Methodology

0D simulations with 3-phases version of Nautilus:

- 504 **+ 60** species
- 7900 **+ 656** gas-phase reactions
- 2557 **+ 394** grains surface reactions
- 1430 + **250** grains mantle reactions

KIDA
KINETIC DATABASE FOR ASTROCHEMISTRY

Dark clouds physical parameters:

$T = 10K$, $n_H = 2 \times 10^4\ cm^{-3}$, $Av = 15$

Element	n_i / n_H*	References
H_2	0.5	
He	0.09	1
N	6.2(-5)	2
O	2.4(-4)	3
C^+	1.7(-4)	2
S^+	8.0(-8)	4
Si^+	8.0(-9)	4
Fe^+	3.0(-9)	4
Na^+	2.0(-9)	4
Mg^+	7.0(-9)	4
P^+	2.0(-10)	4
Cl^+	1.0(-9)	4
F	6.68(-9)	5

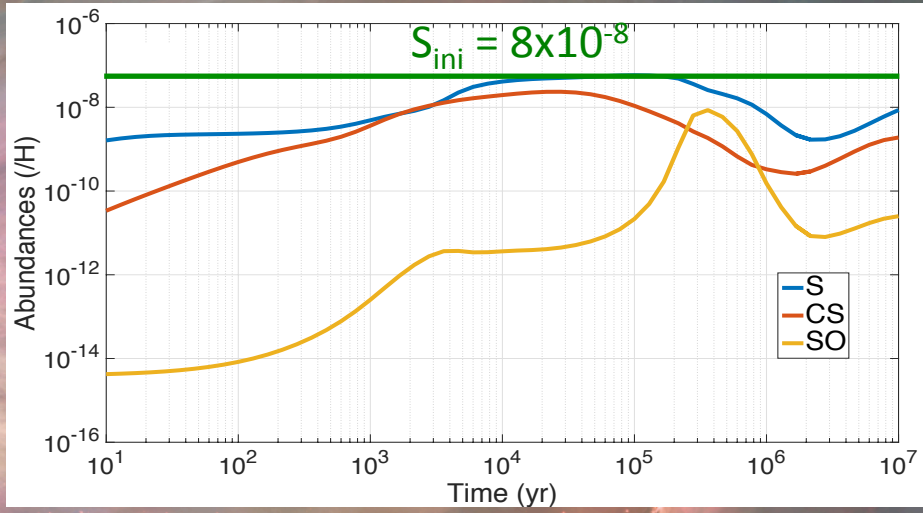
Impact of the modifications on the sulfur reservoirs

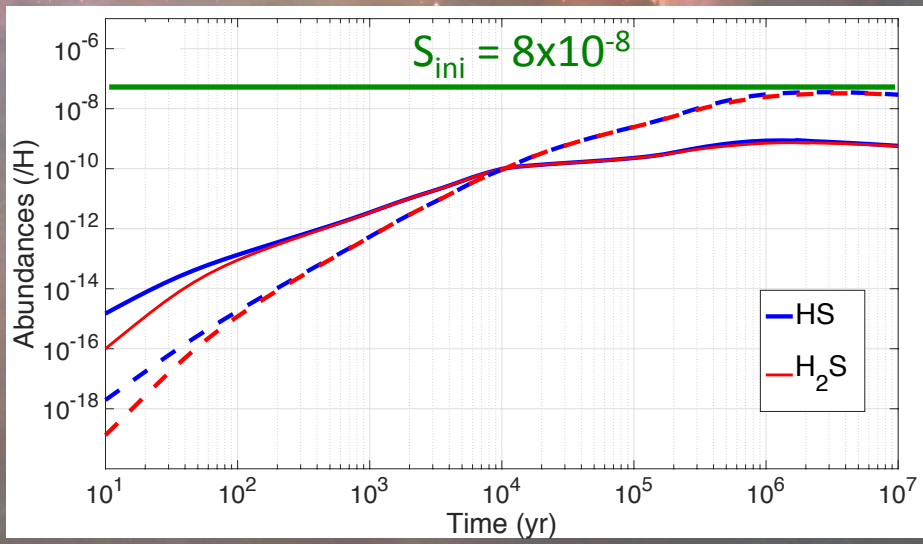
From 10^4 to 5.5×10^5 years :

Atomic sufur (gas) is the reservoir

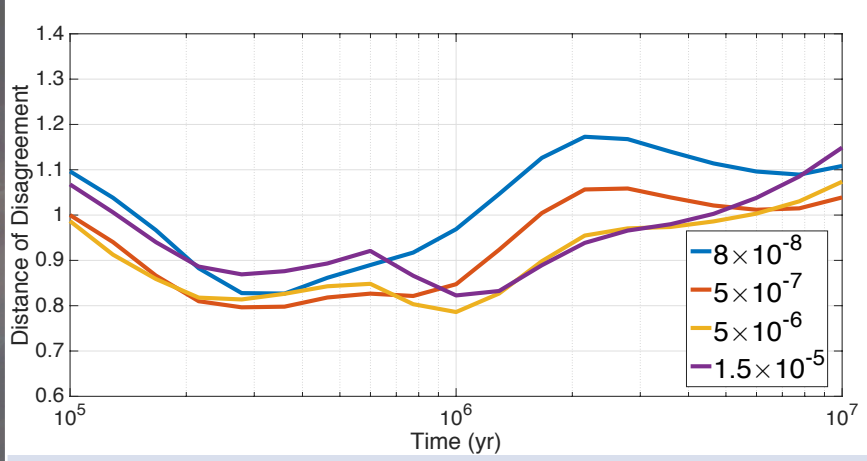
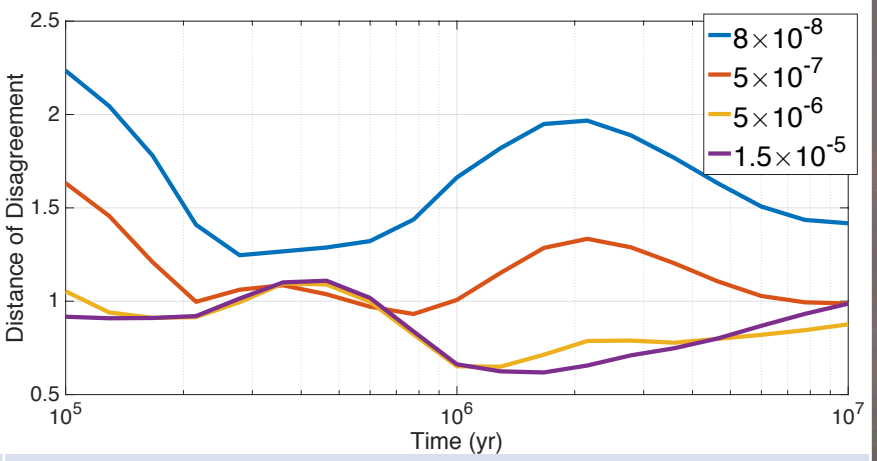
After 5.5×10^5 years :

HS and H_2S (mantle) are the reservoirs and share 80% of the elemental abundance of sulfur





Comparison with the observations in TMC-1 (CP)

61 species	11 S-bearing species
	
Best model : $X(S)_{ini} = 5 \times 10^{-6}$	Best model : $X(S)_{ini} = 1.5 \times 10^{-5}$
50 ou of 61 species reproduced (83%)	All S-bearing species reproduced (100%)

First chemical model able to reproduce the abundances of observed S-bearing species in TMC-1 (CP) using as elemental abundance of sulfur its cosmic value