IAU XXV, Joint Discussion 16: The International Celestial Reference System, Maintenance and Future Realizations
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eds. Gaume, McCarthy, Souchay

Discussion at the IAU JD16

P. Kenneth Seidelmann

University of Virginia, Department of Astronomy, Box 3818, Univ. Station, Charlotteville, VA 22903

Norbert Zacharias

U.S. Naval Observatory, 3450 Massachusetts Ave. NW, Washington DC, 20392-5420

Abstract. The last session of the JD16 meeting was devoted to a general discussion. A list of discussion items was presented. Discussions of the implementation and IAU organization responsibilities for reference systems resulted. The current organization of the IAU WG ICRS was extended for 6 months.

1. Introduction

Following the scheduled presentations for Joint Discussion 16, there was a discussion of open items. This was prepared and led by Ken Seidelmann. To initiate the discussion, a list of items was presented for consideration. They appear as number items in outline form. The discussion appears as paragraphs with the speakers identified, where possible.

2. Items for Discussion

1. Precession-nutation Model
   - New precession Theory?
   - What angles- Newcomb or Williams?
   - What nutation model?
   - An abbreviated nutation theory with less accuracy?
   - Include geodesic precession & nutation?
   - Is it a BCRS or GCRS model?
2. Future of Equinox
   - Introduce Earth Rotation Angle?
   - Revise definition of ERA?
   - Dual system by IERS?
   - Dual system in almanacs?

- Transition period specified?
- For how long? 2004? Indefinitely?

3. Definition of equinox
   - inertial or rotating
4. Introduce Conventional ecliptic
   - How defined, through x axis of ICRF?
   - by node angle and obliquity?
   - For what purpose?
   - With what accuracy?

   Fr.Mignard said that the ecliptic is moving and will change with time. **D.McCarthy** said this is a subject for the WG on precession. The ecliptic is needed for planetary precession.

5. Terminology issues
   - CIO and TIO or CEO and TEO?
   - Stellar angle or Earth Rotation Angle?
   - right ascensions from equinox only?
   - right ascensions from CIO?
   - other terms?

   C.Hohenkerk said some concepts seem odd, the user is not concerned "which" RA,Dec is used, as long as there is some RA,Dec.

   After consideration of the old meaning of CIO, it was generally felt that the new use of CIO would not cause confusion. For consistency, the use of "intermediate" in CIP, CIO, and TIO was desirable.

6. Unification of Lists of Constants
   - IAU Best Estimates
   - IAU 1976 Astronomical Constants
   - IERS Best Estimates
   - IUGG List of Constants
   - JPL DE 405 Constants
   - Astronomical Almanac Constants Used
   - Are all these necessary?
   - A joint IAU/IUGG committee?
7. Redefinition of UTC

- UTC tied to UT1?
- Use of "mean solar time"?
- Leap seconds or not?

8. Implementation Issues
    - Who are the users?
    - What do users need?
    - What is really used by the IERS?
    - What is necessary for almanacs offices?
    - Standardized software?
    - Documentation required?
    - Dual availability for how long?
    - What to do now?

9. Roles of Organizations
    - WG on Reference systems of IAU Div I
    - IERS
    - IUGG
    - IAU Comm 5
    - Others involved?

10. Possible Procedure
    - IAU /IUGG? WG on Reference Systems with subgroups established now
    - Dec 2004 WG proposals circulated
    - Mid 2005 Colloquium for discussion of proposals and draft resolutions
    - IAU 2006 Clarifying resolutions
    - Note: Almanac offices have a March 2004 decision deadline

11. Education Plan
    - Clear and convincing presentation of reference systems and justifications
    - Dissemination of information with proposals in Dec 2004
    - Distribution of 2005 Colloquium Proceedings
    - Wide distribution of any proposed resolutions well before IAU GA in 2006

3. Discussion

3.1. General Discussion

K.Johnston said some issues might not be solved earlier than 2006.

K.Seidelmann asked do you want to introduce the new system or not? If so why wait another 3 years?

P.Wallace said that we need to get away from the "one or the other" concept; I can't imagine not to publish sidereal time in an Almanac. Algorithms are now available for both paradigms, the user can choose.

K.Johnston asked "What does the average user need?"

Chr.Jacobs said they need more education, let people know how complex they need to go for a given goal in accuracy.

K.Johnston said please do this for us, the user does not want to be involved.

P.Wallace replied there is a mis-conception that the "new paradigm = more complex". This is not true. The non-rotating origin procedure is simpler in concept; like spherical trigonometry and vectors, they are both there to choose.

Someone said that this is difficult at the moment, there is a need for education, currently we don't even know what to call things.

K.Johnston suggested that there is no need for the general astronomers to make any change, since at the accuracy they need it doesn't matter. It is only the IERS and space astrometry applications that are concerned about sub-milliarcsecond accuracies and need to use the new more accurate system.

It was pointed out that this was true, but people needed to realize that the basic values were coming from new definitions and methods.

3.2. Division I Organization

At this point there was a break in the discussion and T.Fukushima, President of Division I, presented some details regarding the future structure of Division I in the context of this discussion:

- The ICRS WG has been dissolved (it was too large, with too many sub-tasks). As a follow-up for two of the sub-tasks, two new WGs have been established:

  1. precession, chair is J.Hilton
  2. nomenclature in fundamental astronomy, chair is N.Capitaine

- The new IAU structure puts more emphasis on the Divisions. Commissions are now dynamic, with a finite life time. It is possible to terminate commissions and to create new commissions upon request by the Division and approval by the EC. Working groups can be established by approval of the Division, without EC contact. The approval process is fast, and can be done by e-mail, with no need to wait for a GA.
- T.Fukushima initiated a "special committee" for the re-organization of Division I. Members are T.Fukushima (chair), Fr.Mignard, I. Platais, G. Pettit, and K. Seidelmann.
- For the 2003-2006 period (i.e. before the special committee issues their recommendations), the proposal for ICRS related issues is:
  - Celestial Reference Frame related issues → direct to Commission 8
  - Earth Rotation related issues → direct to Commission 19
  - 2 new working groups (see above)

3.3. Commissions 8 and 19

C.Ma asked what is meant by "directed to" Comm. 8 or 19 ?

D.McCarthy replied that the commissions take over the organizing role, not the former ICRS WG.

T.Fukushima said that the ICRS WG activities are more permanent, as an intermediate step Comm. 8 and 19 take over, later the special committee will suggest a future organization.

Someone asked what exactly is for Comm.8, and what is for Comm. 19?

K.Johnston replied that most of it goes into Comm. 19.

Chr.Jacobs said that I have some ICRF issues, to whom shall I send e-mail now?

T.Fukushima replied Comm. 8 and 19 presidents take over for now.

B.van Altena stated I am not directly involved in the ICRS matters, but I would like to give some comments here as an "outsider". Everybody needs to step back and re-think matters; what's happening is not right for Comm. 8 and 19.

I.Platais said we need to make issues public and transparent for all members of the commissions involved.

K.Johnston said we have an evolution here, we need to look at new fields and assign new commissions, this will evolve and change. There could be a new commission about "space astrometry".

B.van Altena said this discussion "is driven" too much, the users are not happy.

K.Seidelmann said things will be clarified after the process of assigning terms of reference and revising the organization.

V.Dehant asked if I have an education items, where to address it?

Fr.Mignard answered the WG of nomenclature.

D.McCarthy added plus the special committee.

3.4. ICRS WG

A.Fey asked about the current members of ICRS WG; is their expertise lost until a re-organization ?

F.Mignard replied that it is not decided yet, some will be members in both new WGs.

K.Johnston said part of the confusion in the reference frames WG is that now people don't know where they fit in, people have to be put somewhere. One suggestion would be a 6 months "grace period" for the current structure to continue. This is only a transition problem.

N.Capitaine said changes like the definition of a WG are now possible at any time by the Division president.

T.Fukushima responded that the "WG ICRS" shall continue to exist for the next 6 months. During that time a re-arrangement can be organized by e-mail.

F.Mignard said the ICRS WG was not like a WG, rather like a commission.

T.Fukushima said the creation of a commission is more formal.

I.Kumkova said from the 7 sub-tasks of the ICRS WG, 4 tasks are directly related to Comm. 8, the 6 months transition period is a good idea.

D.McCarthy said the job of the special committee is important, it needs to cover all topics.