# Gould Belt Origin

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Introduction

Several star formation regionS within 0.5 kpc, form part of the Gould Beld, this is a sky ring tilt around 20 degrees of the Galactic Plane, it is centered in a point 200 pc from the Sun, and it contains some molecular clouds with star formation. Among these clouds, the Belt contains very well known ones like: Orion, Taurus, Perseus and Ophiucus. Studying these regions give us valuable star formation information in general.
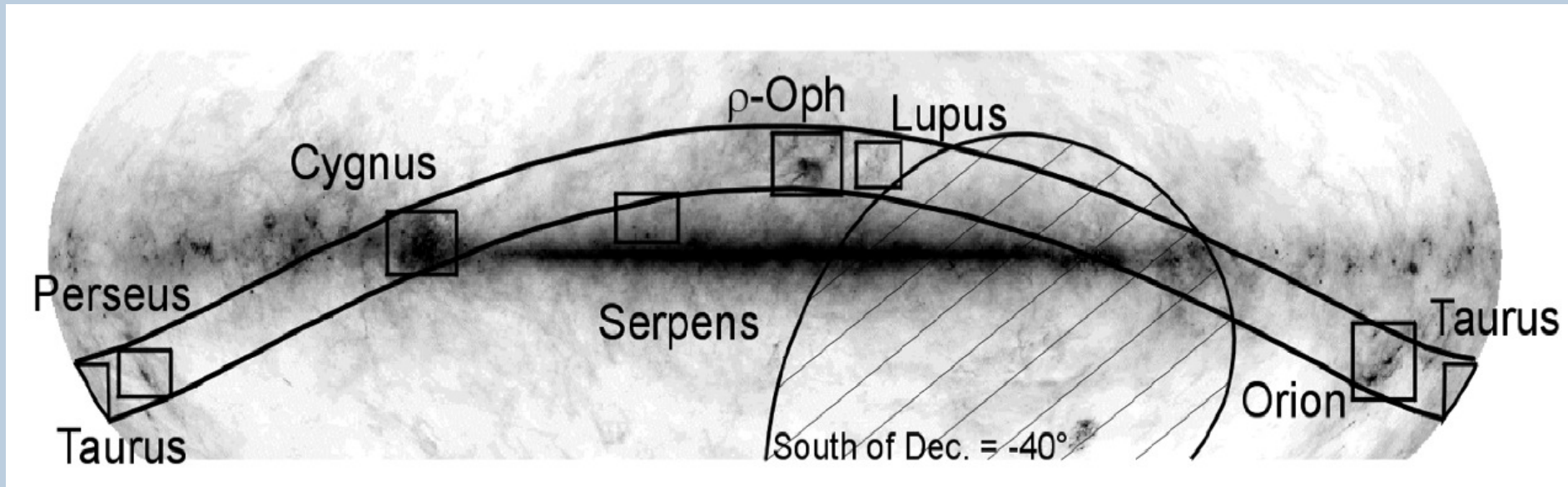
Origin

We think this ring like galactic feature had a comon origin because its regions present simetry. If this is correct, all regions on GB should go apart of the structure center. To examine this posibility, it is necessary determine the vector velocity for each of the GB regions.
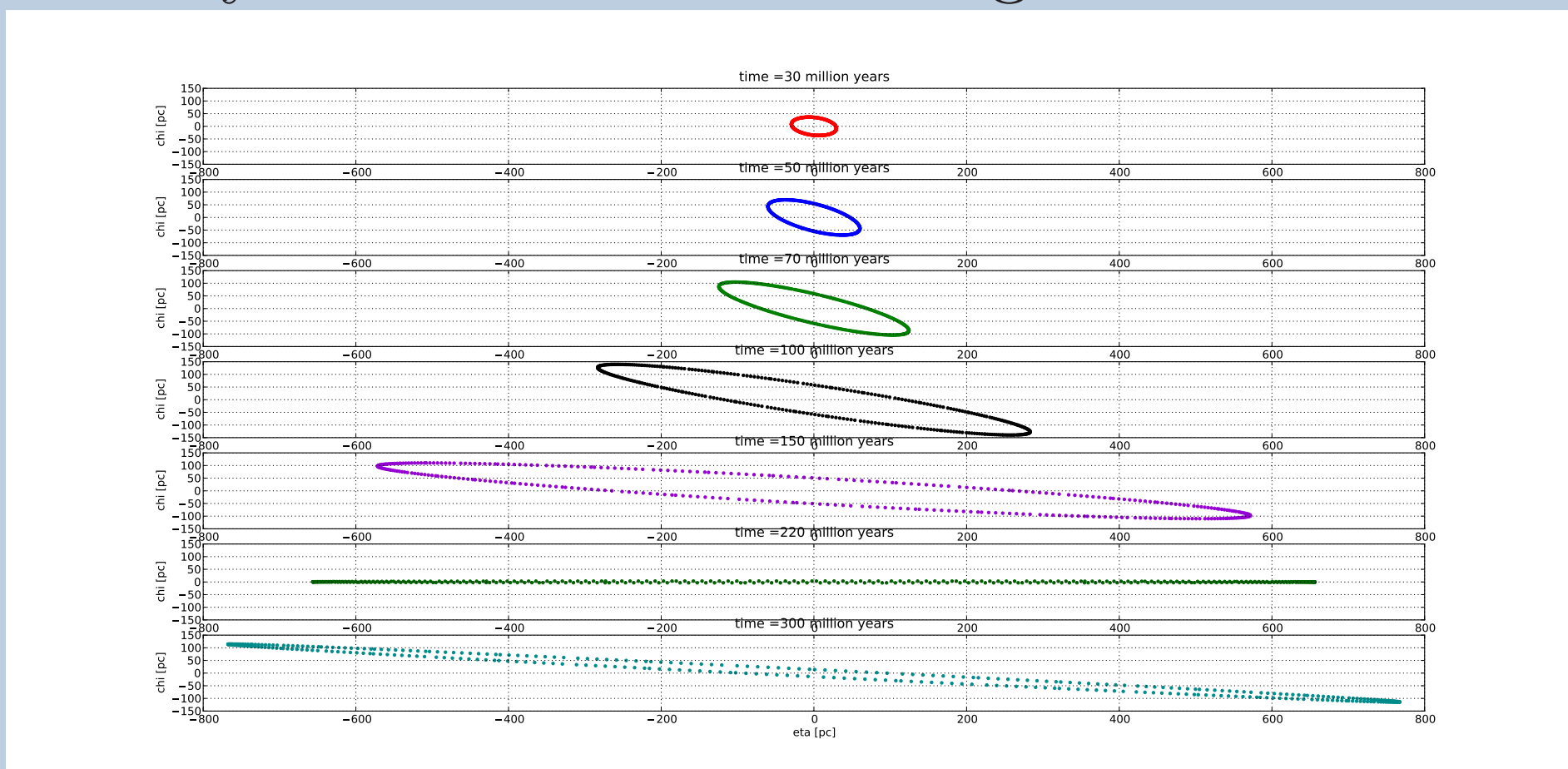
In my work I'm focused in two main clouds: Taurus and Ophiucus, these regions are very much alike each other with a central core and filaments that give the impresion of been the reflexion one of the other, but Ophiucus is located in direction of the Galactic Center and Taurus to the anticenter.

Basics

As the very begining I wrote a python code to select in the VLA archive scans the projects made on Taurus and Ophiucus, on bands C and X, and extended configurations. After downloaded the selected projects, and taking in count the huge amount of information to be processed, I wrote another CASA (based on python) code for a semi-automatic data reduction from importing the xp files to clean the specific target, most of the work is done automatically, just in some punctual cases stops to ask some data like reference antenna, name of the target, etc.

Proper Motions

As we know the motion of a celestial body outside the Solar System is the combination of two effects: the motion between our Sun and this body, and the apparent motion of the body due the rotation and traslation of the Earth around the Sun, respectively proper motion and trigonometric paralax.
Both effects shall be taking in count for accurate determination of velocities.

Data Analysis

After having several different projects and targets downloaded and reduced, we should determine the proper motion of our selected target, as the proff of accuracy of the metode, I began with stars whose proper motion is well known, in the Ophiucus region: S1, VLA1623 and DOAR21.
This analysis consist in three basic steps, all of them contained in a single code. As is run the first code select all the images of the different projects already reduced of a given star, using the comand imfit of CASA, the position is mesured and recorded for both fase calibrator and source. On the second step its run and does the following: read the data and position of all times fase calibrator, makes the first correction taking in count the last position of the same fase calibrator, makes a second correction using the NRAO position data for known calibrators, the code automatically selects among its list the one needed for our correction.
In the same code but refering to our star target, the little offsets needed previously for the calibrators are added to the initial target position in order of correct its position, at last done only for out target it is calculated and add the paralax correction.

Graphics Gain Calibrator
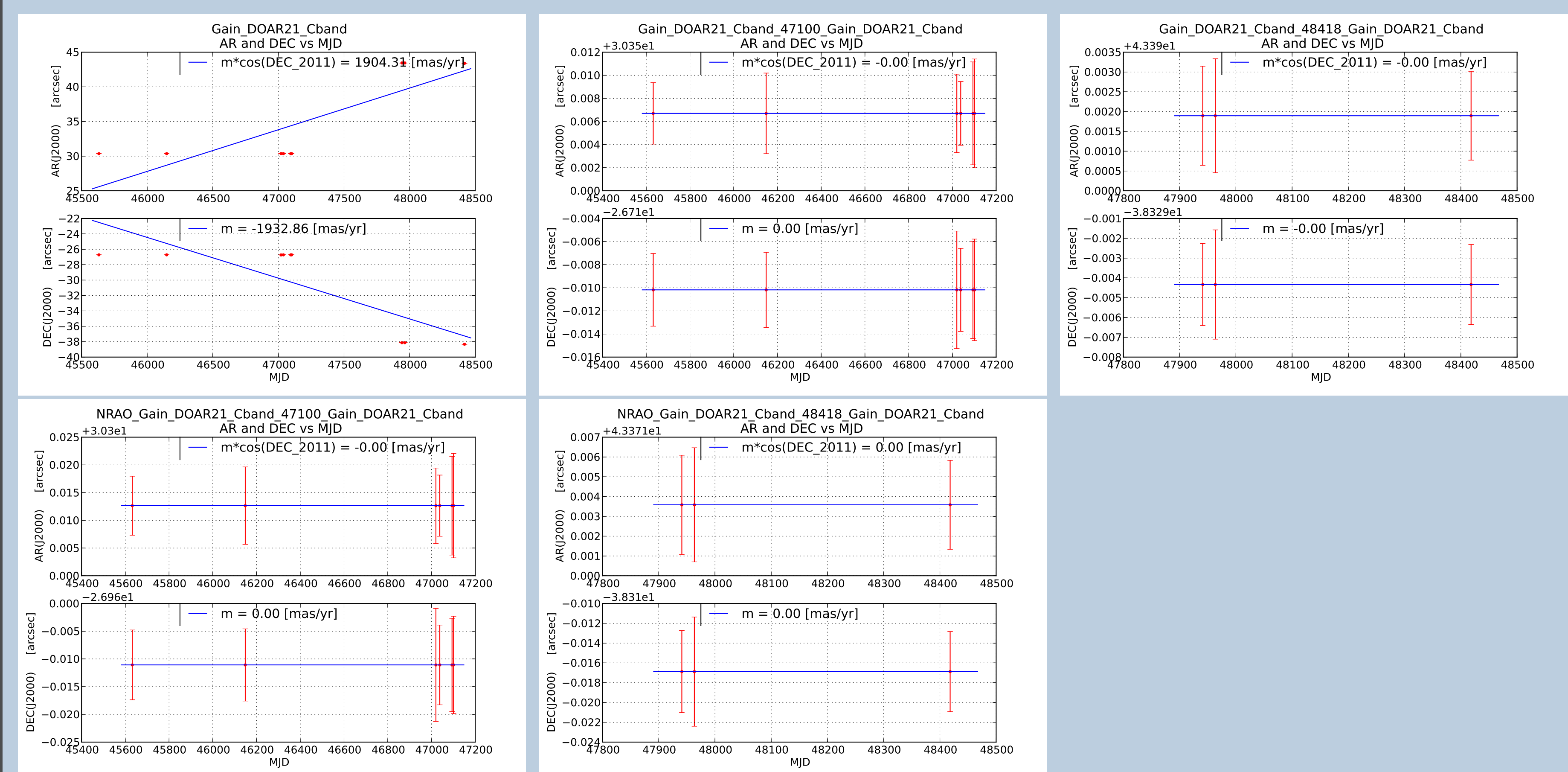
Graphics Target Sample DOAR21
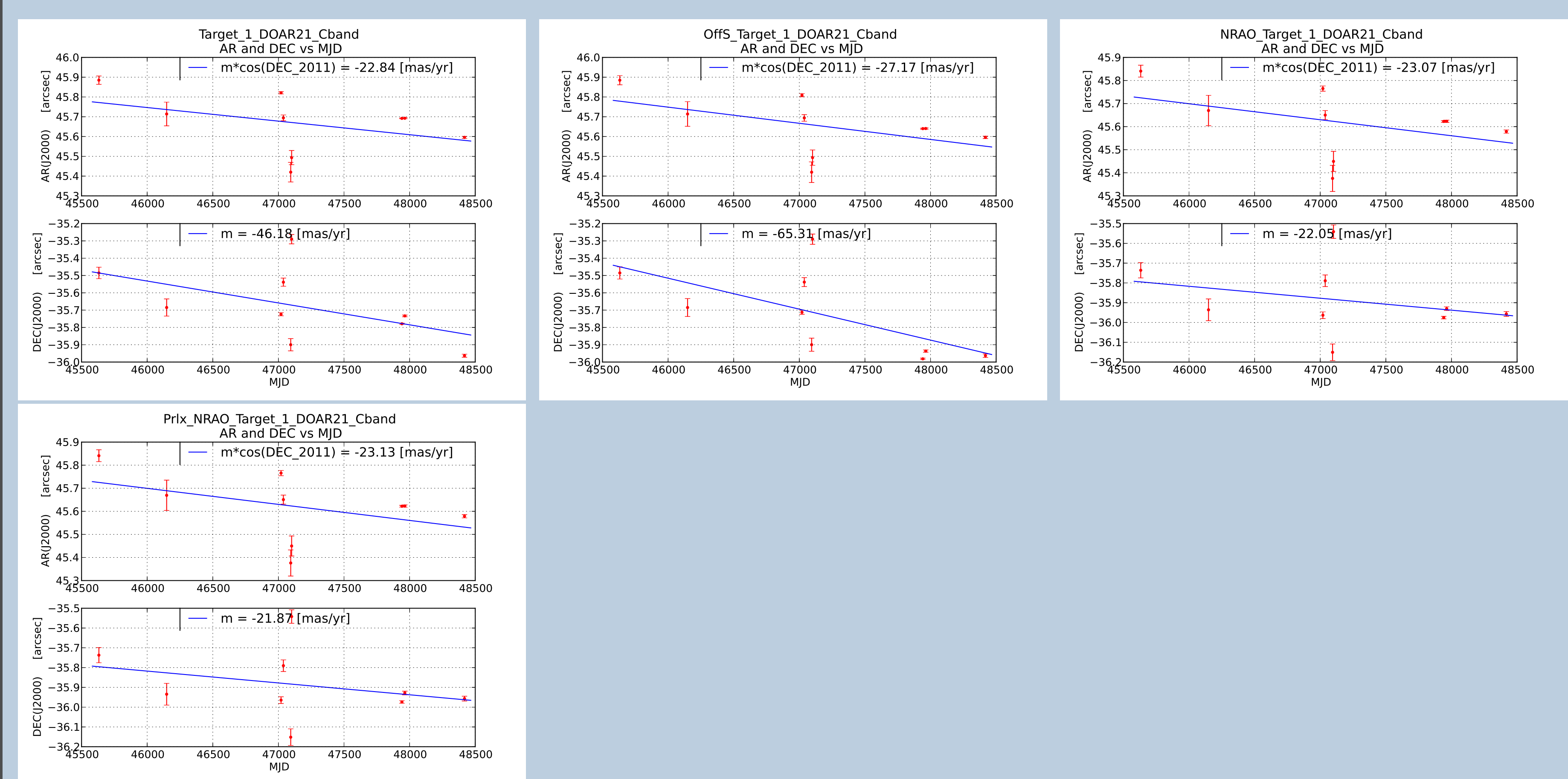
Preliminar Results

As we could see from the last graph the proper motions got with this metode are alike the ones determined by this is the validity test of our metode.
As part of the project: *Gould's Belt Distances Survey* we already have positions of a few docens young stars on the regions of Taurus and Ophiucus did using the *Expanded Very Large Array*, these stars are being used to compare the recent position with the position of the same star a few years back took for the *Very Large Array*.

References

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[3] Torres, Rosa M. *Midiendo Regiones de Formación Estelar Cercanas con el VLBA: de la Distancia a la Dinámica.PhD Thesis, Centro de Radioastronomía y Astrofísica, UNAM* (2009)

[4] Loinard, L.,Torres, R. M., Mioduszewski, A., Rodríguez, L. F. *A Preliminary VLBA Distance to the core of Ophiuchus, with an accuracy of 4%. The Astrophysical Journal* (2008)