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担当：内山

FORMING CHONDRITES IN A SOLAR NEBULA WITH MAGNETICALLY INDUCED TURBULENCE

Yasuhiro Hasegawa[1], Neal J. Turner[1], Joseph Masiero[1], Shigeru Wakita[2], Yuji Matsumoto[2], Shoichi Oshino[2]

- 太陽系内のchondritic meteoritesのchondrulesの起源を探る
  - impact jettingでのchondrules形成と、subsequent pebble accretionでのchondritesへの降着モデルで、現在の太陽系の組成を説明可能か検証

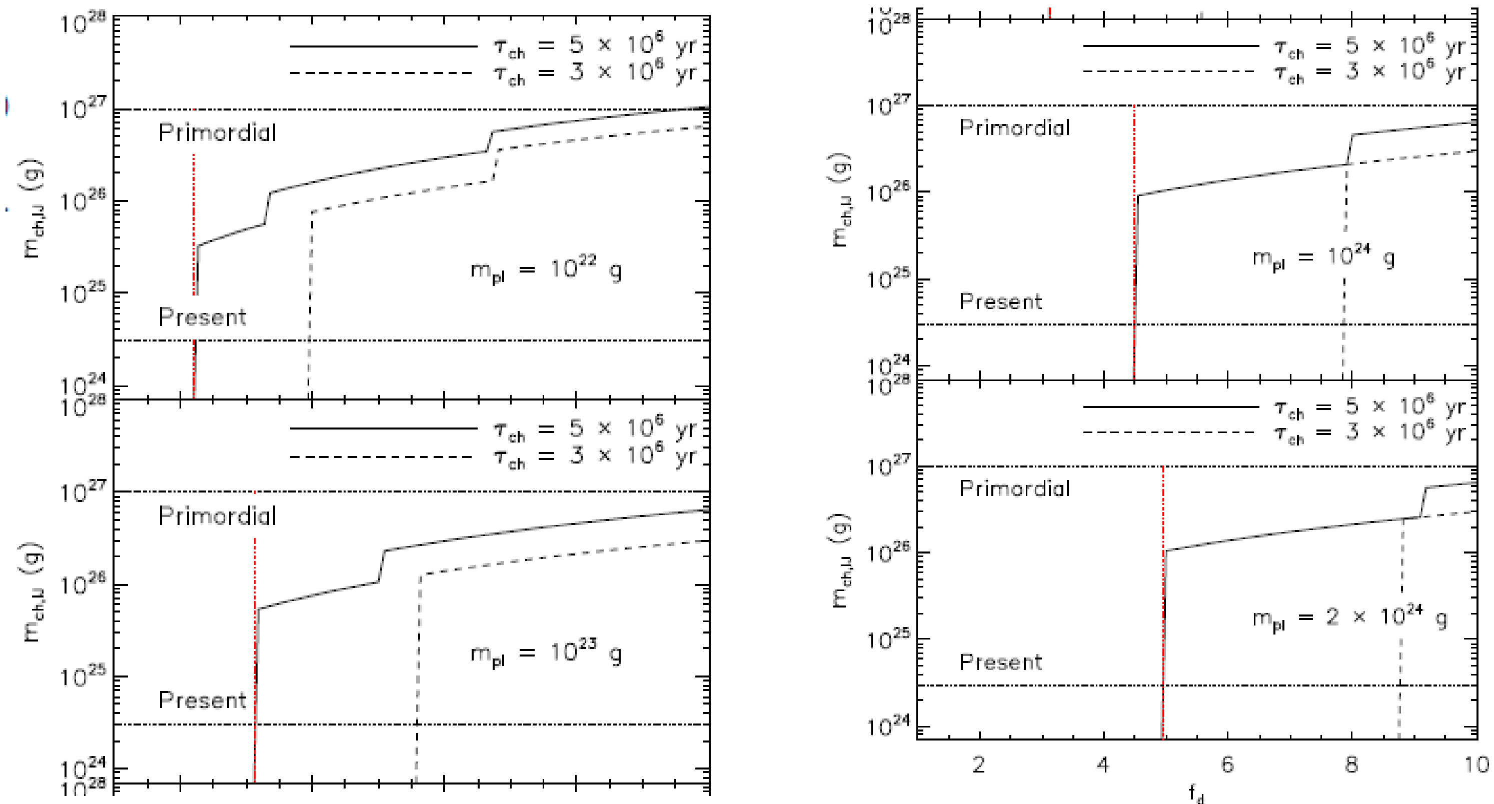

Figure 1. Mass of chondrules ($m_{ch,IJ}$) produced by impact jetting via planetary accretion at $a = 2 - 3$ AU as a function of f_d (see Table 1). The value of m_{pl} varies from 10^{22} g (top) to 2×10^{24} g (bottom). For comparison purposes, both the primordial and the present asteroid belt masses are plotted as the horizontal dotted lines. The minimum value of f_d above which $m_{ch,IJ}$ is large enough to reproduce the required abundance of chondrules increases with increasing m_{pl} (see the vertical dotted line).

- 2-3 AUの地点にMMSNの5倍以下の質量がある
- parent bodies of chondrites ≤ 10^{24} g (≤ 500 km in radius)

→上記のモデルで現状のasteroid belt mass, formation timescale of chondrules, magnetic field strength of the nebulaを説明可能

- 10^{24}g以上/以下のprimodal asteroidsがchondrule-poor/richの分れ目

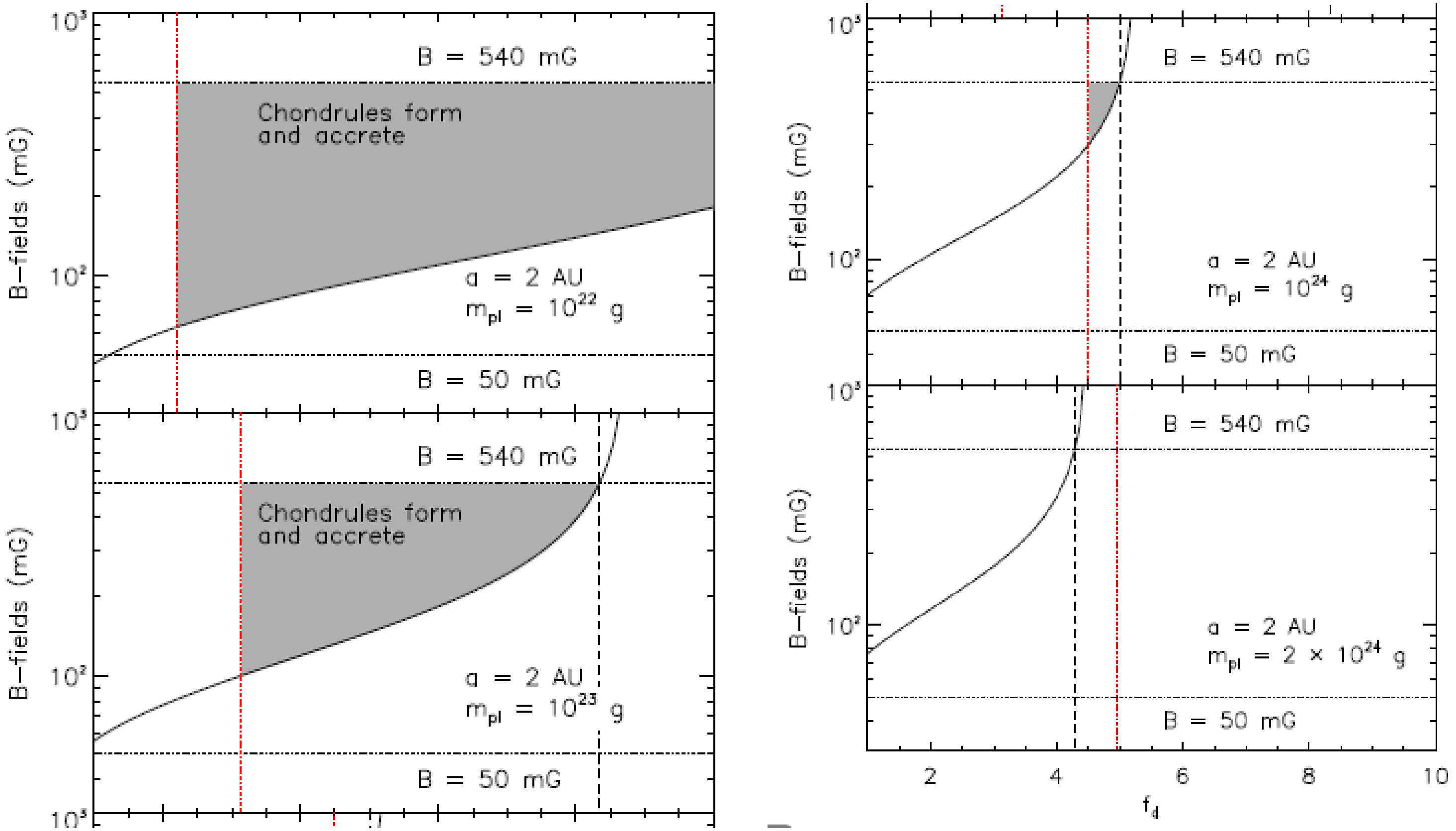

Figure 2. Minimum value of the magnetic field strength ($\langle B \rangle_{min}$) threading the solar nebula, which is needed to achieve efficient chondrule accretion onto planetesimals, as a function of f_d (see Table 1). The value of m_{pl} varies on each panel (as Figure 1). The vertical dashed line denotes a critical value of f_d above which chondrule accretion onto planetesimals is not realized. Coupling with the constraint derived from the chondrule abundance (see the vertical dotted line, which is identical to the one in Figure 1), the results show that all the requirements inferred from the currently available meteoritic samples can be met when $f_d \leq 5$ and $m_{pl} \leq 10^{24}$ g at $a = 2$ AU (see the hatched region).

A proposed new diagnostic for Herbig disc geometry ⋆

FWHM versus J of CO ro-vibrational lines

R. P. Hein Bertelsen[1], I. Kamp[1], G. van der Plas[2], M. E. van den Ancker[3], L. B. F. M. Waters[4,5], W.-F. Thi[6], and P. Woitke[7]

- NIRのCO ro-vibrational linesがGroup IIのHe Ae/Be型星ではGroup Iより広くなるという先行研究の仮説をサンプル数を増やして検証
  - CRIRES (CRyogenic high-resolution InfraRed Echelle Spectrograph)/VLTで観測
  - 4/6天体で十分な強度でlinesを検出
- SED Groupと線幅(FWHM)に明確な相関はなかった

^{12}CO									
Object	Group	FWHM v=1-0, (J<10) [km/s]	3σ	FWHM v=1-0, (J>20) [km/s]	3σ	FWHM v=2-1 [km/s]	3σ	FWHM ^{13}CO $v = 1-0$	3σ
HD 163296	II	54.5	3.9	59.2	4.4	1275_{-950}	–		
HD 250550	I	15.2	0.2	19.7	2.	21.5	2.6	14.1	1.9
Hen 2-80 05	I	38.9	3.2	42.4	4.6	43.7	4.8	42.9	4.2
Hen 2-80 06	I	39.3	4.4	38.9	3.1	43.0	3.8	39.3	4.2
Hen 3-1227 05	I	11.5	0.7	10.8	3.3	–		12.4	15.8
Hen 3-1227 06	I	10.6	1.3	10.4	4.0	–		19.2	6.8

Notes. The averaged FWHM with errors, are derived from the selected lines (listed in Table C.1) for ^{12}CO v=1-0 (FWHM from high and low J separately), ^{12}CO v=2-1, and ^{13}CO v=1-0.

- 一方で、FWHMとJ quantum numberとの関係はinner discについて以下の様な新しいgas diagnosticに用いることができるかも知れない
  - 一定のもの：gas holeやgapを示唆？
  - J増加によって広がるもの：上記のない円盤

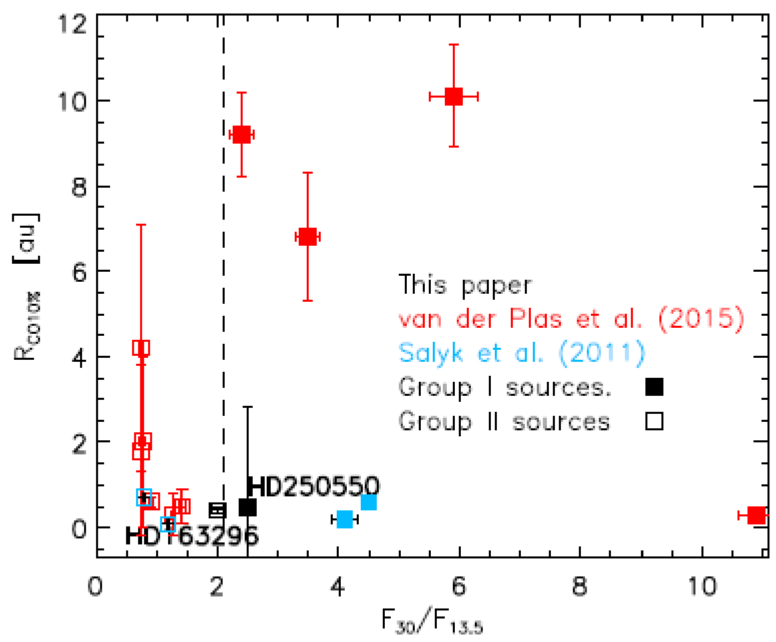

Fig. 4. $R_{CO10\%}$ versus the 30 μm over 13.5 μm continuum flux, from this study (black), together with those from studies by van der Plas et al. (2015) (red) and Salyk et al. (2011) (blue). Group I discs are plotted as filled squares while group II discs are plotted as open squares.