Endemic fluorosis and high-F clay

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Fluorosis caused by indoor coal-combustion type is one of the few endemic diseases that still lack effective methods of prevention and control. By the end of 2000, there have were about 34 million people living in areas where indoor coal-combustion fluorosis occurs. There were almost 18 million patients with dental fluorosis, and nearly 1.5 million patients with skeletal fluorosis. People in Guizhou Province suffer the most from indoor coal-combustion type fluorosis. About 28% of the population of Guizhou Province (almost 15 million people) suffers from fluorosis, including nearly 10 million dental fluorosis patients (NSB, 2000).

During the period of 1980–1984 the following results were obtained:

1. There is no positive relationship between fluorine concentration in foodstuff and fluorine in soils and rocks.
2. Crops dried indoors over coal fires absorbed high levels of fluorine. Fluorine emitted from coal combustion was acid-soluble fluorine.
3. Of the two factors that induced fluorosis, the method used to dry and store crops was more important than the concentration of fluorine in coal. If there was indoor coal combustion without any protection, and if the main crops of the local people was corn, and if the fluorine concentration of coal was only a few dozens mg/kg, fluorosis would occur.

In a new study, the investigation of endemic fluorosis, as well as the determination of fluorine concentration in environmental samples was conducted. In the area where indoor coal-combustion type fluorosis occurs, local fluorine-rich clay was used to mix with coal to form briquettes. The new study concluded that:

There are two key steps in the procedure of indoor transmission of fluorine:

1. Indoor wet corn and vegetables strongly absorbed fluorine from indoor air.
2. Fluorine strongly accumulated in clay, which was mixed with coal powder to form briquettes for combustion. Therefore, increased percentage of fluorine-rich clay in the briquettes resulted in higher fluorine contents in the corn and other vegetable.

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The Re–Os systematics of the Raobazhai peridotites, Dabieshan, central China

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Precise age data for sub-continental lithospheric samples is essential for understanding the stability of continental roots and mass exchange between the crust and mantle. The Re–Os isotopic system has been used successfully to date ultramafic xenoliths and orogenic peridotites, which are thought to represent the underlying lithospheric mantle. However, several recent studies (Brandon et al., 1996; Widom et al., 2003) reveal that slab-derived fluids can introduce radiogenic Os into the overlying mantle wedge and thus change the Os composition of peridotite xenoliths from the wedge. Thus, the Re–Os system may be disturbed and provide false age information.

Here we present Re–Os results from the Raobazhai ultramafic massif of Dabieshan, China. This massif is thought to be part of the mantle wedge overlying the subducted slab during the Mesozoic Yangtze—North China block collision, which was forced to the surface during subsequent slab exhumation (Zhang et al., 1995). Os and Re concentrations range from 1 to 5 ppb and from 5 to 430 ppt, respectively. All 15 samples have sub-chondritic $^{187}Os/^{188}Os$ values (0.11568–0.12830). Despite extensive petrographic and geochemical evidence for several stages of water-rock reaction, involving different fluids, there is no obvious evidence for introduction of radiogenic Os to the massif. Re also shows less mobility than expected, with 13 of the 15 samples studied yielding a rough isochron ($R^2 = 0.8886$). An age of 1.7 Ga is obtained, consistent with Paleoproterozoic ages of the North-China Craton (Gao et al., 2002). Thus, while perturbation of the Re–Os system by subduction related fluids is sometimes an important process, it is apparently not a ubiquitous phenomenon.

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