Coupling during the six month unstratified period has been reported and is required to close large mass-balance inequities for nutrients and contaminants. Recent satellite imagery and sediment trap studies have shown that the majority of sediment resuspension and transport is episodic, primarily in the February-April period. Events in southern Lake Michigan in 1996-98 resuspended more fine-grain sediments (>1MMT) than the estimated total annual external load. Based on water intake turbidity records, the 1998 event was the most intense in 37 years. During the main resuspension event in March, 1998 mass fluxes (sediment particles) in near-coastal traps increased from 16 to 876 g/m²/d and the flux of total phosphorus from 12 to 380 mgP/m²/d. The intensity, duration, and timing (relative to stratification and the beginning of the spring plankton bloom) of these episodic events are being investigated to estimate their impact on lake ecosystems on annual time scales.

Figure 1. A simple conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 2. A summary of long-term mass fluxes for the 6 month stratified (black) and unstratified (gray) periods in Lake Michigan. The data are presented as daily averages for each period and are color-coded by the type of trap deployed (green = 100% response, yellow = 50% response, and red = 0% response).

Figure 3. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 4. Locations of the main trap recordings for the EGGLE program. The main transects (10, 20, and 25) are located in 200 m and are positioned to provide information on resuspended material. There have been two transects (10 and 25) since 1995, but the 10 station is currently decommissioned. The 25 station is located near the plume, while station 10 is further offshore. The traps are deployed in an array to provide information on the temporal and spatial distribution of resuspended material.

Figure 5. Long-term records of turbidity from the St. Joseph and Chicago Water Treatment Plants. Black circles represent the average daily turbidity and the gray envelopes a one standard deviation spread.

Figure 6. Locations of the main trap recordings for the EGGLE program. The main transects (10, 20, and 25) are located in 200 m and are positioned to provide information on resuspended material. There have been two transects (10 and 25) since 1995, but the 10 station is currently decommissioned. The 25 station is located near the plume, while station 10 is further offshore. The traps are deployed in an array to provide information on the temporal and spatial distribution of resuspended material.

Figure 7. Mass flux results for the 1997-98 field year, the largest recorded event in 39 years. Each panel represents a single trap, the bottom panel is the average turbidity data at St. Joseph for the water intake. The data were collected using a remotely deployable automated water sampler that was deployed at trap station 24. The sampler pumps raw water into 24, independently of the trap, and measures the turbidity every 15 minutes. The results are presented as daily averages for each period and are color-coded by the type of trap deployed (green = 100% response, yellow = 50% response, and red = 0% response).

Figure 8. A summary of long-term mass fluxes for the 6 month stratified (black) and unstratified (gray) periods in Lake Michigan. The data are presented as daily averages for each period and are color-coded by the type of trap deployed (green = 100% response, yellow = 50% response, and red = 0% response).

Figure 9. A remotely deployable automated water sampler has been successfully constructed and deployed at trap station 24. The sampler pumps raw water into the trap, independently of the trap, and measures the turbidity every 15 minutes. The results are presented as daily averages for each period and are color-coded by the type of trap deployed (green = 100% response, yellow = 50% response, and red = 0% response).

Figure 10. Trap (numbered stations) and sediment box coring stations, north-eastern basin of Lake Michigan. The data are presented as daily averages for each period and are color-coded by the type of trap deployed (green = 100% response, yellow = 50% response, and red = 0% response).

Figure 11. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 12. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 13. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 14. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.

Figure 15. A standard conceptual model of the movement of particles in the coastal plume in the southern basin of Lake Michigan. Particles derived from the western shore are transported alongshore with the plume (light blue arrow) and thus move into the south basin 10-15 days after their origin. Particles originating from the epilimnion continue to be resuspended in the plume and are ultimately transported into the southern basin. The figure is adapted from a model by the USGS.