Journey of an icy pebble -- from a hydrodynamic view Yu Wang<sup>1</sup>, Chris W. Ormel<sup>1</sup>, Pinghui Huang, Shoji Mori, water snowline Xuening Bai, Rolf Kuiper <sup>1</sup>Department of Astronomy, Tsinghua University, irradiative heating Beijing, China (3) Wang et al, in prep, 2024 pebble Refractory Water ice vapor diffusion (re)condensation settling ice grain radial drift sublimation "vapor retro-diffusion" "traffic-jam" viscous heating accreting planet pebble accretion (1) Development of a sublimation : phase change module absorb latent heat release Particle A Particle B Gas latent heat condensation 1 (1) Wang et al 2023 (2) Jiang, Wang et al 2023 (#) Particle fluid Refractory (#) Tracer fluid (1) Recycling of volatiles make dry planet Gas fluid 🔙 🔰 Vapor 5.0 au (3) Water-cycle accross the snowline facilities 4.0 au 0.014 0.012 planetesimal formation; Latent heat cooling f<sub>vap</sub>~ 1%  $f_{vap} > 30\%$  and keep growing 0.011 0.009 800.0 creates a temperature plateau. 0.006 سے active disk 0.012  $f_{
m i/g} M_{
m acc}/(3\pi 
u)$ 0.002 -  $10^{-3} \rho_0 c_{\mathrm{s},0}$ passive disk 0.2 0.175  $x(H_g)$  $x(H_g)$ 250 0.150 0.125 (2) Release of volatiles by accreting giants ₫ 0.100 alters the disk chemical inventory 0.073(b) C<sub>2</sub>H 3-2 (a) 257 GHz Continuum 0.025 Sierra+ 2021 Law+ 2021  $\Sigma_{\rm gas}$  [g cm<sup>-2</sup>] C/O **Hunt water snowline** See more in my in outburst disks! 1.6 30 homepage 24 25 -25-25 12 -50 -50 **-75** --7550 75 100 25 50 -50 75 x [au] x [au] Hough+ 2024