

# Origin of the Earth-Moon system

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## Pre- New Views (2006) models

### Our understanding at New Views (2006)

- Giant impact model is best, but "standoff" between geochemists and dynamicists

### Outstanding problems/issues

Earth and Moon nearly identical, yet standard model predicts Moon is from impactor

- Dry Moon - Wet Earth

### New datasets

- Isotopes (O and W, as well as Li, Si, Cl, K, Ti, Cr, Fe, Cu, Zn, Mo) **T. Magna**
- Volatiles (H, C, S, Cl, D/H, siderophiles – Ga, Ge, Cu, Zn, Sn, Cd, In, Bi)

**E. Steenstra and F. McCubbin**

### Spectrum of new models

- Modelling advances (SPH, CTH, ; MAGMA, ANEOS, Hercules)
- Dynamics:
  - Spun-up Earth (Cuk and Stewart, 2012)
  - 1:1 collision (Canup, 2012)
  - Hit and run (Asphaug, Reufer, 2006, 2011)
  - Trojan (Belbruno and Gott, 2005)
  - Multiple smaller impacts
- Lunar disk modeling:
  - Salmon, Canup, Visscher, Fegley (2015)
  - Pahlevan, Dahl, Stevenson (2007, 2010)
- Geochemical models:
  - Stochastic late accretion (Walker et al., 2015)
  - Inner Solar system uniformity (Dauphas et al., 2014)

**O. Aharonson; R. Raluca**

### Avenues of research to narrow the spectrum

- Additional disk dynamics and the emphasis on vapor versus melt in newer vs. canonical impact models
- Role of resonances in impact scenarios requiring significant angular momentum loss
- Additional isotopic measurements on refractory and volatile elements to identify differences that might help distinguish models