Role of snow and ice in Hg cycling at polar regions: From the atomistic point of view

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Hg cycling at polar regions

• **Sequestration**

Maybe due to H

particle-bound

been investigate

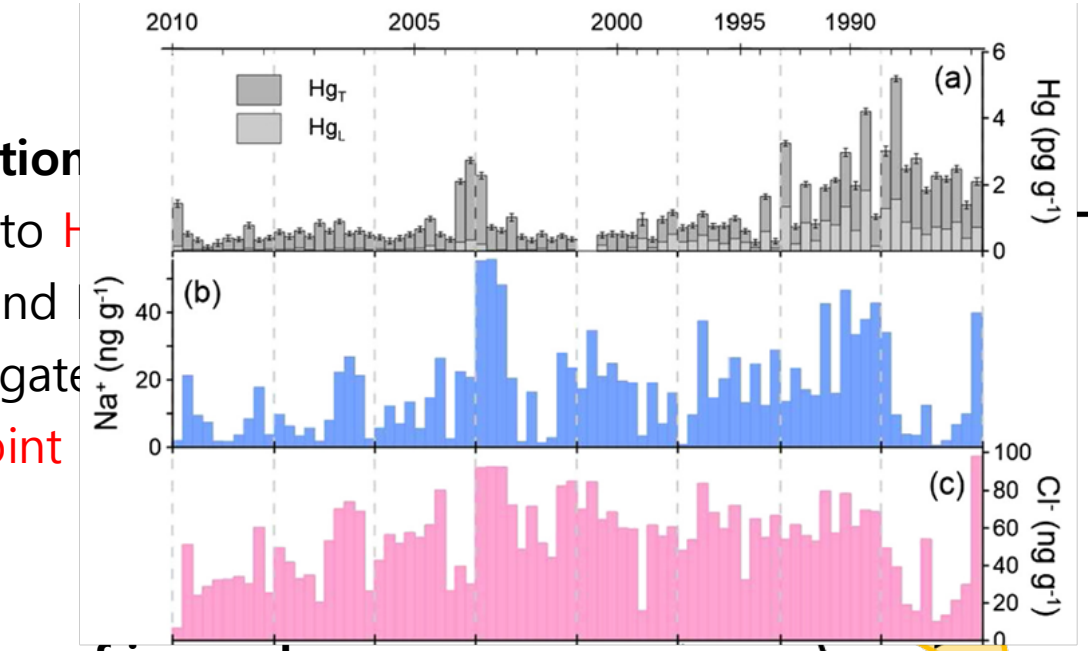
atomistic point

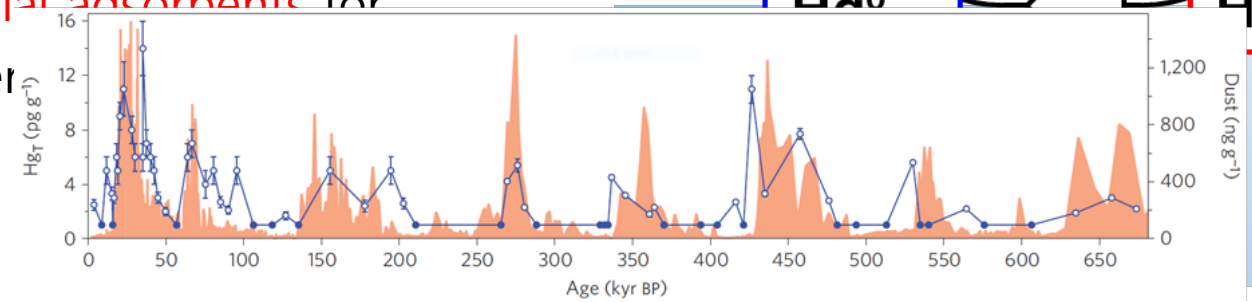
• **Significance of ice and snow**

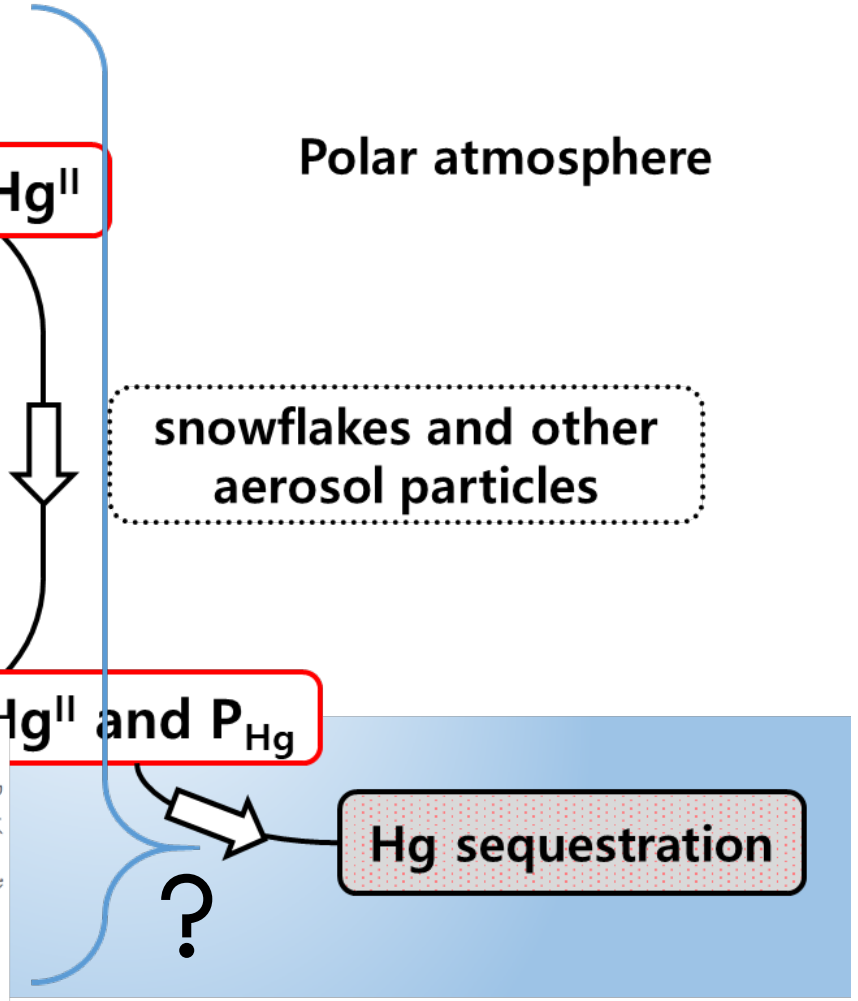
As potential adsorbents for

atmospher

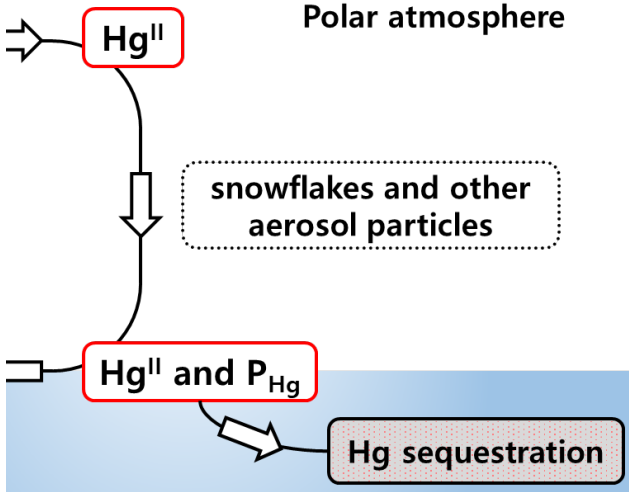
discussed



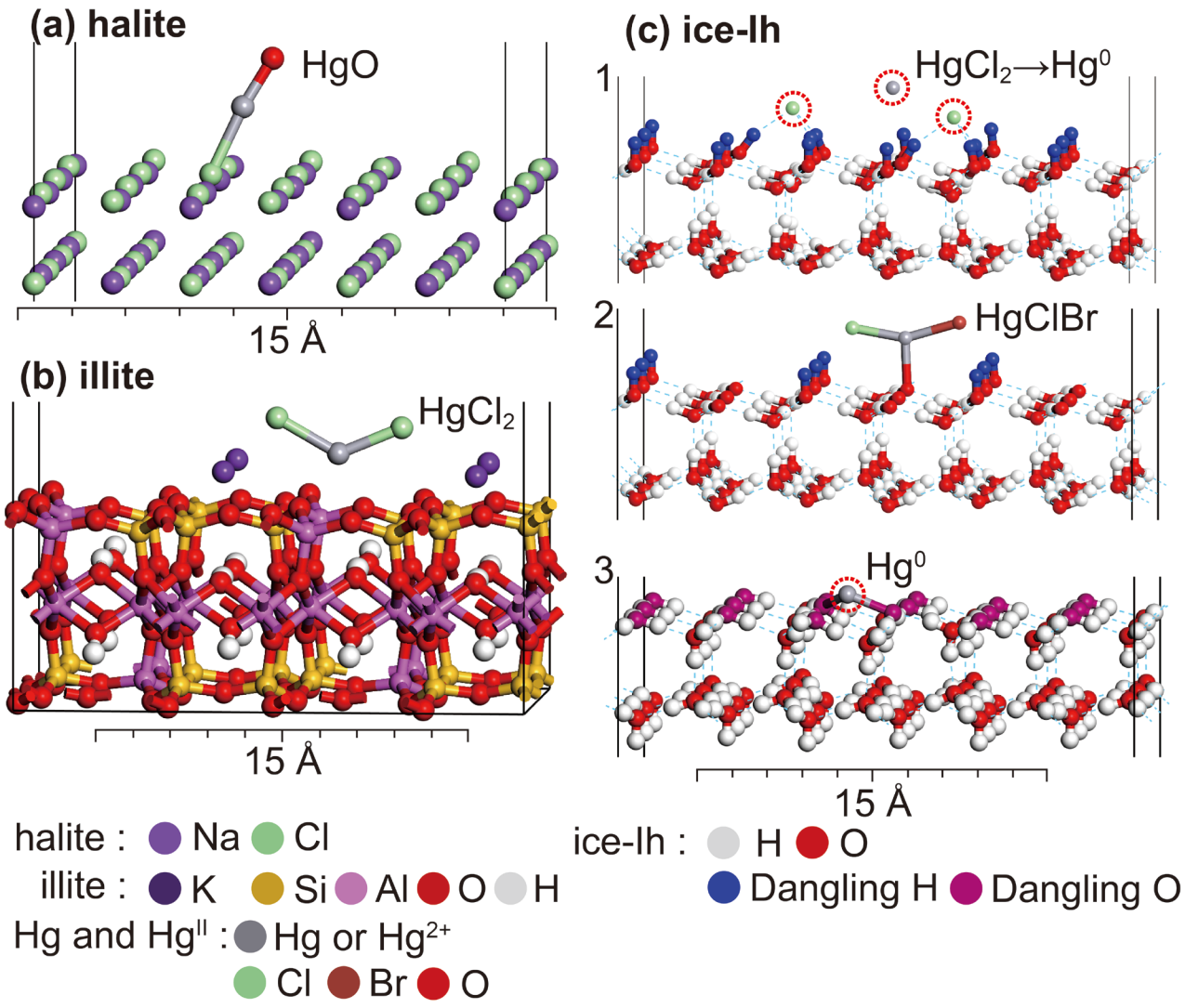




Atmospheric Hg on ice and other adsorbents



Atmospheric Hg	sea salt (halite) sedimentary dust (illite) ice and snow (ice-Ih)
Selected adsorbents	Hg^0, Hg^{2+} $HgBr_2$, $HgCl_2$, $HgClBr$



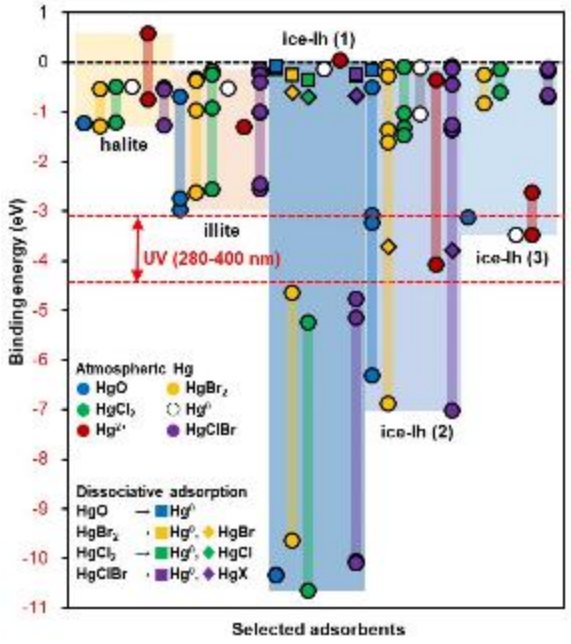
Atmospheric Hg on ice and other adsorbents

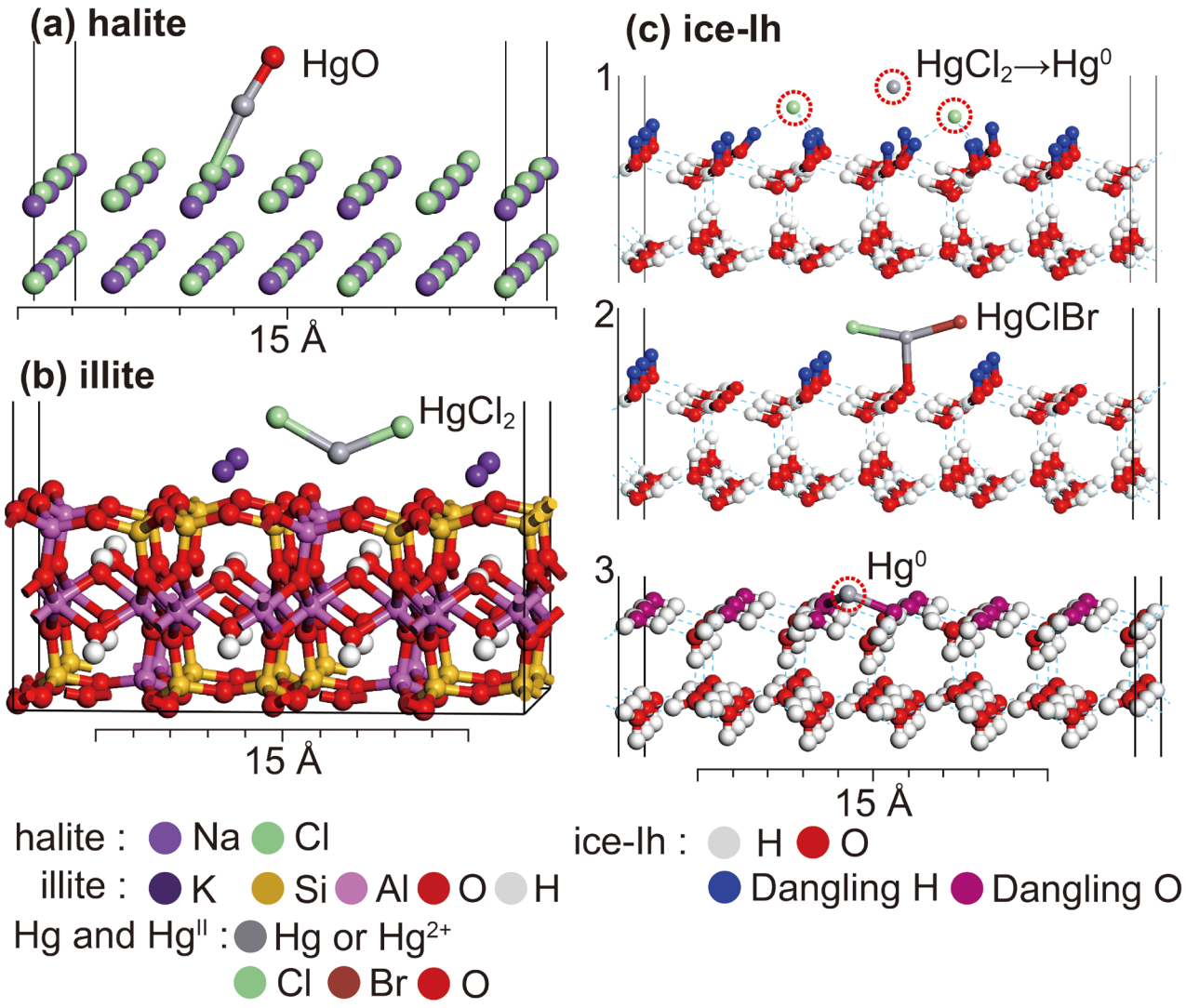
- **Moderate adsorption affinities of Hg species**

$$E_B < 0$$

Hg deposition to surface snow as P_{Hg}

Hg (Hg^0 and Hg^{II}) + Particle → P_{Hg}





Fate of Hg at polar regions (2)

• **Hg sequestration in surface snow**

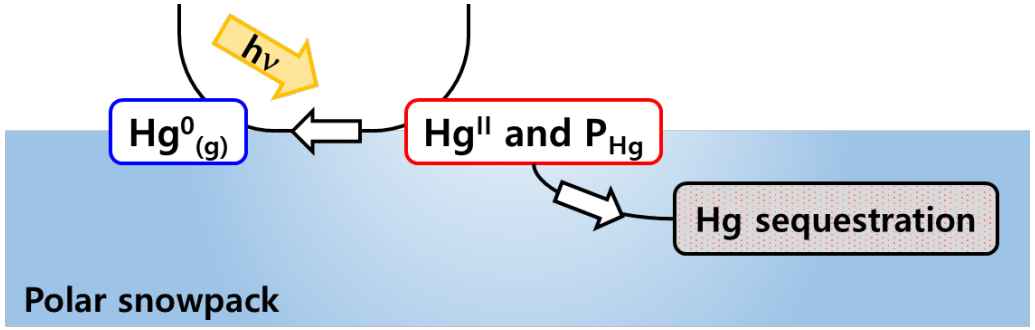
Adsorption of atmospheric Hg on ice and other aerosol particles (sea salt and sedimentary dust) seems not to be adequate for sequestering Hg in surface snow (as being vulnerable to UV-induced photodissociation and photolytic reduction).

(1) Physical trapping in pore spaces

(2) Uptake by highly reactive particles

(3) Yield for photodissociation and photolytic reduction < 1.0

$$J(\lambda) = \int F(\lambda) \cdot \sigma_{abs}(\lambda) \cdot \phi(\lambda)\, d\lambda$$



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