WILKINSON BASIN WATER-MASS STRUCTURE

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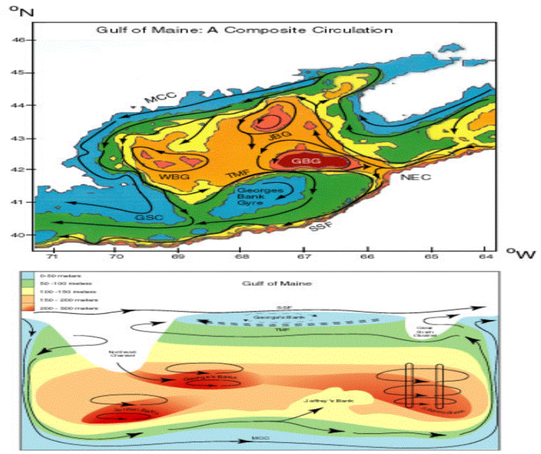
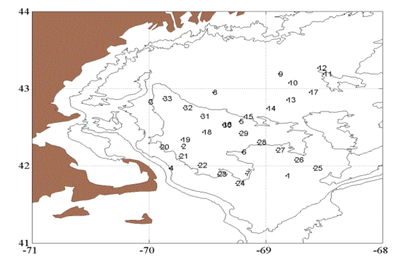
OBJECTIVES

- Statistics of water masses
- Water mass models
- Temperature and salinity feature models
- Volumetric analysis and dynamics

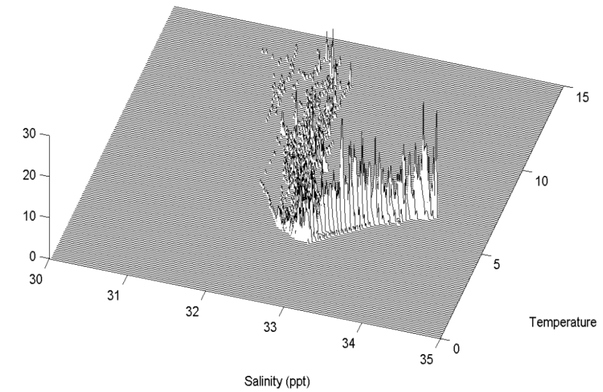
REGION AND DYNAMICS



DATA



WORTHINGTON 3D T, S



CLUSTER MODEL

Distance function

$$F_D = T_n^2 + S_n^2 + d_n^2$$

where

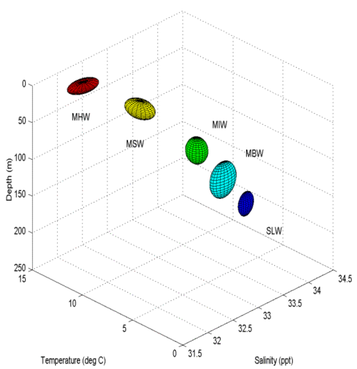
$$T_n = \Delta T_c / \sigma_T, S_n = \Delta S_c / \sigma_S, d_n = \Delta d_c / \sigma_d$$

TABLE 1. Statistics for water masses obtained by cluster analysis.

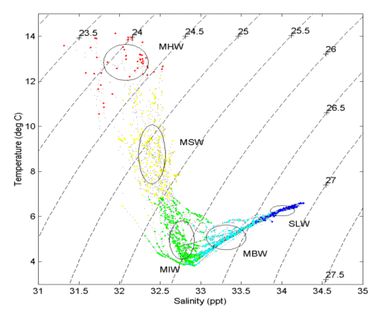
Water mass	No. of samples	Depth (m)	Temperature	Mean T	σ_T	Salinity	Mean S	σ_S
MHW	51	0–20	10.55–14.12	12.84	0.8	31.32–32.53	32.08	0.27
MSW	196	0–45	5.84–12.12	8.77	1.31	31.99–32.74	32.4	0.16
MIW	351	30–100	3.81–7.23	4.96	0.86	32.31–33.13	32.77	0.15
MBW	248	80–180	3.85–6.20	5.07	0.55	32.32–33.94	33.31	0.24
SLW	79	160–220	5.72–6.61	6.26	0.23	33.68–34.27	34.01	0.15

WATER MASSES

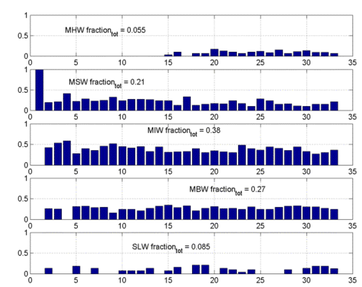
ELLIPSOIDS



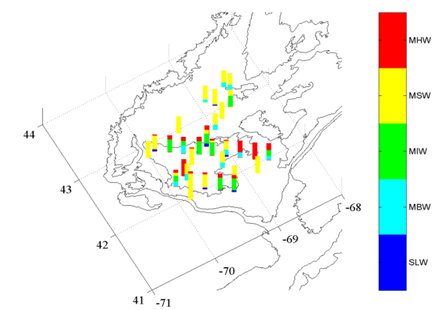
T, S DIAGRAM



VOLUME FRACTIONS



VOLUMETERIC DYNAMICS



SUMARRY

- Deduced the water masses contained in the June 82 data set
- Found one new surface water mass, MHW
- Charted the temperature, salinity, and depth space occupied by the water masses
- Defined the water mass boundaries
- Related the water mass occupancy percentages to the dynamics
- Evolved a water mass based feature model
- Analyzed the water mass statistics

FEATURE MODELS

EOF ANALYSIS

$$\alpha_{i,j} = \overline{T} - T_{i,j}$$

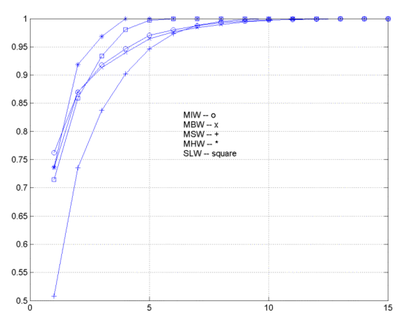
$$A = A_{MHW} + A_{MSW} + A_{MIW} + A_{MBW} + A_{SLW}$$

$$A_m = A_{MHW}, A_{MSW}, A_{MIW}, A_{MBW}, A_{SLW}$$

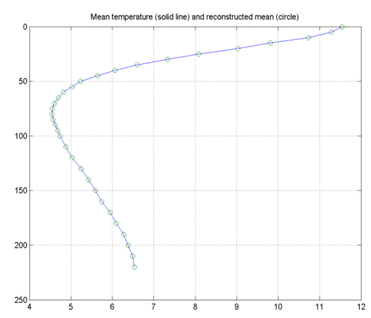
$$A_m A_m^T u_i = \lambda_i^2 u_i$$

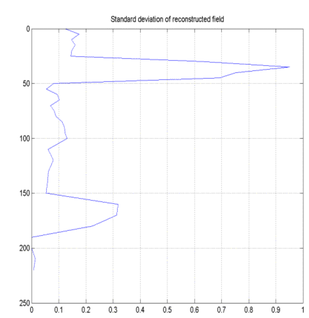
$$A_m = \sum_{i=1}^{k} u_i \lambda_i v_i^T$$

INDIVIDUAL SYNTHESIS ERRORS



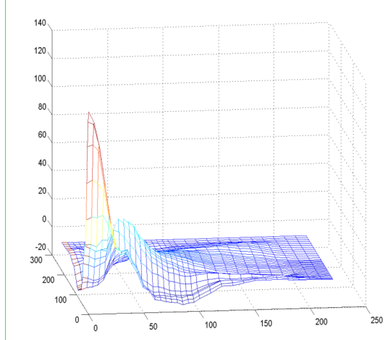
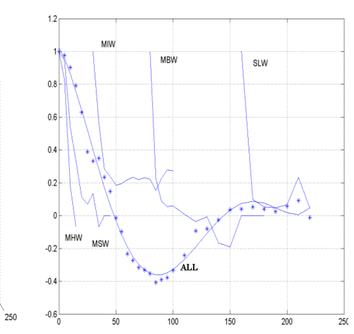
WHOLE FIELD SYNTHESIS ERROR





STATISTICS

COVARIANCE



CORRELATIONS