250 years of research revealed Gaia's climate control – there is sufficient knowledge now for technical CE tests inspired from Nature's "CE method"

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résumé

1758 / 1804: The Russian Count Bestuschew-Rjumin used the $FeCl_3$ photolysis to prepare his Nerve Tincture1). A. F. Gehlen (1804) investigated the °Cl generating photolysis step of the tinctures preparation: sunshine photon +Fe(III)Cl_3 → Fe(II)Cl_2 + °Cl 2).

1990 / 2017: J.H. Martin formulated "The Iron Hypothesis": the glacials are induced by phytoplankton fertilized iron dust3). In the Antarctic, the ice cores reveal that during glacial ages there was high dust, low CO_2, and low methane levels and that during warm interglacials there was low dust, high CO_2 and high methane levels13). Dust concentrations during glacials have been 50 to 70 times higher than during warm interglacials14). Glacial outwash plains are potent sources of iron-containing sub-micron dust15-16). The solubilisation of atmospheric Fe mineral aerosol particles by HCl is activated by sunshine17).

2004: F. D. Oeste proposed tropospheric methane depletion by atomic °Cl generated from Fe(III) containing dust, sunshine and chloride4).

2003 / 2012: Additional to sediments, the solidified ocean crust (up to 2 km below the ocean bottom) acts as flexible CO_2 carbon dump: this fissured convective flow system has recharge and discharge zones5).
At an ocean crust growth rate of about 24 km3/yr = 7 x 1010 t/yr6) it fixes recent HCO_3^- and CO_3^{2-} as calcite by up to 1.6 weight % = 1.1 x 109 t/yr or 0.48 x 109 t CO_2/yr7). The elevated Cretaceous CO_2 level of 1130 ppm8) increased the ocean crust calcite content to 5.5 %7).

2012 / 2017: Direct vegetation climate control acts by CO_2 assimilation and HCO_3^- and calcite generation by accelerated weathering9)10)11): Roots and mykorrhizal fungi excrete CO_2, organic acids, complexing agents, and generate fissures by mechanical opening. Roots transform CO_2 and rock to hydrogen carbonate and soil at velocities many times faster than abiotic weathering. Roots increase CO_2 level of soil air up to 100 times that of atmosphere. Foliar fertilization by soluble iron salts of mineral aerosol support and accelerates vegetation weathering especially of those plants growing on alkaline rock and soil types12).

2004 / 2016: Confirmation of activated photochemical production of °Cl atoms and/or °Br atoms from iron(III) and solid, liquid or aerosol halogenid18)4)19)20) or from iron containing aerosol in the presence of gaseous HCl21)22). Iron oxides and dissolved iron in aerosols and tropospheric H_2O_2 induce atmospheric Fenton reactions and produce atomic °Cl and °OH radicals in the troposphere even in the dark23)24)25).

2016: Confirmation of the photochemical generation of CH_4 depleting °OH radicals by iron(II) aerosol and NO_2 45)

2017: A technical variant mimicking the natural "Iron Salt Aerosols (ISA)" climate control method has been proposed12). 12 or more cooling effects are described, among them CH_4 and CO_2 atmospheric removal.

conclusions

Does current research ignore important climate regulation principles?

Ignored: halogen activation by iron photolysis (Figure 1)

1989: Revelation of the O_3-induced atomic °Cl generation from gaseous HCl by Fe_2O_3 aerosol photolysis. This process shall contribute to the chemistry of Antarctic O_3 depletion26).

2009 / 2017: Discussions about the cause of atomic °Cl and °Br in volcanic eruption plumes27)28)29)30)31)32).

2013 / 2017: Models about the influence of mankind induced halogen emissions on tropospheric O_3 content33)34).

2017: Discussion about the increased tropospheric halogen chemistry during glacial climate periods35).

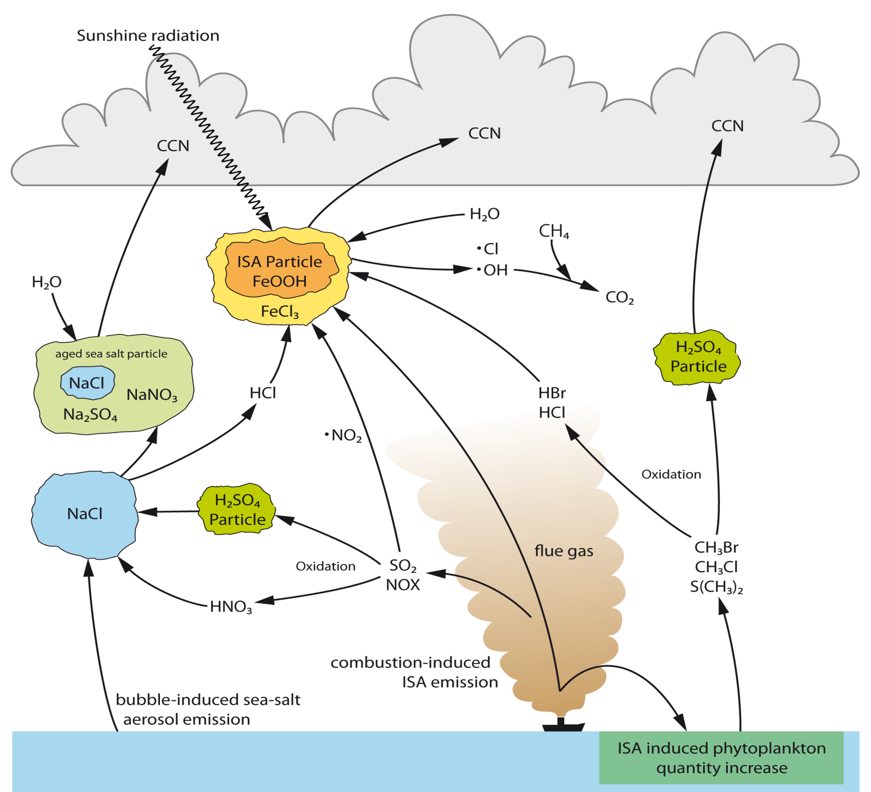
1998 / 2017: Discussion about possibilities of the generation of atomic °Cl and °Br from arctic snow and sea ice36)37)38)39)40)41)42)43).

Ignored: carbon cycle direction
atmosphere → ocean → sediment / crust; not vice versa (Scheme 1):

2014: Upwelling water in the Antarctica neighboring glacial Southern Ocean should have lost lesser CO_2 to the atmosphere than recently44).

FIGURE 1

Tropospheric CH4 depletion induced by Fe(III) photolysis



Scheme 1

Driving-forces directing the carbon cycle from atmosphere into ocean and from ocean into sediments and crust

- **Troposphere:** Oxidation of CH_4, CO, COS and VOC to CO_2 and soot hydrophilization
  → → →
- **Continent/ocean:** 1) CO_2 absorption
  2) CO_2 hydrolysis to HCO_3^-,
  3) CO_2 and HCO_3^- metabolization to organic and carbonate C
  4) sedimentation of organic and carbonate C
  → → →
- **Sediment/oceanic crust:** Carbonate and CH_4 hydrate precipitation
  → → →

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