Interbasin water exchange and sedimentation during late Quaternary

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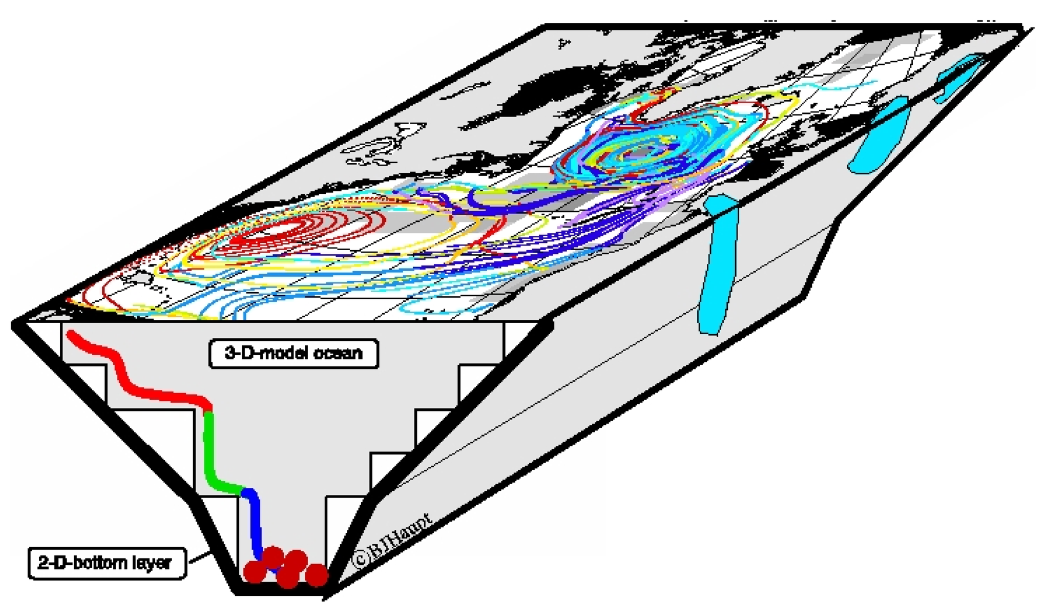
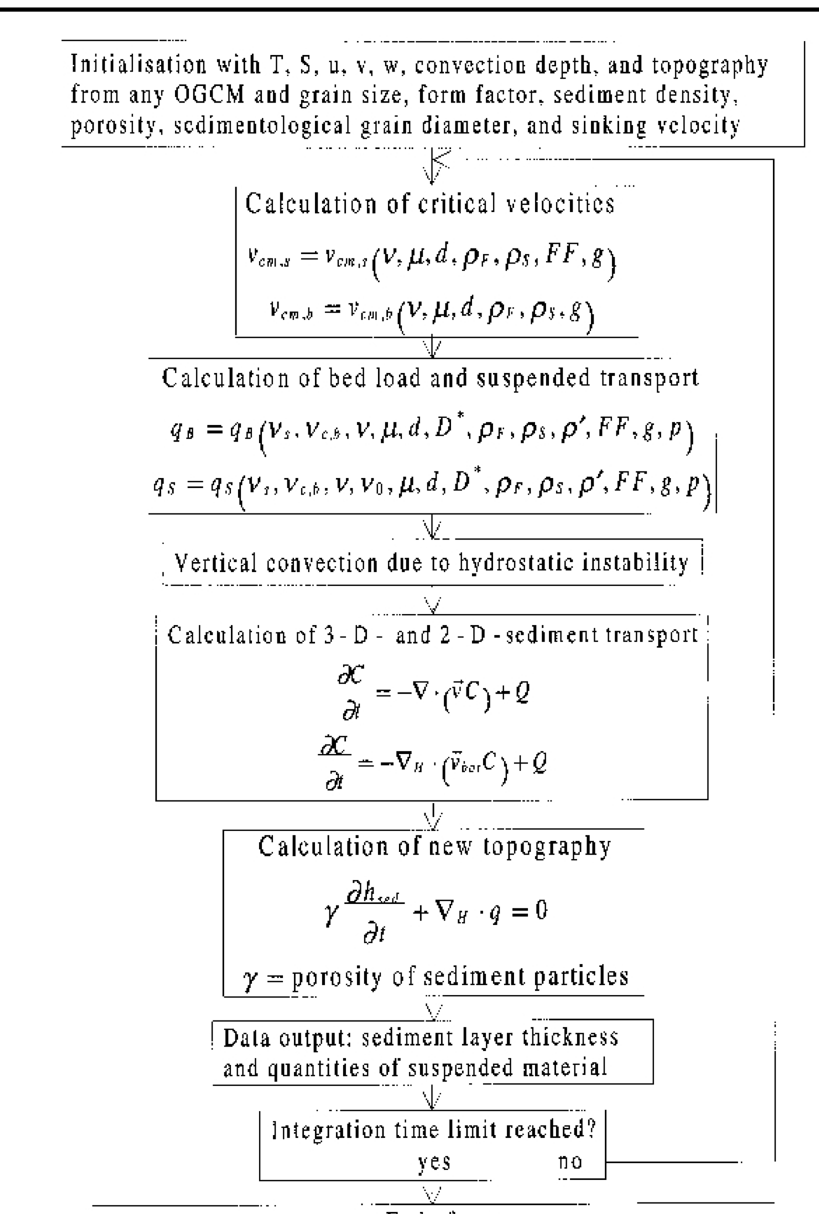
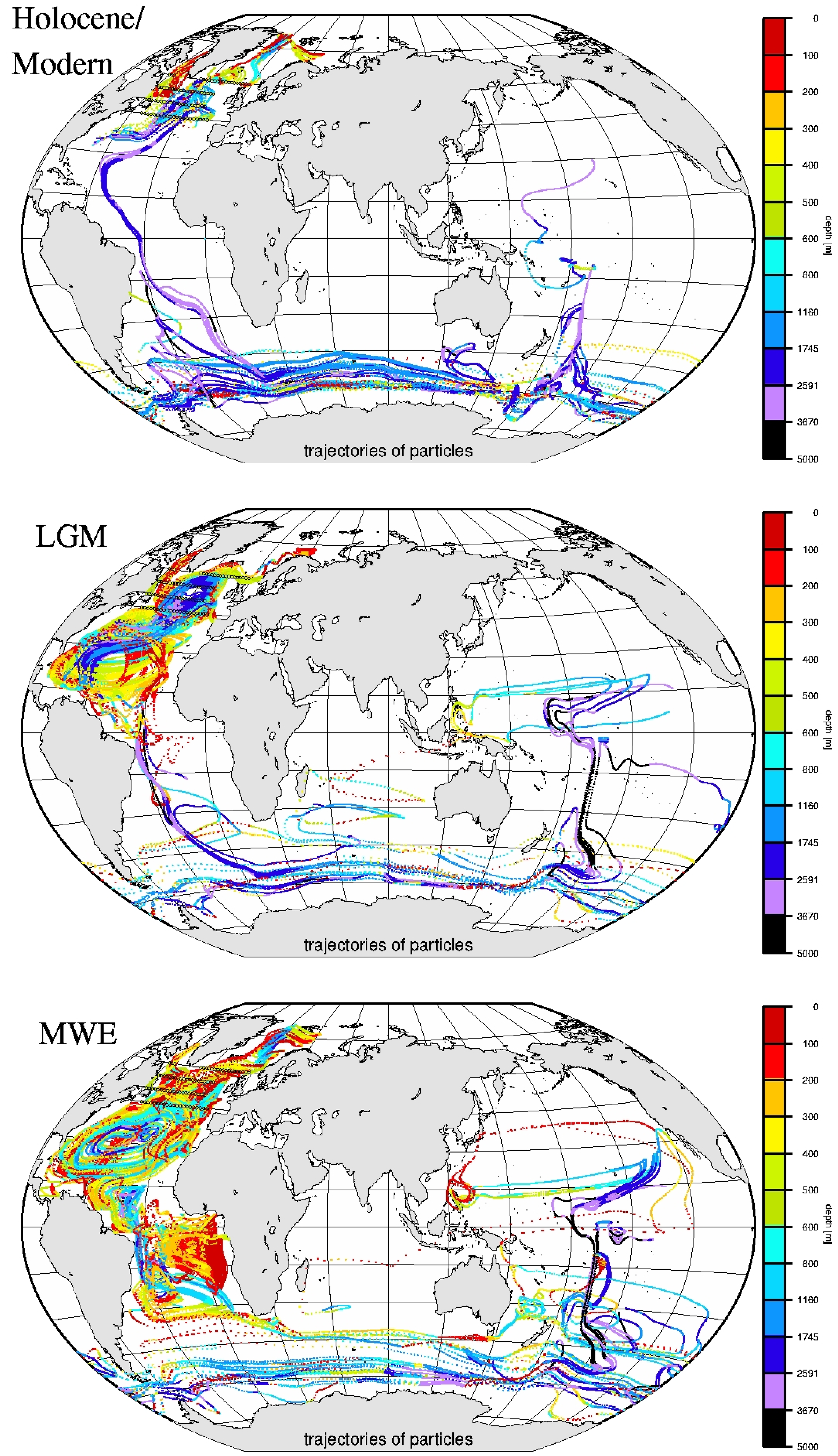
During the late Quaternary the global thermohaline conveyor has undergone major structural changes linked to the glacial-to-interglacial climate tran-sitions.

To enhance paleoceanographic simulations, traditional calculations of large-scale thermohaline circulation are supplemented by off-line Lagrangian trajectories and by simulations of sediment transport using a 3-D sedimentation model.

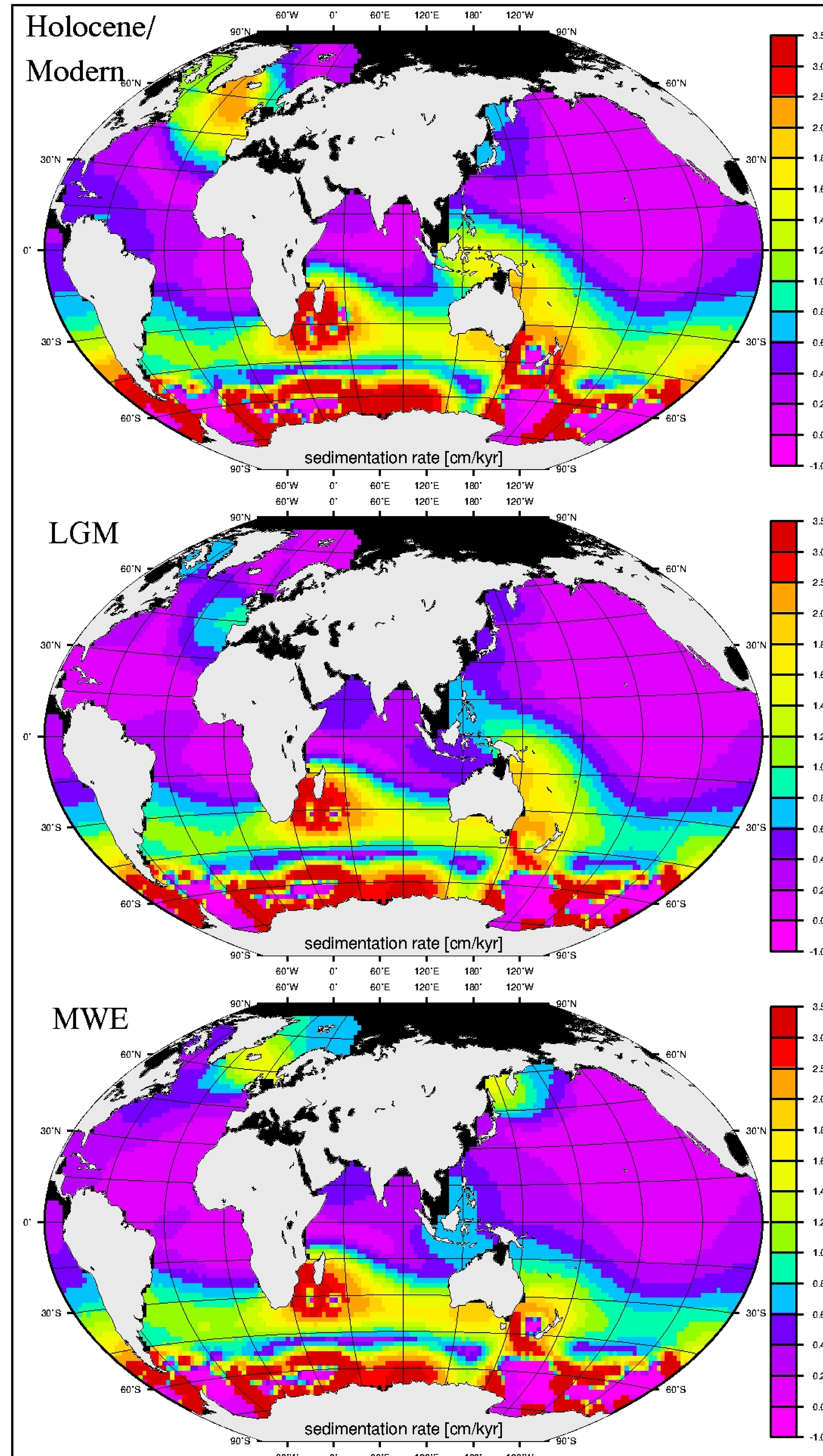




Flow chart of the sedimentation model



Trajectories of particles deployed in the the northern North Atlantic. The depth is indicated by colors palette; as the particle descends or upwells the color of the trajectory changes.



Sediment accumulation in 1000 years (in cm) for the three cases (from top to bottom): Control run (present day ocean circulation); LGM, and MWE. The thickness of the sediment is shown by color; negative values indicate erosion.

The conveyor is modeled numerically using available sea surface data for the Last Glacial Maximum (LGM) and a subsequent meltwater event (MWE) near 13,5 ka. Sea-surface characteristics are specified using a synthetic data set compiled from different sources (references in Seidov et al., JGR, 101, 16,305-16,332, 1996).

The results of these two runs are compared with the control run performed using the present day sea surface climatology.

Dramatic alterations of the deep-ocean currents due to localized meltwater event in the North Atlantic are easily visualized by both the trajectories and the maps of sediment accumulations.

The most noticeable change is reduction of accumulation rates in the Southern Ocean and in the Indonesian throughflow, and the reduction of sediment transport in the north-western North Atlantic.

References:

Haupt et al., *Paleoceanography, 9*, 897–916, 1994

Seidov and Haupt, *Paleoceanography, 12*, 281-305, 1997a

Seidov and Haupt, *Geophysical Research Letters 24*, 2817-2820, 1997b