Erratum: On the implications of the Galactic aberration in proper motions for celestial reference frame

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This is an erratum to the paper ‘On the implications of the Galactic aberration in proper motions for celestial reference frame’ published in MNRAS 445, 845 (2014). As was pointed out by Wallace (private communication), the text related to matrix (5) is, strictly speaking, not fully accurate and needs clarification.

It was stated in the original paper that the matrix (5) is taken from Perryman & ESA (1997). In fact, Perryman & ESA (1997), equations (1.5.9) and (1.5.10), defined as the primary quantities three orientation angles:
right ascension of the North Galactic Pole in International Celestial Reference System (ICRS):
\[ \alpha_G = 192.85948, \]
declination of the North Galactic Pole in ICRS:
\[ \delta_G = 27.12825, \]
Galactic longitude of the ascending node of the Galactic plane on the equator of ICRS:
\[ l_G = 32.93192. \]

Perryman & ESA (1997) wrote: ‘The angles \( \alpha_G, \delta_G \) and \( l_G \) are to be regarded as exact quantities. From them, the transformation matrix may be computed to any desired accuracy’. They provided a transformation matrix computed with the above angles to 10 decimal places (transposed for compatibility with our paper):
\[
\begin{bmatrix}
-0.0548755604 & -0.8734370902 & -0.4838350155 \\
+0.4941094279 & -0.4448296300 & +0.7469822445 \\
-0.8676661490 & -0.1980763734 & +0.4559837762
\end{bmatrix}
\]  
\hspace{1cm} (1)

Matrix (5) in our original paper:
\[
\begin{bmatrix}
-0.054875560416 & -0.873437090235 & -0.483835015549 \\
+0.494109427876 & -0.444829629960 & +0.746982244497 \\
-0.867666149019 & -0.198076373431 & +0.455983776175
\end{bmatrix}
\]  
\hspace{1cm} (2)

was computed using the same orientation angles with higher precision to provide microarcsecond levels of accuracy for coordinate transformation. So, not this matrix itself, but the orientation angles between the Galactic coordinate system and ICRS used for the matrix computation were taken from Perryman & ESA (1997).

A separate question is whether the orientation angles can be taken as constants independent of the epoch. That is true in the case of Galactic rotation without precession, which, evidently, cannot currently be verified.

The results and conclusions of the original paper are not affected by this discussion.

REFERENCE

Perryman M. A. C., ESA, eds, 1997, ESA SP-1200: The HIPPARCOS and TYCHO Catalogues. Astrometric and Photometric Star Catalogues Derived from the ESA HIPPARCOS Space Astrometry Mission. ESA, Noordwijk

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