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Mark Storz noted a list of various alternative options for redefining UTC, ranging from maintaining the *status quo* to discontinuing leap seconds. One of the proposed options mentioned "periodic adjustments of leap seconds." Storz asked how that option differed from the *status quo*. Dennis McCarthy replied that this describes a situation where an indeterminate time interval would be periodically inserted into the calendar, say every four years. Storz noted that this situation is therefore different from the *status quo* in that the insertion point is regular but the amount of time inserted is variable. McCarthy said that some people like that idea because then they know when there will be leap seconds, but David Simpson said that they will not necessarily know how many. McCarthy agreed, but said that they can plan for inserting leap seconds, say, every fourth year or so. Seidelmann also said that there would be no bound on |UT1-UTC| in that situation. Storz said that perhaps the description of this option should be changed, because the current description reads much like the *status quo*. Seaman said that the option and its phrasing originated from a paper of McCarthy's.[1] McCarthy said that some software people especially like the idea. John Seago commented that this option is really not different than the *status quo* because the insertion points of leap seconds already occur at a known, predictable epoch: the end of each month. Under the present system, the value of the leap second is constrained to -1, 0, or +1, whereas under the alternative the exact value would not be constrained. Daniel Gambis noted that inserted values would be predicted in advance.

With regard to the IAU and American Astronomical Society (AAS) not having taken a position on this issue, Steve Malys asked if there would be any discussion regarding which organizations have taken a position. Malys believed that governmental entities would be involved in making the decision, and that most of the colloquium attendees do not represent governmental entities. McCarthy replied that the USA formulated a position in response to an ITU-R questionnaire. The response was handled by the US State Department because the ITU is an international treaty organization and therefore the actions of the ITU-R Radiocommuncation Assembly take on the status and force of an international treaty agreement. McCarthy described the ITU-R questionnaire as being rather simple minded.[2, 3]

Regarding the AAS and the IAU, McCarthy was chairman of the IAU working group and participated in the AAS working group on leap seconds. Both of those organizations did not "forcefully come out and say 'Yes we need to get rid of leap seconds' or 'Yes we want to keep leap seconds.' The problem was that there was a big yawn on the part of both the IAU and the AAS on this." McCarthy said that he experienced difficulty getting interest within these organizations. The AAS working group sent letters to every conceivable astronomical institution and received limited feedback, such that "there was no consensus that anybody cared." Thus within the AAS it was felt that the astronomical community could live with whatever the ITU-R decided. Seaman commented that "*absence of evidence* is not *evidence of absence*." McCarthy continued that the IAU essentially had the same sort of response as the AAS, except that within the IAU working group there were perhaps more people favoring the abolition of leap seconds.

Malys said it seemed that only two of the five notional solutions are being considered by the ITU-R: "*status quo*" and "discontinue leap seconds." McCarthy said this situation exists "because of the way the question is phrased within the ITU." The proposal forwarded to the Radiocommunication Assembly by Study Group 7 seeks to amend Recommendation TF.460-6 to define Coordinated Universal Time so that it no longer has leap seconds. George Kaplan noted that framing the discussion as one related to the elimination of leap seconds limits participation only to those stakeholders who know about leap seconds, understand the difference between UT1 and UTC, and appreciate the implications of that relationship. Kaplan guessed that the vast majority of astronomers in particular would not understand the difference between UT1 and UTC.

REFERENCES

[1] McCarthy, D.D., W.J. Klepczynski (1999), "GPS and Leap Seconds—Time to Change?" *GPS World*, November, pp. 50–57.

[2] Timofeev, V. (2010), "Questionnaire on a draft revision of Recommendation ITU-R TF.460-6, Standard-frequency and time-signal emissions." ITU-R Administrative Circular CACE/516, July 28, 2010.

[3] Racey, F. (2011), "Questionnaire on a draft revision of Recommendation ITU-R TF.460-6, Standard-frequency and time-signal emissions." ITU-R Administrative Circular CACE/539, May 27, 2011.