47.01 Add a sentence in the call ITRF 2008 to include the validation by Technique Centres, modify the date with the target to be ready for IAG.

47.02 All Technique Centres should contribute to ITRF2008.

47.03 P. Sarti should set up a new charter for Working Group on Site Survey and Co-location.

47.04 Send a letter to authorities performing the local tie surveys and thank for the activities.

47.05 IVS is asked to sort out the effect of atmospheric loading for their distribution to the ITRF2008.

47.10 Technical Note for ITRF2005

ICRS/ICRF

C. Ma reviewed the activities of the IERS/IVS Working Group on the Second Realization of the ICRF and presented the schedule to continue. The aim is still to present a new ICRF at the IAU General Assembly in Rio de Janeiro, August 2009.

Earth orientation products ***Report of the Earth Orientation*** ***Centre***

Based on a survey among Bulletin B users D. Gambis proposed a revised Bulletin B. The proposed new format is not accepted by the Directing Board, especially the two line information which would cause new programming in the application software. A new proposal should be developed.

In the continuance of the presentation D. Gambis described the eight steps of the EOP combination algorithm and gave an outline for the publication.

In three viewgraphs he compared various solutions of the X-, Y-pole residuals and LOD residuals with igs00 to demonstrate the smoothness of the IERS solution.

As a result of the comparison of 05C04 with Bulletin A the Directing Board decided that the 05C04 should not contain predictions and should be handled as a “frozen” series.

C04 constancy

W. Wooden and B. Luzum investigated the C04 constancy. They compared a half year data set, taking the current C04 and compared it to the fixed value at the beginning of the series. As a result they found changes with every solution (twice/week) and sometimes significant changes of more than 1 mas.

***Rapid Service/Prediction Centre
status report***

W. Wooden informed about recent improvements by extending the AAM forecast data from NOAA NCEP and Navy NOGAPS from 5 to 7.5 days. The prediction accuracy improved by 15% beyond 5 days. After testing new intensive baselines will be added. Depending on the results of the investigations the new UTGPS data (more satellites, better orbit modelling ...) will be incorporated into the operational products. New algorithms for combining AAMs with new data sources are studied. Rapid turn-around e-VLBI (RT e-VLBI) are processed and provided faster than the IGS Ultra rapid. First investigations on the effect of RT e-VLBI on Rapid Service/Prediction Centre combination and prediction products show a noticeable improvement in the combination solution.

***Report of the Working Group on
Prediction***

This report was presented by W. Wooden. By reviewing the different input data sets and algorithms the Working Group will create the potential of new improved EOP products. W. Wooden described the goals and objectives, the requirements, input data, algorithm considerations, and prediction methods. The findings of the Working Group – definitive user requirements, a comprehensive look at prediction methods and data sets – will be described in an IERS Technical Note.

***Status of UT1 discrepancy
investigation***

J. Ray noted that there are larger than expected discrepancies between the 05C04 UT1 values and the Rapid Service/Prediction Centre UT1 values. Several investigations show that problems occur when VLBI data are missing. Furthermore, 05C04 UT1 and LOD do not agree as well with Rapid Service/Prediction Centre and SPACE2007 UT1 respectively Rapid Service/Prediction Centre and SPACE2007 LOD. 05C04 LOD derived from UT1 does not agree as well with IGS Finals LOD.

Ways to improve EOP products

R. Gross recommended to include more data like e-VLBI for UT1, LLR for UT0, real-time GPS for polar motion but basis for a proper combination should be the consistent use of reference frame. OAM might improve the predictions but are not yet available from ocean modelling groups. R. Gross used AAM provided by NCEP and ECMWF, OAM provided by JPL, and UT1 predictions using JPL's Kalman Earth orientation filter to create several test cases.

New Action Items:

- # 47.06 Prepare a proposal for a new bulletin format
- # 47.08 Remove the prediction part from C04

***First actions of the Working Group
on Combination at the Observation
Level***

D. Gambis presented a first report of the Working Group on Combination at the Observation Level. The aim is to process several space techniques by using the same input models for each technique, the same constants and standards. The various

techniques will be connected by local ties on ground or in space using multi-technique satellites. Presently active in the Working Group are GRGS, DGFI, TUM, OPA; ASI plans to join in spring 2009. The combination will be made in two steps: 1. Processing of the observations by uniform software, 2. Accumulation of normal equations. In spring 2009 first results will be available for comparison.

New Action Item:

47.09 Draft of charter for Working Group on Combination at the Observation Level. Distribute to Directing Board after refinement.

IERS Conventions updates

B. Luzum gave an overview of IERS conventions updates since December 2007 and an outline of work in progress for various chapters. It is planned to publish the next registered edition of the Conventions in 2009.

Reports of the Unions (IAU/WDS)

Information on recent meetings, works and publications related to the IAU, 2009 IAU meetings

N. Capitaine informed in detail about the IAU symposium “Relativity in Fundamental Astronomy” to be held in Virginia Beach, VA, USA, on April 27 – May 1, 2009, the International Year of Astronomy and the IAU General Assembly in Rio de Janeiro on August 03–14, 2009.

Information on the ICSU 2008 General Assembly and the implementation of the ICSU World Data System (WDS)

After detailed discussions FAGS and the World Data Centres will be replaced by the new World Data System. The final report of the ad hoc Strategic Committee on Information and Data (SCID) informed in detail about the transition. The new WDS will function under the oversight of a new WDS Scientific Committee (WDSSC) to replace the current Panel on World Data Centers and FAGS Council. The transition period before the implementation of the WDS is approximately 12 months.

New Action Item:

47.12 IERS should work for membership in WDS.

Report of the Central Bureau

IERS Data and Information Centre

B. Richter showed the general functionalities of the IERS Data and Information Centre. For most IERS products meta data according to ISO 19115 were produced as well as a proposal for SINEX file meta data. All IERS products are standardized in format and interactive tools will allow plotting the data and performing data analysis.

Annual Report of IERS

The status of the Annual Report 2007 was given. There are still some contributions missing.

Scheduling of the elections of the IERS Chair

Chopo Ma is willing to act as IERS Chair for a second term. The necessary formalities for election will be arranged by the Central Bureau.

Change of Terms of Reference concerning Research Centres

Some changes in the Terms of Reference are necessary due to decisions of the IERS Directing Board to dissolve the Combination Research Centres and establish Research Centre(s):

Current Terms of Reference:

COMBINATION CENTER(S)

- Combination Research Center(s) are responsible for the development of combinations from data and/or products emanating from the different techniques (TCs). These research combination solutions are provided to the Analysis Coordinator.
- ITRS Combination Center(s) are responsible to provide ITRF products by combining ITRF inputs from the TCs and others. Such products are provided to the ITRS Product Center.

Changes:

1. Replace “COMBINATION CENTER(S)” by “ITRS COMBINATION CENTER(S)”.
2. Delete first paragraph on Combination Research Center(s).
3. Add:

RESEARCH CENTER(S)

Research Center(s) are responsible for carrying out research on a specific subject. They are established by the Directing Board and are related to a corresponding Product Center. Research Center(s) are limited to a term of 4–5 years.

Current Terms of Reference:

DIRECTING BOARD (DB)

The Directing Board consists of the following members:

...

- One representative from the Combination Research Center(s).

Changes:

Delete “One representative from the Combination Research Center(s).”

Decision: The proposed changes in the Terms of Reference were accepted.

New Action Item:

47.11 The Central Bureau should send out a notification that the present Chair is willing to serve for a second period.

Calls for GGFC Special Bureaus

Via telephone T. van Dam joined the IERS Directing Board meeting and presented a proposal for a new GGFC structure. The main points are: there are three major fluids: Atmosphere, Ocean, Hydrology. Within one fluid centre e.g. atmosphere all products will be provided, here: AAM, loading, geocentre, TWV, atmospheric tides ... In addition to the product centres GGFC

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science and support products will be offered. Each of the mayor centres will have a chair, who organise the work within the centre. The products are generated by individuals or institutions on a self binding commitment. The calls will be launched in two steps, first the chairs will be searched and then the institutions providing the operational products.

Decision: The Directing Board accepted the proposed new structure in general.

New Action Items:

47.13 Update the graphic of the structure of the proposed GGFC

47.14 Contact the chairs and possible product providers

47.15 Prepare two calls for chairs and for product providers

Report on GGOS and GEO

M. Rothacher informed about the call for the new GGOS components, new GGOS mission statement and further updates of the GGOS Terms of Reference. The GGOS 2020 reference document is available and will be published by Springer. A list of upcoming meetings und next major steps was presented.

B. Richter summarized the major steps in GEO since the last IERS Directing Board meeting.

Does the present structure of IERS fulfil the requirements?

ITRS: Towards an international standard?

Z. Altamimi presented an idea by Claude Boucher to place the ITRS/ITRF under the BIPM umbrella. This could give more recognition of the ITRF as international standard. Claude Boucher will work on a position paper.

ISO geodetic registry

B. Richter reported about another possibility to get more formal international acceptance. Presently the ISO TC 211 searches for a candidate for a registration authority of ISO/TS 19127 Geographic information – Geodetic codes and parameters. When the ISO register is set up the ITRF can be registered and will become an ISO-accepted standard.

Product review

M. Rothacher as Analysis Coordinator gave a short review of IERS products and draws steps towards a rigorous combination for the ITRF2008, weekly routine combined products up to daily routine combined EOP products. For this he presented two strategies.

Discussion of an IERS Executive Committee

For more intensive discussion within the IERS especially in between the Directing Board meetings it is proposed to form an IERS Executive Committee. After a short discussion the IERS Directing Board decided not to follow this suggestion.

New Action Item:

47.16 Which information is necessary to get the ISO stamp?

Miscellaneous	<p><i>New Action Item:</i> # 47.18 Telecom each month, participants: IERS Chair, IERS Analysis Coordinator, IERS Central Bureau and experts if necessary</p>
Next IERS Directing Board meeting / workshops	<p>The next IERS Directing Board meeting was proposed to be held in Vienna prior the EGU at the Technical University on April 19, 2009.</p> <p>W. Wooden proposed a workshop on EOP prediction in Warsaw in the fall of 2009. A decision will be made at the next Directing Board meeting.</p> <p>The next GGOS/IERS Unified Analysis Workshop should be held in December prior to the AGU Meeting.</p> <p><i>New Action Items:</i> # 47.17 Check date for Directing Board meeting at EGU meeting on Sunday before, contact H. Drewes to check for IAG Executive Committee meeting</p>
Meeting No. 48	April 19, 2009, Technical University of Vienna, Vienna, Austria
Introduction and approval of agenda	<p>The Chair, Chopo Ma, welcomed the guests and the members of the IERS Directing Board. He reported that he wrote a letter of support w.r.t. the Italian VLBI activities in Matera and Noto; unfortunately it wasn't helpful as was reported at the Bordeaux VLBI Meeting in March 2009.</p>
Formalities	<p>The Directing Board (DB) accepted the minutes of IERS Directing Board Meeting No. 47.</p>
ITRS/ITRF	<p>Z. Altamimi gave a preliminary analysis in view of ITRF2008. Combined solutions to the ITRF2008 were submitted from all TCs:</p> <ul style="list-style-type: none">• IGS: final solution• IDS: preliminary combined solution based on 7 AC solutions.• ILRS: preliminary solution including historical SLR data starting 1984• IVS: final solution but only 4 ACs contributed and used models may not be consistent. <p>Feedback of all preliminary results was sent to the techniques. 5 new local ties w.r.t. ITRF2005 are available: Tahiti, Tsukuba, Herstmonceux, Medicina and Greenbelt.</p> <p>The ILRS intrinsic origin and scale show a much more internal stability as within ITRF2005. No problems are showing up when comparing with ITRF2005, except a slight drift in TY and a drift in the scale. When including historical data the results are getting much noisier but the behaviour of the origin and the scale does not change, i.e. these parameter are completely driven by the data after 1992.</p>

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3 ILRS stations with discontinuities in the vertical component were discovered: Herstmonceux, Zimmerwald and Haleakala. Recently for Herstmonceux the range and time bias corrections were set up and should be applied for this station. But the biases were not applied by all ACs contributing to the ILRS combined solution. Therefore a new combined solution will be prepared by the ILRS. The IVS combined solution shows a scale with respect to ITRF2005, and an offset of 0.5 – 0.6 ppb appears because of the application of the correct pole tide model (according to IERS conventions).

The IDS solution shows discontinuities in scale due to changing the number of satellites. The combined solution is dominated by the ESA solution and the discontinuities within. Therefore ESA should reanalyze the solution.

For local tie residuals, a VLBI-GPS test combination was performed. Compared to ITRF 2005 it seems that the local tie residuals are better in quality. For some stations an improvement by a factor of 2 for the up component was achieved.

In summary, there is a significant improvement of the reprocessed solutions of all techniques.

However, the following problems remain:

- ILRS has some bias issues to be fixed.
- IDS shows a scale and translation in Z?
- For IGS including early data from 1995 to 2000 would be good.
- IVS is probably ok.
- A multi-technique combination should be done.

Updated schedule for the creation of ITRF2008:

November 10, 2008	Dissemination of the Call
February 10, 2009	Deadline for submissions by Technique/Analysis Centres
April 19-24, 2009	EGU: Preliminary results
Until May 20, 2009	Final submission by TCs
Until June 20, 2009	Analysis by ITRF CCs Preliminary ITRF2008 solution
June 20 – July 20, 2009	Preliminary ITRF2008 solution for evaluation by TCs / ACs
July 31, 2009	Final ITRF2008 solution

H. Drewes pretended the status of the ITRF2008 computation at DGFI. IGS, IVS, and ILRS combined solutions were analyzed; the IDS combined solution was not analyzed because it is not the official solution.

For IGS, about 130 discontinuities more than in the IGS station

discontinuities list were identified. The list of discontinuities is different from the IGN list.

For ILRS (1993 – 2008), only a few discontinuities were identified in addition to the ILRS list. The list will be discussed at ILRS AWG meeting in Vienna. The results are similar to that of the IGN solution.

Form the IVS solution, 324 single-baseline sessions were excluded. Discontinuities were taken from IVS; only the approximation of the movement of station PIETOWN is still unclear (to be resolved by IVS).

Next work will comprise finalizing the IGS and IVS analysis and the TRF computation, the analysis of the ILRS data, the analysis of the IDS time series, and an inter-technique combination.

IERS Working Group on Site Survey and Co-location

P. Sarti argued for a continuation of the IERS Working Group on Site Survey and Co-location.

Identified areas of work of the group are

- Standards and documentation
(Guidelines, survey reports, possibly store reports and data)
- Coordination
(Share know-how and join efforts between survey teams)
- Research
(investigate discrepancies btw. space geodesy and tie vectors, alignment of tie vectors into a global frame)
- Cooperation
(between TCs and CCs as well as GGOS BNC, IAG Commission 4?).

Work items are:

Item 1: site survey standards:

- revise former local tie activities
- produce new documentation

Item 2: site survey activities:

- promote accurate surveying
- remotely assist on field operations
- provide computational support

Item 3: tie vector estimation:

- set guidelines on computational procedures
- provide tie vectors with full variance covariance matrix in SINEX
- improve local ties

Item 4: coordination and research:

- Can local ties be accurate enough?
- Local ties aim at locating the conventional reference point.

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- Space geodesy observables are acquired at the electric reference point.
- Reference points are stochastically determined (e.g. single path variations of the Medicina telescope due to receiver displacement, vertex displacement and focal length variation together show variations of about 2 cm).

The work to be done includes compiling a list of members and a schedule.

Working Group on Combination at the Observation Level

D. Gambis explained the plans of the new Working Group on Combination at the Observation Level. The charter of the WG was proposed at IERS DB Meeting No. 46. It's main goal is to bring together groups capable to do combinations at observation level and to improve the homogeneity, precision and resolution of the products. The planned activities of the WG are described in 9 tasks in the charter of the WG.

Currently GRGS and DGFI are jointly responsible for the working group. Different software packages are being used at the institutions and activities started to exchange SINEX files. First GRGS SINEX files from GINS software turned out not to be readable at DGFI. The export to SINEX in GINS will be improved.

Activities should be extended to other groups like ASI, GSFC, and Chinese colleagues, who already expressed their interest in that work. However, they have not yet been participating actively.

Decision: The DB accepted the charter of the Working Group on Site Survey and Co-location.

New Action Items:

- # 48.01 Z. Altamimi will sent out a new schedule for ITRF 2008.
- # 48.02 P. Sarti will finalize a list of WG members and a schedule of the Working Group on Site Survey and Co-location and send it to IERS DB.
- # 48.03 The Working Group on Combination at the Observation Level was asked to send a revised charter to the DB.

ICRS/ICRF

IERS/IVS Working Group on the Second Realization of the ICRF

C. Ma presented an account of the IERS/IVS Working Group on the Second Realization of the ICRF. The sixth meeting of the WG took place in March 27–28 at Bordeaux Observatory. Short reports as well as action items were distributed during the meeting. The official documentation of the ICRF2 is in preparation and will be published as IERS TN No. 35. The draft is due mid June and will be posted on the IERS web site by mid July. A “Resolution on the Second Realization of the International Celestial Reference Frame” was prepared for the IAU General Assembly in August. The draft will be sent to the IAU after distributing to the IERS DB.

IAU related issues C. Ma gave also a note on IAU related issues. The IAU Symposium 261 “Relativity in Fundamental Astronomy – Dynamics, Reference Frames and Data Analysis” will take place in Virginia Beach (USA) from April 27 to May 1, 2009. The 27th IAU General Assembly will take place in Rio de Janeiro (Brazil) from August 3 to 14, 2009. The Joint Discussion 6 “Time and Astronomy” will take place on August 6–7. Submission of resolutions of type B (relevant for the resolution regarding ICRF2) are due May 15.

Re-organization of the ICRS Centre J. Souchay reported about the re-organization of the ICRS Centre. A new director was elected at Paris Observatory and new tasks for the ICRS Centre were identified. Therefore, a revised proposal for the ICRS Centre was set-up to be signed by the directors of Paris Observatory and U.S. Naval Observatory.

Decision: The DB accepted the revised proposal for the ICRS Centre.

New Action Items:

48.04 The Central Bureau will send the draft resolution on the “Second Realization of the ICRS” to the IERS DB.

48.05 Responses from the IERS DB members to the draft resolution are asked.

Earth orientation products D. Gambis summarized the status and function of current and new or changed EO products.

Status of C04:

- The series is available from ftp/web.
- The values are fixed until today – 30 days.
- Preliminary values are available for the last 30 days.
- The series is updated every year or when necessary (e.g. after issue of a new ITRF).
- An IERS Technical Note is in preparation, the draft was reviewed by W. Wooden.
- Corrections and comments are going to be taken into account.

Proposal of revised monthly Bulletin B:

- A survey asking users for their needs was done in Spring 2008.
- A new presentation was proposed based on the survey results.
- It is already available from ftp.

Differences in UT1 (100 μ s) occur between Bulletin A and 05C04.

The differences can be attributed to:

- gaps in the UT1 intensive data (up to 4-5 days)
- different weighting of UT1 intensives
- too weak smoothing in the 05C04 solution

Including an integration of LOD from GPS as a correction when VLBI intensives are erroneous or filling gaps when UT1 intensives are missing yield better results.

Quality of EOPs from IVS EOP combination

A. Nothnagel discussed the quality of EOPs from the IVS EOP combination. Two combined EOP products are provided by the IVS Analysis Coordination in Bonn. There are quarterly solutions where the whole series of 24 VLBI sessions is being re-processed and intensive solutions re-processed every Tuesday and Thursday when results of VLBI Intensives appear. During the last year significant improvements were achieved w.r.t. the quality of the products. Problems within single solutions of the ACs were identified and solved. For instance systematic differences were found between the solutions of the ACs using the software packages CALC/SOLVE and OCCAM. These were due to different high-frequency EOP models used in the software packages. Much better results were achieved as soon as both software packages used the models recommended in the IERS Conventions. Since late 2008 VLBI uses an own TRF for combination because some Russian stations participated which do not have reliable coordinates in ITRF2005. As a result it can be said that the combination is always better than the input of the individual solution.

Working Group on Prediction

W. Wooden reported about the activities of the IERS WG on Prediction. The tasks are to determine which prediction products are useful to the user community, and to make a detailed examination of the fundamental properties of the different input datasets and algorithms.

Current activities are:

- Organizing an IERS Workshop on EOP Combination and Prediction (WGP): It will be hosted by Space Research Centre in Warsaw. The Science Organizing Committee was established. The preliminary program is under review.
- Completing analysis of data and algorithms for presentation at the workshop.

WGP expectations are:

- Definitive user requirements.
- Comprehensive look at prediction methods.
- Comprehensive look at new data sets.
- IERS Technical Note describing current state-of-the-art EOP prediction including requirements, methods, and data set information content.

Decision: The format change of Bulletin B was accepted.

Future of the GGFC structure, implementation

The draft Call for Proposals (CfP) was sent out last week by the Central Bureau. The call was prepared by M. Rothacher and T. van Dam.

A presentation of the CfP was given by M. Rothacher. The structure of the GGFC should be updated in order to allow for the establishment of regular, reliable, and precise products as operational products and to allow for the inclusion of new operational products. The new GGFC structure will be divided into an Operational Component (GGFC-OC) and a Science Support Component (GGFC-SSC). The first component will host products that can be provided regularly, with acceptable latency, and sufficient precision. The latter component will host products that do not change with any regularity, but are nonetheless required by the IERS community. For the GGFC-OC, there will be 4 Special Bureaus: Atmosphere, Hydrology, Oceans, and Combination Products (from mixed fluids data sets). For the GGFC-SSC only 3 Special Bureaus are foreseen in the beginning: Core, Mantle, and Tides. Each SB will be chaired.

The call asks for three types of proposals:

- Individuals interested to chair one of the CBs. (Existing Chairs are very much encouraged to submit a proposal.)
- Accreditation of one or more operational products produced by a specific institution.
- Accreditation of already existing operational products produced by a specific institution

The call describes in detail:

- Responsibilities of the SB Chairs and how to submit a proposal.
- Process of accreditation for new official IERS products.
- Process of accreditation for already existing operational products.

Proposals will be reviewed by the IERS DB with input from the GGFC Chair. Funds required by the institutions in the framework of the GGFC have to be provided by the proposing institution.

The IERS DB members raised the following question when discussing this proposal: How to take care that existing SB chairs will send a proposal to stay as a chair in the new structure? Answer: T. van Dam will get into contact with the chairs before sending out the call and encourage them in order to answer the CfP and remain active in the future in the framework of the GGF. Does a joint call together with IAS, IGFS might make sense? Answer: The CfP will be sent out and is open to all IAG services.

The members of the evaluation committee to decide upon the proposals will be selected after the proposal deadline.

3.1 Directing Board

Schedule:

May 22, 2009:	Dissemination of the Call for Proposals
August 15, 2009:	Due date for Proposals
October 09, 2009:	Report by the evaluation committee to the IERS DB
Mid October, 2009:	Decisions by IERS Directing Board
End of October, 2009:	Notification of proposers on proposal acceptance
January 1, 2010:	Start of the product generation activities.

Decision:

The Call for Proposals is approved by the IERS DB and actions given below should be followed up.

New Action Items:

48.06 T. van Dam will contact current SB chairs to inform them about the GGFC Call for Proposals and push them to contribute to the new GGFC structure.

48.07 The Central Bureau will send out the GGFC Call for Proposals.

Renewal of the Analysis Coordinator

According to the IERS Terms of Reference (ToR) the AC serves for a four-year term, renewable once by the DB. Accordingly the term of M. Rothacher as AC ends on August 31, 2009. He is willing to continue till December 31, 2009 to provide more time to find a successor.

Since the ToR does not specify how to find a new AC the following procedure is proposed:

- Find appropriate candidates (DB).
- Ask candidates about their willingness (CB).
- Set up final list of candidates.
- Election by DB (by email in the second half of 2009).
- Installation of the new AC on January 1, 2010.

New Action Items:

48.08 Comments of DB members on how to proceed should be sent to the CB until end of April.

Reports of the Unions (IAU/WDS)

B. Richter described the planned implementation of the new ICSU World Data System.

A meeting of the World Data System Transition Team (5 members from FAGS and 5 members from WDC) took place on March 9–11 at ICSU in Paris with participation of the Unions, GEO, CODATA, etc. The summary of the discussions during the meeting will be circulated shortly as well as the WDS-TT White paper (about 10 pages). The paper includes the proposed criteria for the accreditation of a WDS. As soon as these documents are ready, a survey

will be sent out to identify the community interested in being part of the new WDS.

ICSU created two new committees, the WDS Scientific Committee and the Strategic Coordinating Committee for Information and Data (SCCID). The ICSU nomination process for these committees is under way.

For a report of IAU, see above under ICRS/ICRF.

Decision:

IERS should work for membership in WDS.

New Action Item:

47.12 IERS should work for membership in WDS.

Conventions

This report was presented by Brian Luzum. The updates to the IERS Conventions are listed at <<http://tai.bipm.org/iers/convupdt/convupdt.html>>.

Updates since the last IERS DB Meeting in October 2008 were:

Chapter 4: Terrestrial Reference Systems and Frames

- 10 April 2009: Chapter has been significantly rewritten with Z. Altamimi and C. Boucher as the primary authors. A presentation of the ITRF2005 is now included.

Chapter 7: Displacement of Reference Points

- 10 April 2009: The subroutine `dehanttideinel.f` was updated to correct for a bug in software (the effect of this bug was < 0.05 mm).
- 19 February 2009: Section on models for displacement of reference points of instruments has been rewritten.
- Subroutines `dehanttideinel.f` and `hardisp.f` updated for leap second and `hardisp.f` has been improved by increasing the number of terms and correcting a sign error in the long-period tides.

Chapter 9: Models for Propagation Delay

- 12 February 2009: New section on ionospheric models for radio techniques.
- Chapter title changed accordingly.

Chapter 10: General Relativistic Models

- 12 December 2008: Added note 6 to state a sign error in a reference.

Work in progress:

Introduction:

- Define classification of models and criteria for choosing models

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Chapter 3: Dynamical Realization of ICRF

- Revisions underway to include newer ephemeris

Chapter 5: Transformation

- Further revisions for consistency with IAU Resolutions

Chapter 6: Geopotential

- General rewrite including new geopotential model
- Rewrite of “Effect of Ocean Tides” (under review)

Chapter 7: Site displacement

- General rewrite
- Atmospheric tidal loading
- Routines revisited

Chapter 8: Tidal Variations in Earth Rotation

- Rewrite of the model for ocean tides; work on new model begun by R. Gross
- Review of the model for diurnal and semidiurnal EOP variations

Software Standardization

- Revised software template to be consistent with SOFA template

Additional Material

- New web page at
<http://tai.bipm.org/iers/convupdt/convupdt_aux.html>

IERS Conventions changes – not yet started:

Chapter 1: General Definitions and Numerical Standards

- Incorporate recommendations of IAU NSFA WG

Chapter 2: Conventional Celestial Reference System and Frame

- Incorporate ICRF-2

Incorporate recommendations of IAU Commission 52 (RIFA)

- Not yet completed

A late 2009 publication date is estimated for the next registered edition of the Conventions.

Next IERS Directing Board meeting / workshops

IERS Workshop on EOP Combination and Prediction (presentation by W. Wooden)

Goal: Provide specific recommendations that when implemented will mitigate existing shortfalls / deficiencies in current techniques / IERS products

Time: 19–21 October 2009

Location: Space Research Centre, Warsaw, Poland

3 Reports of IERS components

Proposed topics:

- Space geodetic EOP observations
- Sub-daily EOP tide models
- Long-term EOP tide models
- EOP combinations
- Non-geodetic AAM + OAM predictions
- EOP predictions

Deadline: Abstracts 1 August 2009

SOC: Orhan Akyilmaz, Aleksander Brzezinski, Daniel Gambis, Richard Gross, Wieslaw Kosek (co-chair), Brian Luzum, Zinovy Malkin, Jim Ray, Harald Schuh, Tonie van Dam, William Wooden (co-chair)

Next steps:

- SOC to finalize the preliminary program
- IERS Message to advertise workshop
- Session chairs to provide white papers / draft recommendations
- LOC to continue preparations

GGOS / IERS Unified Analysis Workshop 2009 (presentation by M. Rothacher)

Date and Location:

- Dates: December 8-9, 2009
- Place: Embassy Suites, Napa Valley

Participants:

- GGOS , IERS, IGS, IVS, ILRS, IDS, IGFS experts
- By invitation only
- Each service selects / nominates ~5 participants / experts

Sessions:

- Preparation by a team of chairs / co-chairs composed of one member of each Service
- Position papers

Topics:

- Topic 1: Details of Product Generation and Future (including portal and meta data)
- Topic 2: Technique-specific biases and co-location
- Topic 3: Modeling aspects, modeling based on external data (atmosphere, ocean, ...)
- Topic 4: Combination, common parameters, and combined products
- Topic 5: Network simulations and analyses

Next Steps:

- Send UAW 2009 session proposal to IAG Services for comments and modification

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- Ask IAG Services to select / nominate the participants
- Start preparations of sessions and position papers
- Setup web pages (Bernd Richter, ... ?)

The next IERS DB meeting is proposed to be held right after the workshop in Warsaw for 1 and ½ day.

New Action Items:

48.09 Sent out an IERS Message w.r.t. the Workshop on EOP Combination and Prediction.

48.10 Ask for comments from the IERS DB to the proposed Agenda for the Unified Analysis Workshop.

Meeting No. 49

October 22–23, 2009, Space Research Centre, Polish Academy of Sciences, Warsaw, Poland

Introduction and approval of agenda

The Chair, Chopo Ma, welcomed the guests and the members of the IERS Directing Board. New in the Directing Board are Aleksander Brzezinski and Rüdiger Haas. The agenda was adopted.

Formalities

The Directing Board (DB) accepted the minutes of IERS Directing Board Meeting No. 48. The Annual Report 2007 is ready and will be online on October 26, 2009.

Proposals for new GGFC components, implementation

T. van Dam introduced the people who sent in the 8 proposals: 4 proposals for the chairs of the GGFC Sub Bureaus Atmosphere (SBA), Combined Products (SBCP), Hydrology (SBH), Ocean (SBO), 4 proposals for new GGFC products:

- Frank Flechtner: GRACE AOD products, contribution to SBCP
- Maik Thomas: combined atmosphere + ocean + hydrology AM, contribution to SBA
- Johannes Boehm: Vienna mapping functions 1 and zenith delays, contribution to SBA
- Tonie van Dam: loading from atmosphere, hydrological, non-tidal ocean and combined products, contribution to SBA, SBH, SBO, SBCP

The proposals were reviewed by 5 reviewers.

Summary of reviews:

- No comments on the proposed chairs.
- Missing components, especially research products.
- New products should be reviewed by the chairs and case by case by external reviewers but accepted by the DB.

The chair of GGFC should be active as chair of the combination centre.

Products should be operational. After the structure will be in place, more proposals should be solicited.

Missing components are: Cryosphere observations or models, solid Earth models: post glacial rebound, core, and mantle. T. van Dam will contact the corresponding chairs of old SBs.

Accreditation of new products is important. D. Salstein's (SBA) and R. Gross' (SBO) products should be used right away; the hydrology products should be checked because they are not very user friendly.

M. Rothacher asked for product statistics w.r.t. timeline, availability, latency ... within one year. Documentation for each product should to be ready by the next DB meeting. Chairs to confirm membership lists. GGFC to take care of lists.

Decision: The DB accepted the proposals for the chairs and products.

New Action Items:

49.01 T. van Dam will inform the chairs about products their SB will receive and about their role in the accreditation process.

#49.02 The Central Bureau should send e-mails about proposal acceptance and reviewers' feedback to all proposers.

#49.03 T. van Dam should contact the chairs of old SBs.

#49.04 The Central Bureau should send an e-mail to the community announcing structure and chairs as well as products in accreditation, and requesting proposals for missing products.

Earth orientation products

D. Gambis summarized the status and function of current and new or changed EO products. The Technical Note is under discussion; the manuscript circulates between Observatoire de Paris and USNO. The new format of Bulletin B is available in parallel to the old. At the end of 2009 only the new format will be available, the old one only on request. C04 is supposed to be the basis. The schedule for aligning the C04 to ITRF2008 is:

- Check consistency of data between 2005 and 2008.
- When ITRF 2008 is official then C04 should be checked immediately and be ready in a month.
- Announcement of new series C04(08) should simultaneously be made in Paris and Washington.

Workshop on EOP Combination and Prediction

B. Luzum reported about the IERS Workshop on EOP Combination and Prediction (9 – 21 October 2009). The workshop made recommendations to IERS, IERS Conventions, IERS Rapid Service/Prediction Centre, IERS GGFC, and IAG Services. Maik Thomas will prepare a letter to ECMWF requesting data access. Short-term prediction series should be handled differently than the long-term ones. There are only a few users of 1-year predictions.

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IVS UT1 intensives should be available in SINEX. Recommendation 12 demands to provide EOP prediction accuracy goals, having in mind concrete goals, not just “better” predictions. The DB members discussed, who work can follow on – as working group on combination of predictions or as a pilot project? A first test suggests that a pilot project would be better. B. Luzum will be the lead and prepare a call. [See also Section 4.2 of this Annual Report 2008–09.]

Decisions: The DB will write a letter to ECMWF. The DB encourages going ahead with a working group or a pilot project.

New Action Items:

49.05 B. Luzum will talk to R. Ray to update the subdaily tide model.

49.06 Combining of geophysical fluids data sets (intra or multi fluids), coordinated by T. van Dam, should ask B. Luzum for details.

#49.07 M. Thomas will prepare a letter to ECMWF requesting data access.

#49.08 B. Luzum will prepare a pilot project on combination of predictions.

Report on status of ITRF 2008

H. Drewes announced that DGFI has not yet finished combining different techniques, but intra-technique combinations are ready. A first presentation will be made at the AGU meeting.

Z. Altamimi stated that IGN ITRF2008 is characterized by a combination of 4 techniques; concerning the EOP the techniques contribute differently: IVS 1980–2009, full EOP set; IGS 1997–2009.5, PM, PM rate, LOD; ILRS 1984–2009, PM, LOD; IDS 1993–2009, PM, LOD. There are new ties, including new data from Russia, for a total of 600 sites and 800 stations.

Preliminary analysis of ITRF2008P yielded the following: there is a negligible origin shift and drift of SLR/ILRS wrt ITRF2005; there is no drift in scale. ILRS has included range biases, differences in VLBI–SLR scale drift is 0.04ppb. The offset between VLBI–SLR scale is 1 ppb. The agreement for the frame is 0.5 ppb. The combined adjustment of coordinates, velocities (600 – 800) and EOP requires ~40000 unknowns (5 days computing time). Inconsistencies in the EOPs affect the solution of the frame. There is an unexplained drift in the VLBI/IVS Y component of PM.

The schedule is the following: The final IGN solution needs fine tuning for another 2 weeks, DGFI needs one month, then both solutions are ready for evaluation. Only one solution will be presented but with information on agreement in velocities, differences in application of local ties, agreement in positions, and understanding of how EOPs affect the frame.

P. Sarti submitted a written report for the IERS WG on Site Survey and Co-location [see the web pages of the WG].

Working Group on Combination at the Observation Level

R. Biancale reported about the IERS Working Group on Combination at the Observation Level (COL). During the kick-off meeting, 25 participants reviewed the state of the art of combination. There are four institutions with different software packages for combination: GEODYN, DOGS-CS, GINS, BERNESE, EPOS (GFZ). Observatoire de Paris (OP) will set up a forum to activate the discussion between the four groups. DGFI and OP agreed to compare solutions on the basis of SINEX files. The test period benchmark is: 3 weeks around the CONT08 campaign. The standards and models to be used are open. Laurent Soudarin prepared a form to give more details about the software used. Forum participants have to register. Combined SINEX files have to be submitted by Feb. 2010 for comparison. Before the EGU meeting decisions will be made to focus work.

Report on GGOS and GEO

M. Rothacher gave a report on GGOS activities since IERS DB meeting No. 48 including the new components in GGOS, the GGOS documents (especially the GGOS2020 book), meetings and workshops (past and planned), and the next major steps. A GGOS retreat will take place in Miami in the first week of February.

The 2nd IERS / GGOS Unified Analysis Workshop will be held in San Francisco on December 11–12, 2009 (see below).

IERS relationship to GGOS/GGOS products

To find the right points for the planned GGOS retreat there was a general discussion on the IERS relationship to GGOS and GGOS products. M. Rothacher as chair of GGOS stated that GGOS is not a service. GGOS as an umbrella will not produce products. Products of the IAG Services are GGOS products and the benefit for the services is greater international visibility.

Z. Altamimi discussed the structure of GGOS and that there should be a better interaction with the IAG Services. He proposes a change of the structure with a board of directors to give a better visibility to the Services. Services are supported by agencies, depending on the funds of the agencies.

D. Gambis pointed out that GGOS is relying on the IAG Services, so the services should be more involved in GGOS with a stronger relationship between GGOS and the services. M. Rothacher noted that the services should support GGOS.

C. Ma remarked that GGOS does not create the services, which have higher level sponsors.

Z. Altamimi demanded that if GGOS likes a push then the structure has to be improved, diminishing the influence of other players in the SC, e.g. IAG Commissions.

C. Ma draw attention to the fact that IERS is different from the Technique Services. GGOS can be seen as the unified voice of geodesy. GGOS is the corresponding Observing System (OS)

to other OS. Z. Altamimi GGOS should be an advocate for the infrastructure that supports the services.

B. Richter reported about the planned initiative to create an Intergovernmental Committee for GGOS. The tasks of such an intergovernmental body will be

- Advocate and secure resources for the GGOS infrastructure.
- Coordination among the involved agencies.
- Promote and represent GGOS where necessary.
- Find an organizational umbrella to establish an intergovernmental arrangement.

Priorities will be developed in cooperation with GGOS. A first meeting of corresponding agencies, the IAG President, the GGOS Chair, and representations from the IAG Services will be held in Frankfurt am Main on Nov. 1–2, 2009.

New Action Item:

49.09 B. Richter should report from the Frankfurt meeting to the DB.

ICRS/ICRF

C. Ma presented a report of the IERS/IVS Working Group on the Second Realization of the ICRF. Compared to the original ICRF the new ICRF is characterized by the following qualities:

- 14 years additional observations
- Utilizes numerous advances in observing, analysis and modeling
- 5 times as many sources (3414)
- Noise floor 5–6 times lower (40 micro arc sec)
- Axis stability 2 times better (10 micro arc sec)

ICRF2 work was done by the IERS/IVS Working Group on the Second Realization of the ICRF, endorsed by the IERS DB and the IVS DB, proposed by IAU Division I Working Group on the Second Realization of the ICRF, supported by IAU Division I and accepted by IAU in resolution B3. Details can be read in IERS Technical Note No. 35.

A. Brzezinski summarized the IAU XXVII General Assembly (GA) held in Rio de Janeiro, Aug. 3–14, 2009. Sessions of interest were: business meeting of Division I, business meetings of Commissions of Division I, e.g., IAU Commission 19, Joint Discussion 6 “Time and Astronomy”. Two IAU resolutions were supported by Division I: resolution B2 on IAU 2009 astronomical constants, B3 on the second realization of the ICRF. New officers were elected for Comm. 19 for the period 2009–2012: President Harald Schuh, Vice President Chengli Huang, members at large: Christian Bizouard, Ben Chao, Richard Gross, Wieslaw Kosek, David Salstein, representative for the IERS Bernd Richter. The

new officers for Division I for the period 2009–2012 are: President Dennis McCarthy, Vice-president Sergei Klioner. A. Brzezinski went through the new ToR and gave an outlook to possible activities for the next term. Presentations from the IAU GA were posted on the Commission 19 webpage <<http://iau-comm19.cbk.waw.pl/>>.

New Action Item:

#49.10 The Central Bureau should send an official letter to IAU that B. Richter represents the IERS.

Renewal of the Analysis Coordinator

The proposal and election of an Analysis Coordinator is still pending. Background: the term of M. Rothacher ended in 2008. He is willing to continue until a solution is found. Several potential candidates were asked but none agreed to serve as IERS Analysis Coordinator. During the discussion on how to proceed, Z. Altamimi proposed a group formed from the Services, preferably the TC Analysis Coordinators. The tasks of the analysis coordinator should be redefined. An alternative could be to collect new names from the DB or to prepare a call.

Proposals to continue:

- ask the DB to suggest names,
- alternatively to prepare a call,
- to establish a group of TC AC to work together, to improve the consistency of products (mainly EOP, ITRF).

New Action Item:

#49.11 The Central Bureau should collect comments from the DB on the two proposals.

Reports on ICSU activities

B. Richter presented the ICSU World Data System (WDS) as a new body combining the old World Data Centres and the Federation of Astronomical and Geophysical Data Analysis Services (FAGS). After a first call IERS asked to become a member. Ruth Neilan is a member of WDS steering committee.

The ICSU Strategic Coordination Committee on Information and Data (SCCID) will establish and assert a visible and effective strategic leadership role, on behalf of the global scientific community, in relation to the policies, management and stewardship of scientific data and information. Furthermore it will provide strategic advice, where appropriate, to guide the implementation of the new ICSU WDS structure and the continued development of CODATA. B. Richter is a member of the SCCID.

Next IERS Directing Board meeting / workshops

M. Rothacher elucidated the planes for the GGOS Unified Analysis Workshop 2009:

Date and Location:

3.1 Directing Board

- Dates: December 10–11, 2009
- Location: Grand Hyatt, San Francisco

Participants:

- GGOS, IERS, IGS, IVS, ILRS, IDS, IGFS experts
- By invitation only
- Each service selects / nominates ~5 participants / experts

Sessions:

- Preparation by a team of chairs / co-chairs composed of one member of each Service
- Position papers

Topics:

- Topic 1: Details of Product Generation and Future (including portal and meta data)
- Topic 2: Technique-specific biases and co-location
- Topic 3: Modelling aspects, modelling based on external data (atmosphere, ocean, ...)
- Topic 4: Combination, common parameters, and combined products
- Topic 5: Network simulations and analyses

Next Steps:

- Send UAW 2009 session proposal to IAG Services for comments and modification
- Ask IAG Services to select / nominate the participants
- Start preparations of sessions and position papers
- Setup web pages (Bernd Richter)

The next IERS DB meeting was proposed to be held before the EGU in Vienna (1 day) on May 2 (Sunday). [Due to an overlap with the IAG EC meeting it was later shifted to May 1, 2010.]

The second 2010 meeting of the IERS DB could be held in the USA or in Europe, e.g. in conjunction with the GRACE science meeting in Portugal, the Journées at the beginning of September in Paris, or the IAG Commission 1 meeting in October in Paris. A proposal was made that the Paris meetings should follow each other.

New Action Items:

#49.12 The CB should ask Harald Schuh for a meeting room.

#49.13 Feedback is asked from Z. Altamimi if the fall DB meeting can be held in conjunction with the Paris meetings.

Bernd Richter, Wolfgang R. Dick