MGMTP Software to obtain tritium concentration in precipitation

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Tritium, as one of various environmental tracers, has been broadly applied in hydrogeology. However, observations of tritium concentration in precipitation are generally scarce. The utilization of tritium concentration is strongly limited by our knowledge of the natural distribution of tritium in precipitation over both space and time. The modified global model of tritium in precipitation (MGMTP) was developed by Zhang et al. (2011) [1]. For the purpose of making MGMTP model easy to use, the MGMTP software, a MATLAB Software Package, was developed to obtain the annual mean tritium concentration in precipitation in the area from 80°S to 80°N over the period from year 1960 to 2005. The MGMTP model was developed by improvement of Doney model [2] based on the method of factor analysis. The annual mean tritium concentration in precipitation $c_p(t)$ at any place in the MGMTP model is established by the equation:

$$c_p(t) = b + f_1 \hat{c}_p(t,1) + f_2 \hat{c}_p(t,2) + \varepsilon_a(t) \quad (1)$$

Where $\varepsilon_a(t)$ is the error term; $\hat{c}_p(t,1)$ and $\hat{c}_p(t,2)$ are the two reference curves (factor scores), which is determined by factor analysis using tritium data from International Atomic Energy Agency(IAEA) covering all the stations from 50°S to 70°N over period from 1960 to 2005. The coefficients f_1 and f_2 are unique for each station and are similar to the factor loadings; b represents the mean of the vector. Parameters of b, f_1 and f_2 are calculated from the least-squares solution for each selected station. The global maps of model factor coefficients f1, f2 and b are generated using a kriging interpolation method. The Software Package includes a MAT-file and a M-file. It was originally inspired by a MATLAB toolbox. The values of five parameters in MGMTP model have been stored in the MAT-file. User could easily update MAT-file if new observation data is available, because MATLAB offers functions of factor analysis and regression analysis. The role of the M-file is to solve equation (1). User can get tritium concentration with the input of specific latitude, longitude and time. The Software Package's Syntax is c = feval (Latitude, longitude, time).

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Understanding sediment interfaces with voltammetric microelectrodes: Two decades of science and fun with Bjørn Sundby

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Abstract

GWL had the pleasure to meet Bjørn Sundby at a Black Sea conference in Gotebørg, Sweden in 1986 hosted by David Dyrssen. After that George and Bjørn communicated on a regular basis and when our Delaware group developed solid state (micro)electrodes that could measure O_2, H_2S, Fe(II) and Mn(II), it was obvious that we should join forces on studying sediment biogeochemisry. In this talk, I will show our collaborative work in the St. Lawrence estuary and Portuguese salt marshes. This includes detailed work on Mn chemistry with the O, Fe and N cycles leading to new insights on soluble Mn(III) chemistry, and interesting Pb chemistry as the redox state of the sediment changes. The collaboration has been frutiful beyond our wildest imagination, and has led to much fun and the development of a great friendship for us as well as our students and colleagues.

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