by these least squares estimates, we obtain the estimate $\hat{r}(\tau)$ of $r(\tau)$.

A detailed discussion of the procedure sketched above, together with a comparative study of this approach and the popular curve-peeling methods for compartmental analysis (cf. [12]), will be presented elsewhere.

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DISCUSSION

of the T. L. Lai paper,
Regression Analysis of Compartmental Models

T.-H. Peng

Oak Ridge National Laboratory

One of the major tasks of marine geochemists is determining the uptake by the sea of CO_2 derived from the combustion of fossil fuels. Until valid models of the general circulation of the ocean are constructed, this task will have to be done with box models calibrated through use of the distribution of natural radioisotopes and transient tracers.

We need to explore how sensitive the uptake of fossil fuel CO_2 is to the basic design of these models and how the design can be improved by simultaneously fitting the distributions of several tracers. Five different 11-box thermocline circulation models of the temperate North Atlantic were constructed for this purpose.* Anthropogenic tritium, ^{3}He, and radiocarbon are used as tracers to calibrate these models. The temporal input functions of these tracers differ considerably from one another. So also do the geographic patterns of their inputs and their geochemistries in the sea.

Using the basic equation of the box model [e.g., eq (1) of T.L. Lai's presentation at this conference] and the finite difference method of computation for mass balance in each box, these thermocline ventilation models with differing circulation patterns were calibrated to yield a tritium distribution similar to that observed during the Geochemical Ocean Section Studies (GEOSECS) survey in 1973. These models were then run for ^{3}He and bomb-produced ^{14}C. While the models differ significantly in their ability to match the observed ^{3}He and ^{14}C distributions, these differences are not large enough to clearly single out one model as superior. This insensitivity of tracer to tracer ratio to model design is reflected by the nearly identical uptake of CO_2 by the various models. This result also suggests that the uptake of CO_2 by the sea is limited more by the rates of physical mixing within the sea than by the rate of gas exchange across the sea surface.

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