A water budget dichotomy of rocky protoplanets from ^{26}Al-heating

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INTRO

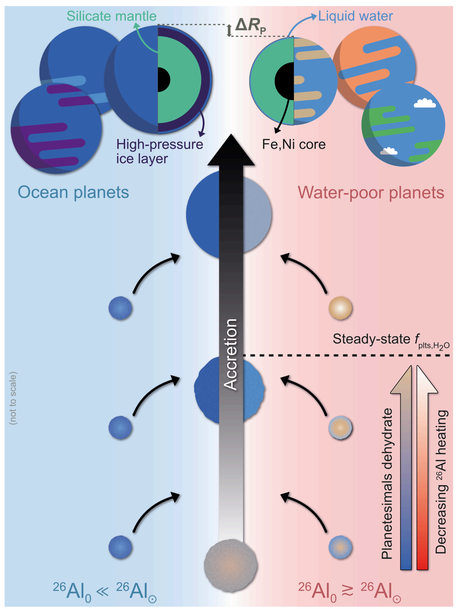
^{26}Al powered internal heating and chemical differentiation of rocky bodies during planet formation in the early Solar System, but is likely inhomogeneously distributed across forming planetary systems.

METHODS

We coupled models of ^{26}Al-driven planetesimal dehydration and a planet population synthesis code to investigate its effects on exoplanet population statistics and potential observability.

RESULTS & CONCLUSIONS

In the planetesimal-based accretion framework, ^{26}Al displays first-order control on the distribution of planet water abundance, and thus exoplanet radii, possibly traceable with TESS or PLATO.



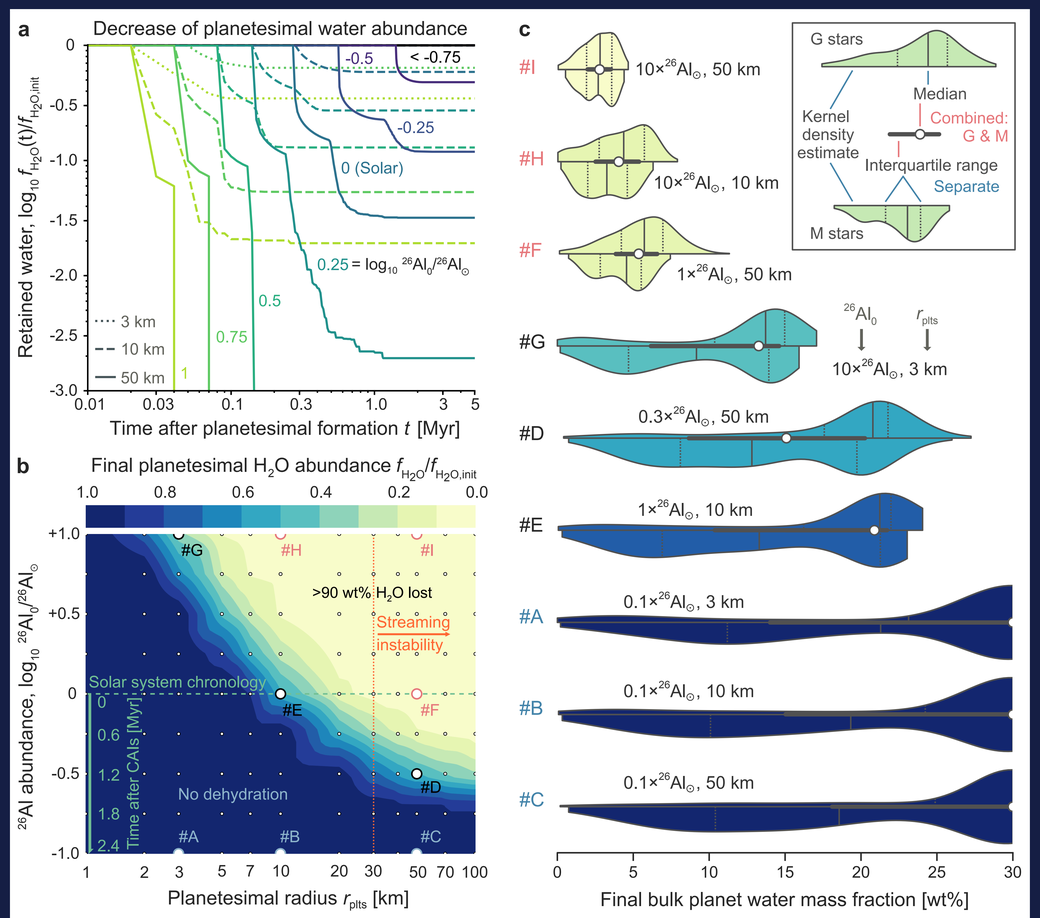
Varying ^{26}Al abundances across planetary systems induce systemic changes in rocky exoplanet water content

≥ $^{26}Al_\odot$ during planet formation:

- ~ 10–100× water depletion
- Up to 10% smaller $R_{transit}$
- Intra-system size correlation

No/few ^{26}Al present:

- Water worlds dominant type of rocky exoplanets
- Stable against hydrodynamic escape



Photo

- Paper PDF
- Related publications
- Author Website
- Author PhD Thesis

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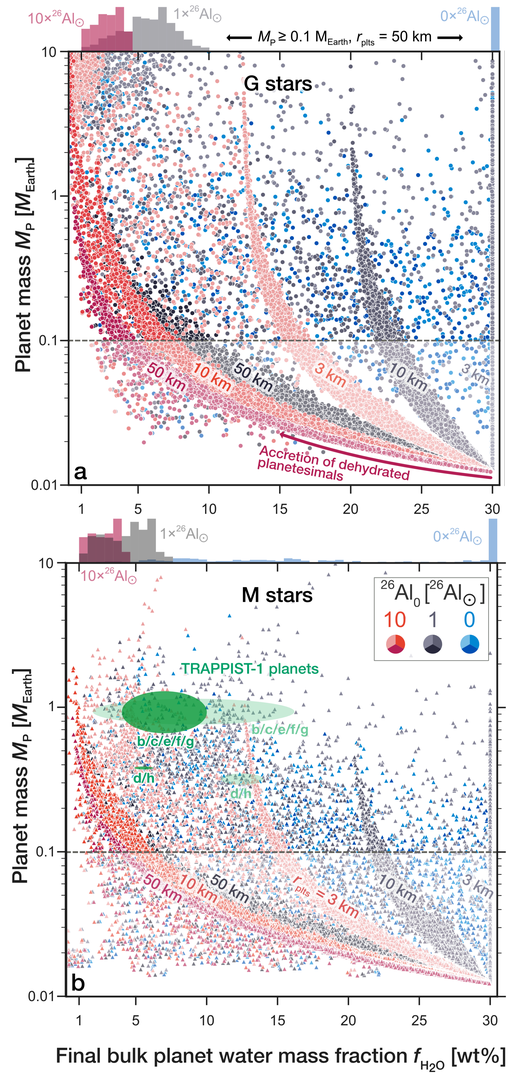
Planet population



Mean transit radius shift