

## Sensitivity of the ocean-to-atmosphere N<sub>2</sub>O flux to variations in atmospheric dust deposition

P. SUNTHARALINGAM<sup>1</sup>, E. BUITENHUIS<sup>2</sup>  
AND C. LE QUERE<sup>2</sup>

<sup>1</sup>University of East Anglia (P.Suntharalingam@uea.ac.uk)

<sup>2</sup>University of East Anglia

Nitrous oxide is produced in marine environments through processes of nitrification in oxygenated waters, and denitrification in oxygen minimum zones and sediments. Marine N<sub>2</sub>O formation and the ocean-to-atmosphere N<sub>2</sub>O flux is a function of marine productivity (through dependence on organic matter remineralization) and the local oxygen regime. Atmospheric mineral aerosol deposition on the open ocean provides a source of new nutrients, such as Fe, to upper ocean ecosystems. Variation in this nutrient supply affects ocean primary production and organic matter export to the deep ocean, and thus influences marine N<sub>2</sub>O formation and the ocean-to-atmosphere flux.

Here we employ a process-based model of the marine N<sub>2</sub>O cycle embedded in the PlankTOM ocean biogeochemistry model to evaluate the sensitivity of marine N<sub>2</sub>O production to variations in atmospheric dust deposition. We present initial results from simulations evaluating variations in atmospheric dust loading from pre-industrial times to the present day.

## Thermodynamic modeling of cassiterite-wolframite ore formation at the Iultin Sn-W deposit

T.M. SUSHCHEVSKAYA AND A.JU. BYCHKOV

Vernadsky Institute of Geochemistry and Analytical

Chemistry RAS, Moscow, Russia (Ryzhenko@geokhi.ru)

Thermodynamic modeling of cassiterite and wolframite deposition as a result cooling, boiling, interaction with wall rocks and mixing of genetically different fluids has been carried out. The evolution of mineral forming processes were modeled as a sequence of equilibrium states of the hydrothermal systems. Total compositions were determined by dynamic relationships. The equilibrium compositions of heterogeneous systems were calculated with HCh software package [1]. Input data for modeling were obtained in the studies of the Iultin deposit [2]. The Iultin deposit was formed by the systems of quartz veins with cassiterite and wolframite mineralization, located in hornfelsized sandstone-schist rocks (T<sub>1-2</sub>) and in greisenized granites (K<sub>2</sub>) of the stock. The deposition of the productive association took place from sodium chloride boiling solutions enriched in CO<sub>2</sub> and CH<sub>4</sub> at T 270-350<sup>0</sup> C, P 0,5-1,0 kbar, as it followed from fluid inclusion data. Interpretation of oxygen isotopic zonalities of wall rocks witness to its intensive interaction with waters of initial meteoric genesis [3].

The results of the calculations showed that in ore-forming solutions of the Iultin deposit Sn was transported mainly in the form of SnOHCl<sup>0</sup>, while W as H<sub>3</sub>WO<sub>4</sub>F<sup>0</sup>. This is the reason of the difference of the main factors of of cassiterite and wolframite deposition. Cooling of the hydrothermal fluid leads to the deposition of these two minerals but in a broader temperature interval (450-150°C), than it took place during the formation of the deposit. Boiling gives rise to the formation of cassiterite and, to less extent, of wolframite, but it cannot describe in full measure the occurrence of Sn and W mineralization in the Iultin ore-forming system. Results of the calculations which take into account mixing of the ore-forming fluid with the exogenic one and equilibration of this mixed fluid with the wall rocks, correspond to the natural situation to a greater extent. This process may be accepted as the main factor of the ore deposition. and are in agreement with the previous modeling data [4,5].

[1] Shvarov Ju.V., Bastrakov E. (1999) *Austr.Geol.Surv. org.* 56p. [2] Erokhin, Sushchevskaya *Geokhimiya*. 1992. no.5. P.660. [3] Spasennykh M. *et al.* (2005) *Geochem. Int.* **43**. P.1217. [4] Heinrich Ch.A. (1990) *Econ.Geol.* **85**. P. 457. [5] Sushchevskaya T.M., Ryzhenko B.N. (2002) *Geochem. Int.* **40**. P. 155.