

Revisiting TW Hydrae association in light of Gaia-DR1

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Abstract. TW Hydrae is a very young and nearby association with about 30 known members which is an excellent target for studies on stellar evolution since several of its members present a particular interest (planetary system, brown dwarfs, etc.). With the new data from TGAS and the Gaia DR1 eventually combined with others astrometric data we intend to improve our kinematic knowledge of this association.

Keywords. stellar association, TW Hydrae, proper motion, Gaia, TGAS

We started to investigate the impact of the new astrometric data reality as consequence of the first Gaia data release (Gaia Collaboration 2016) on the kinematics of the TW Hydrae association. Indeed until now, only dedicated small field astrometric data were available leading to imprecise kinematic membership determination. Recent papers (Weinberg *et al.* 2013, Ducourant *et al.* 2014) argued about the utilization of the trace back strategy to determine the age of stars belonging to TWA. This is a relevant point since the age so obtained is model independent but assumes all stars of the association were formed at the same time in the place.

Although proper motions from several astrometric catalog as PPMXL (Roser *et al.* 2010), SPM4 (Girard *et al.* 2011), UCAC4 (Zacharias *et al.* 2013) and more recently HSOY (Altmann *et al.* 2017) and UCAC5 (Zacharias *et al.* 2017) can be considered globally reliable, they can locally present some inconsistencies (Teixeira *et al.* 2014) that can perturb the membership determination or the trace back results. In Figure 1 we present the various published proper motions of the "well-behaved" star TWA07 from TW Hydrae. We notice huge discrepancies between the values that cannot be explained by the fact that UCAC5 and HSOY are not in the same reference system than the others.

This example is illustrative of what can be frequently be found when one gets interested in specific objects and it becomes evident that dedicated studies of individual targets (i.e., stars) are needed in punctual works. In view of this scenario, we have been determining new TWA proper motions using the various positions found in the literature, including Gaia-DR1. Figure 2 confirms the existence of large discrepancies that could, for example, change the membership status or the convergence in the trace back analysis.

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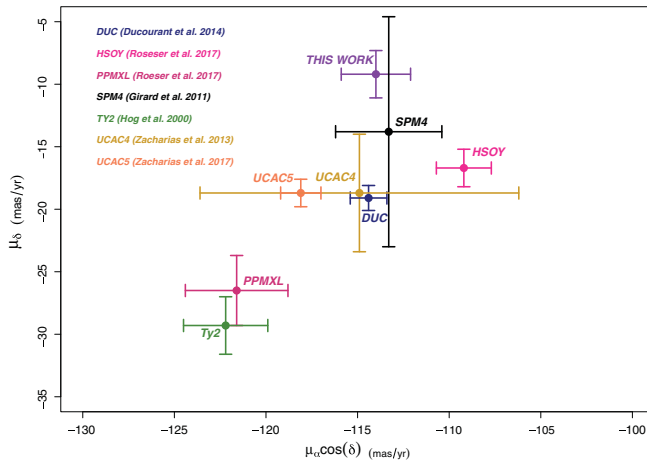


Figure 1. Comparison of the proper motions from several sources.

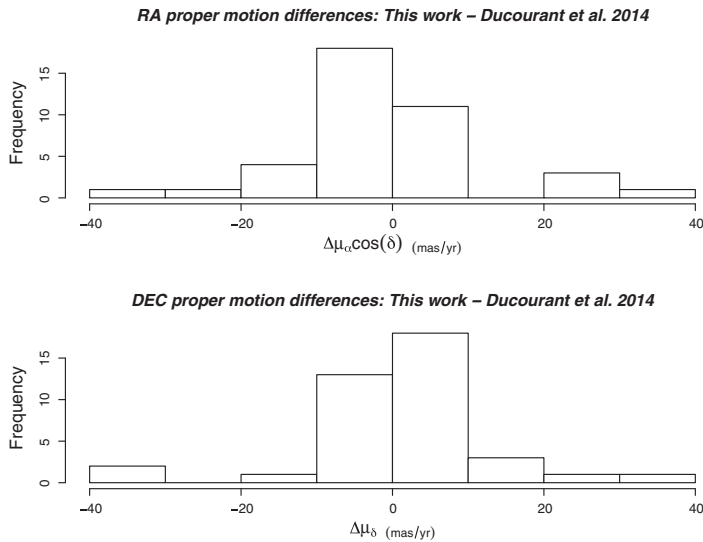


Figure 2. Differences between our proper motions and those from Ducourant *et al.* 2014.

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