RevMexAA (Serie de Conferencias), **49**, 76–76 (2017)

XV Latin American Regional IAU Meeting (Cartagena de Indias, Colombia, 3-7 October 2016)
Editors: Mario Armando Higuera Garzón & Santiago Vargas Domínguez

POPULATION SYNTHESIS ANALYSIS: DETERMINING PARAMETERS AND FAVORABLE SCENARIOS FOR THE FORMATION OF SOLAR SYSTEM ANALOGS

M. P. Ronco[1], O. M. Guilera[1], and G. C. de Elía[1]

The primordial scenario and the initial conditions that gave rise to the Solar System are still under debate. A population synthesis analysis of the formation and evolution of Solar System Analogs (SSA) is a possible mechanism to understand our own Solar System. From a new numerical code called PLANETALP, which is able to build a diversity of planetary systems describing the evolution of embryos and planetesimals during the gaseous phase, we determine which are the parameters of the disk and the most favorable scenarios that provide planetary systems like our own.

PLANETALP is a code based in previous works (Guilera et al. 2010, 2014) which incorporates important physical phenomena of planetary formation like photoevaporation of the disk, type I and type II migration, gas accretion, water delivery in embryos and planetesimals, planetesimal ejection and the fusion between embryos considering their atmospheres.

Since the original size of planetesimals is still uncertain, we consider different sizes: 100m, 1km, 10km and 100km, and, like other authors, we considere different reduction factors for type I migration: $f_{migI} = 0, 0.01, 0.1$ and without reduction. We perform 1000 simulations for each block of planetesimal size and f_{migI}, randomly changing the disk parameters: mass M_d and characteristic radius of the disk R_c, the surface density gradient γ, viscosity of the disk, etc (see Fig1).

We find that the scenarios that favor the formation of SSA (planetary systems with only rocky planets in the inner zone of the disk and at least one giant planet beyond 1.5 au) are those with low rates of type I migration, formed with small planetesimals and with disk masses greater than $0.05 M_\odot$. These results will serve as initial conditions to analize the post-gas evolution of SSA with N-body simulations.

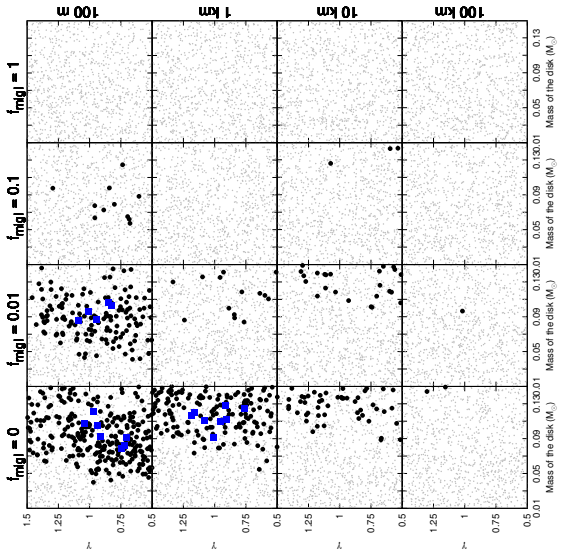

Fig. 1. Distribution of the planetary systems produced by PLANETALP in a plane M_d - γ. SSA are represented with black points. Blue squares are SSA with all their disk parameters between $\pm\sigma$. Small grey dots represent planetary systems that are not SSA. Each row and column shows the results for different planetesimal sizes and different f_{migI}.

REFERENCES

Guilera, O. M., Brunini, A., & Benvenuto, O. G. 2010, A&A, 521, A50

Guilera, O. M., de Elía, G. C., Brunini, A., & Santamaría, P. J. 2014, A&A, 565, A96

[1]Grupo de Ciencias Planetarias, Instituto de Astrofísica de La Plata (CONICET-UNLP), Facultad de Ciencias Astronómicas y Geofísicas (UNLP), La Plata, Argentina (mpronco@fcaglp.unlp.edu.ar).