# The first 200 kyr of the Solar System

F.C. Pignatale[1,2], S. Charnoz[1], M. Chaussidon[1], E. Jacquet [2]
[1]Institut de Physique du Globe de Paris, Sorbonne Paris Cité, Univ. Paris Diderot, CNRS, F-75005 Paris, France, pignatale@ipgp.fr
[2]Muséum national d'Histoire naturelle, UMR 7590, CP52, 57 rue Cuvier, 75005, Paris FRANCE

Chondrites are among the most puzzling objects in the Solar System as they combine components that experienced different and as yet unclarified thermal histories [1], whose accretion processes and locations/epochs are still largely unconstrained. Among them, carbonaceous chondrites, which are widely believed to have assembled in the outer cooler region of the Solar System, are paradoxically the richest in refractory material, Ca-Al-rich inclusions (CAIs), which should have formed close to the Sun [1]. The age of the latter [2], the oldest ones measured in the Solar System, suggests that their building blocks formed concurrently with the Sun, during the collapse of the parent cloud that formed our Solar System [3].

Here we investigate, for the first time, the dynamical and chemical evolution of the solids inherited from the collapsing cloud to their transport in the forming protoplanetary disk. Our 1D disk model includes several processes such as gas and dust condensation/evaporation, dust growth/fragmentation, radiative and viscous heating, dead zone and cloud infall in the form of a source term.

We find that the interplay among (1) the location in which material is injected in the disk from the cloud, (2) the physical and thermal properties of the considered material, (3) the disc dynamics and (4) several accretion burst events, naturally produces aggregates where components with different thermal histories can coexist.

Moreover, the disk expansion causes an efficient advection of refractory material towards large radii. The dead zone plays a crucial role in creating and keeping an heterogeneous mixture of dust. Our results also account for the CAI production timescales and their distribution in chondrites without requiring any other mechanism of outward transport of material in the disk.

**References:** [1] Scott, E.R.D., & Krot, A.N., 2003, Treatise on Geochemistry, 1, 711; [2] Amelin, Y., Krot, A.N., Hutcheon, I.D., & Ulyanov, A.A., 2002, Science, 297, 1678; [3] Hueso & Guillot, 2005, A&A, 442, 703