An Update on: Sputter yields in agreement with recent experimental data

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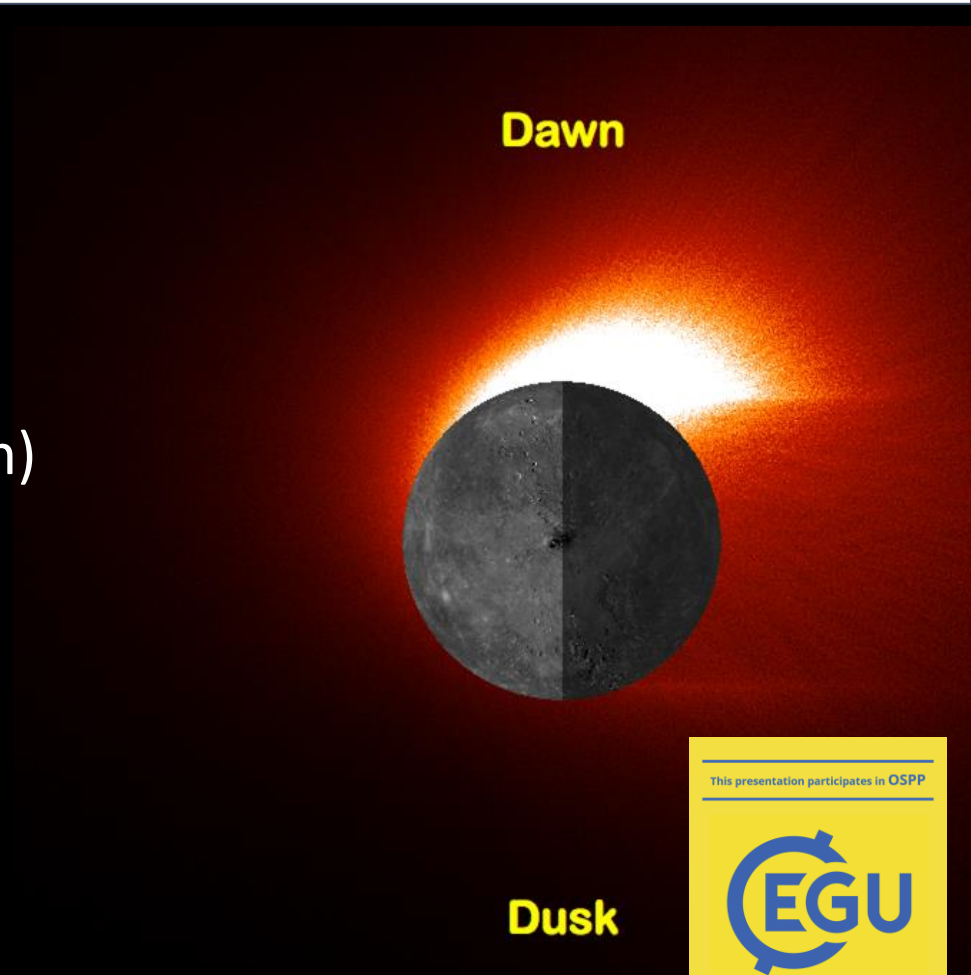
Solar wind (H^+, He^{2+}, … O^{6+-8+}, ...) supplies exosphere

Mass ejection rate

- is fluence dependent
- reaches equilibrium in ~60/600 years (Merc/Moon)

SDTrimSP

- mineral interaction with SW ions
- allows for changing surface composition
- reproduces experimental data well



This presentation participates in OSPP
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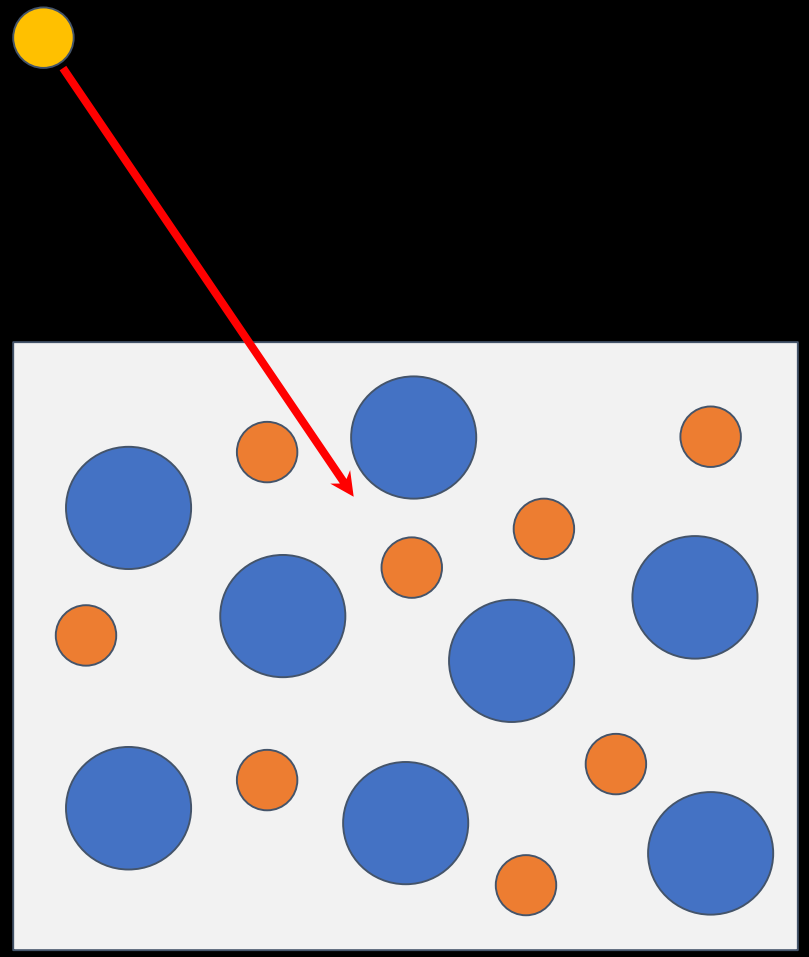
The SDTrimSP model

Monte Carlo model

- independent, binary collisions
- amorphous target with a given density
- collision occurs after a defined travelled distance
  - mean free path f(ρ)

$$\mu = \rho^{-1/3}$$

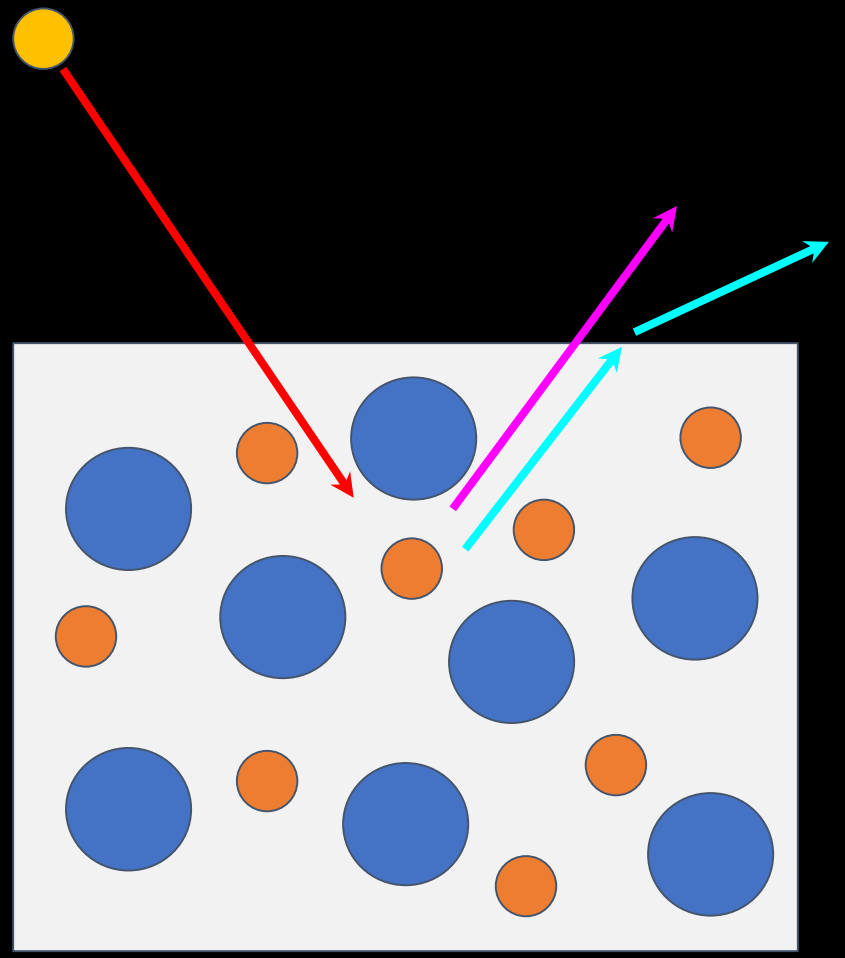


The SDTrimSP model

Two end-member assumptions

- collisions are elastic, particle only has to overcome a set surface binding energy (SBE)

- collisions experience no SBE, but a loss of energy as they have to overcome a bulk binding energy (BBE)



What about density?

- Severely underestimated based on atomic components

- Affects mean free path of recoils

$$\mu = \rho^{-1/3}$$

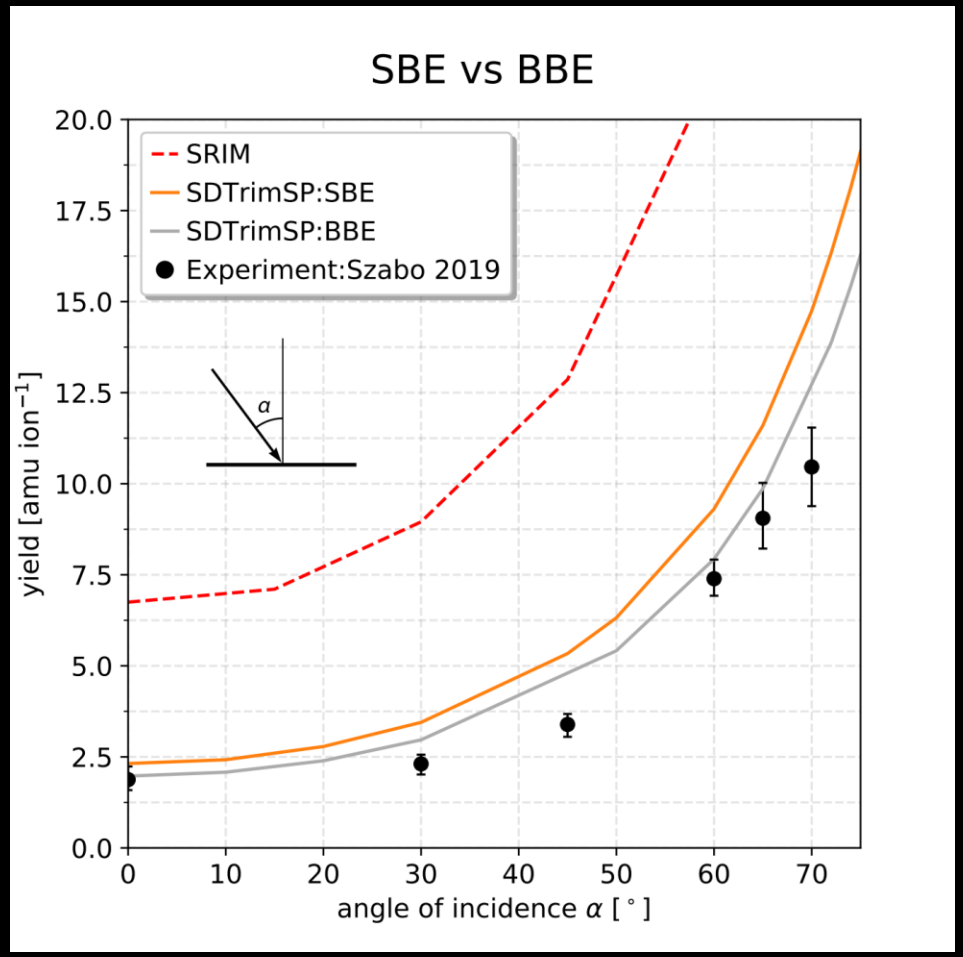
- OUT NOW:

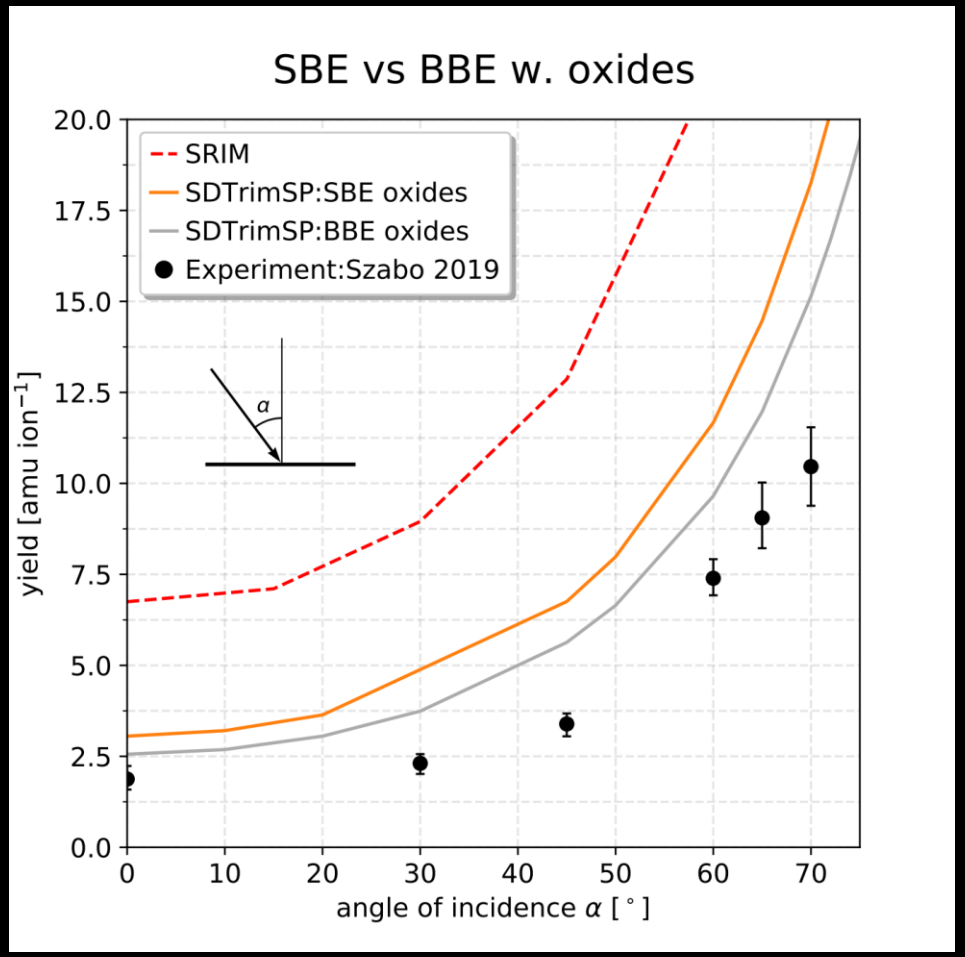
  New oxide model in SDTrimSP

Mineral	Components [at/Å^3]			ρ_{calc} [at/Å^3]	μ [Å]	ϵ_μ^a [1]
Wollastonite	Ca	Si	O			
$CaSiO_3$	0.0231	0.0499	0.0429	0.0376	2.985	+25%
$\mu = 2.380$ Å	CaO	SiO_2				
	0.0724	0.0797		0.0759	2.362	-1%
Enstatite	Mg	Si	O			
$MgSiO_3$	0.0431	0.0499	0.0429	0.0442	2.828	+30%
$\mu = 2.184$ Å	MgO	SiO_2				
	0.1070	0.0797		0.0913	2.221	+2%

Jäggi (in prep.)

Surface vs. Bulk effect (4 keV He^+ on wollastonite)





The oxide model

Benefits:

- More realistic density

- User friendly bulk binding model implementation

- **Most relevant for modelers:** bulk binding model generally **better** recreates experimental data of minerals!

Questions & Comments

→ Coffee Break

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