Seidov, D. and B.J. Haupt (2003) Inter-basin versus meridional ocean freshwater disparity and global ocean conveyor, AGU Fall Meeting, San Francisco, California, USA, 8-12 December 2003

Cite abstracts as *Eos Trans. AGU, 84*(46), Fall Meet. Suppl., Abstract xxxxx-xx, 2003

HR: 16:20h
AN: **OS12C-02 INVITED**
TI: **Inter-basin Versus Meridional Ocean Freshwater Disparity and Global Ocean Conveyor**

AU: *** Seidov, D**
EM: *dseidov@psu.edu*
AF: *Penn State University, 2217 Earth&Engin. Sci. Bldg., University Park, PA 16802-6813 United States*
AU: **Haupt, B J**
EM: ***bjhaupt@psu.edu***
AF: *Penn State University, 2217 Earth&Engin. Sci. Bldg., University Park, PA 16802-6813 United States*

AB: This presentation contributes to the ongoing discussion on the role of freshwater transport in the global ocean thermohaline circulation (THC). The current paradigm presumes that the meridional freshwater transport and northern high-latitudinal freshwater impacts in the Atlantic Ocean are the most critical for THC dynamics. Not only does this paradigm belittle the role of the southern freshwater impacts, it also underrates the role of the well-known asymmetry in sea surface salinity (SSS) between the Atlantic and Pacific Oceans and to a lesser extent between other parts of the World Ocean. A disparity in redistribution of freshwater between the Atlantic and Pacific Oceans, both by the atmosphere and by the ocean circulation itself, has long been recognized as a major cause of the observed asymmetry in SSS. However, it has not yet been examined whether this asymmetry accounts for the functioning of the global ocean conveyor, and whether there is a threshold that would trigger such a conveyor. In fact, although the significance of the zonal inter-basin SSS contrasts has never been disputed, their role in driving the global conveyor has inspired far fewer modeling efforts than the more obvious high-latitudinal sea surface freshening, especially in the North Atlantic Ocean and Nordic Seas. In a series of recent publications, we have shown that even if SSS is zonally averaged and thus retains only schematic inter-basin contrasts, it can yield a reasonable global conveyor. In a subsequent series of sensitivity experiments, we have also shown that despite the southern (versus the northern) freshwater impacts are indeed the important controls of THC dynamics, the inter-basin SSS contrasts may be even more important. Our results favor zonal versus meridional SSS contrasts as most critical for building up and maintaining the global THC. Based on those results, we have introduced a hypothesis that inter-basin SSS gradients, regardless of their genesis and even with only rudiment SSS latitudinal distributions in different basins, can be accountable for the global character of THC. To test this hypothesis, we have used an ocean circulation model in a series of sensitivity experiments with an idealized SSS that mimics either meridional, or zonal freshwater disparity, or both. Our experiments have revealed the Atlantic-Pacific SSS asymmetry being one of the most critical elements, if not the most critical one for sustaining the global character of THC. We have also estimated how freshwater must be redistributed consistently in order to facilitate a genuinely global ocean conveyor. We also conclude, albeit preliminary, that high-latitudinal freshwater impacts, as a mechanism of altering the global THC, may be less effective than inter-basin freshwater communications.

UR: **http://www.personal.psu.edu/dxs60**
DE: 1600 GLOBAL CHANGE (New category)
DE: 3339 Ocean/atmosphere interactions (0312, 4504)
DE: 3344 Paleoclimatology
DE: 4255 Numerical modeling
DE: 4532 General circulation
SC: Ocean Sciences [OS]
MN: 2003 Fall Meeting