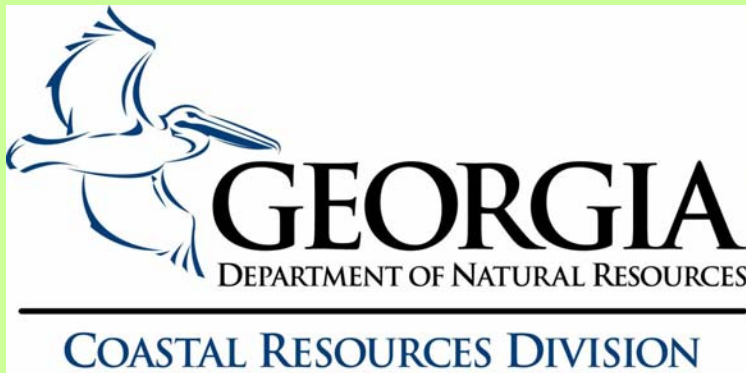


Large-scale patterns of oxygen availability in GA estuaries

William Savidge



Regional Forcing by Light on Dissolved Oxygen Levels in Shallow Temperate Estuaries

Anna M. Sawabini & David R. Schlezinger & Miles A. Sundermeyer & Brian L. Howes

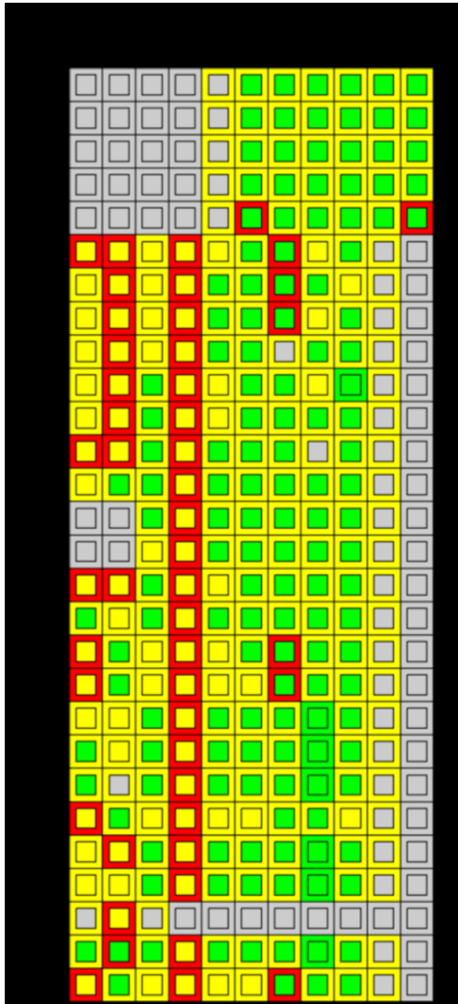
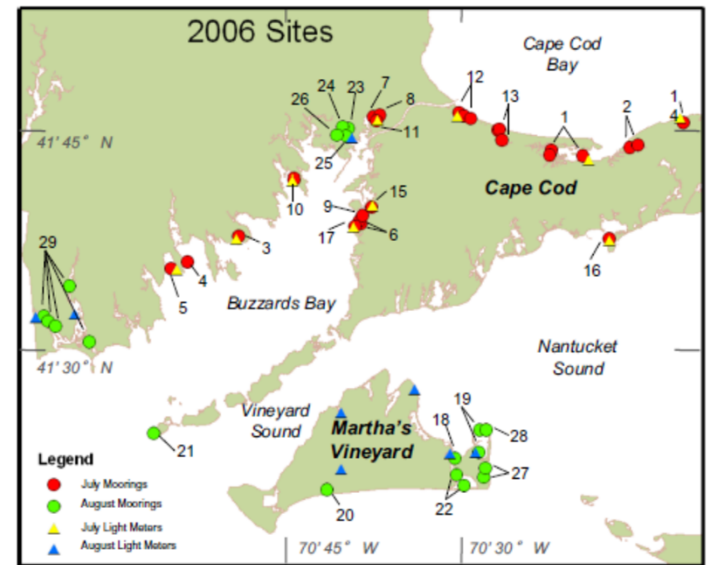


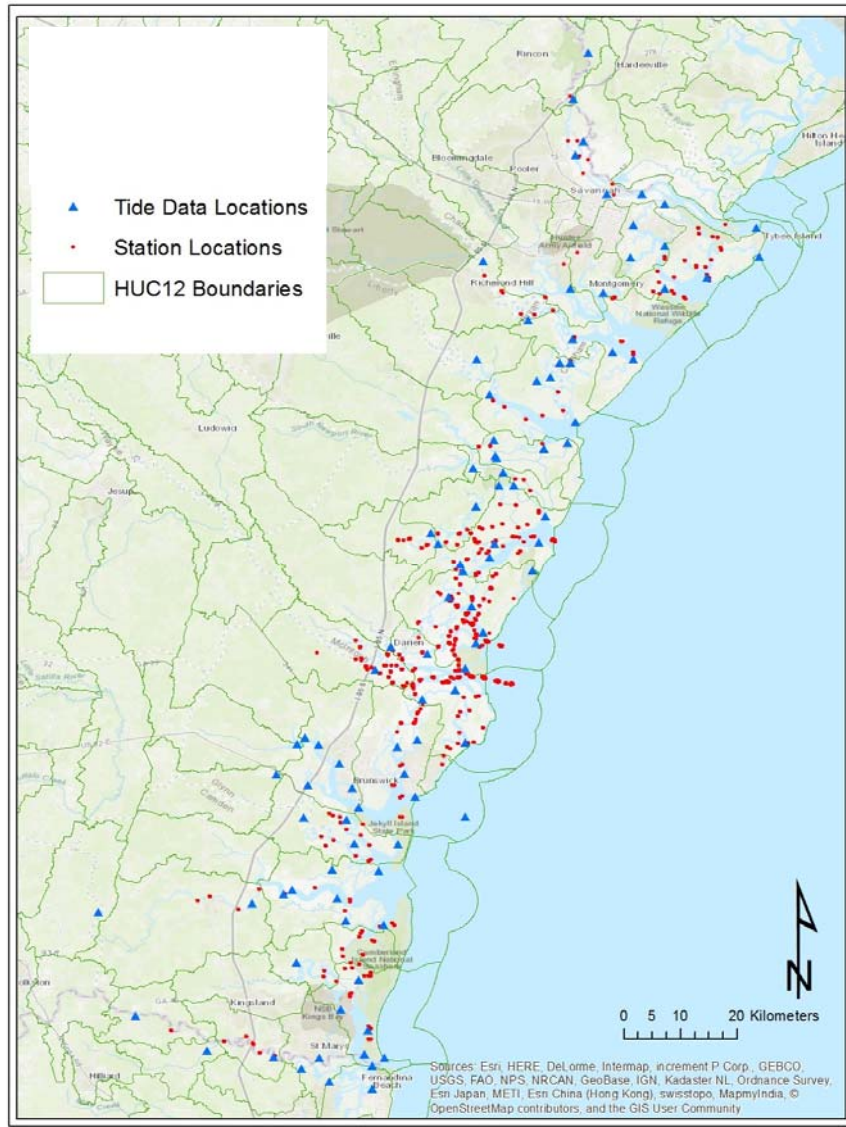
Fig. 1 Locations of estuarine moored instruments and surface light measurements in southeastern Massachusetts, summer 2006. Bottom-water moorings are shown for July (*red circles*) and August (*green circles*) deployments. Light meters deployed on land to measure photosynthetically active radiation are also shown for July (*yellow triangles*) and August (*blue triangles*)



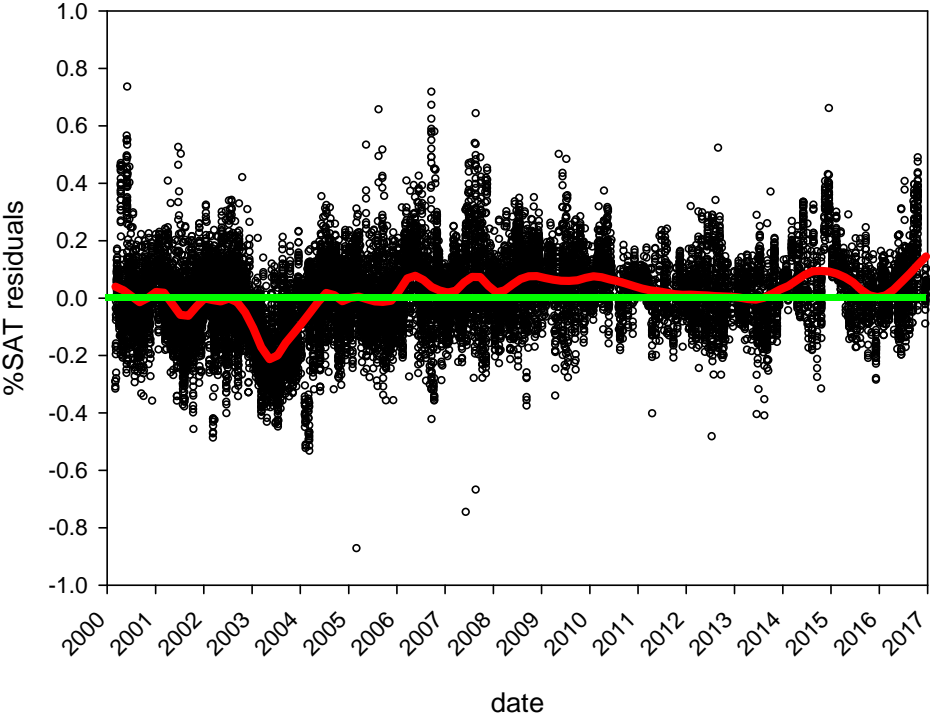
SOURCE	DATES	# OBSERVATIONS	INCLUDED?
GA-DNR	2000-2016	16700	Y
GCE-LTER	2000-2004	700	Y
SINERR	2000-2016	“60 SONDE-YEARS” 34805	N
USGS	2007-2016	38048	N
GSU-Phinzy	2014-2016	720	N
SkIO (Savidge 1)	2009-2011	690	N
SkIO (Groves Creek)	2013-2015	-	N
SkIO (Savidge 2)	2016	13	N
SkIO (Maruya)	2004	-	N
SkIO (ACT)	2004	-	N
SkIO (Frischer)	2004-2016	-	N
GARLMER			N

Description of environmental variables used in this study

VARIABLE CLUSTER	DESCRIPTION	SOURCE
TEMP & SAL		DNR Field Sampling
TIDAL INDICES	Indices of tidal height, speed, and velocity (-1,1)	Interpolation of NOAA tidal data
WINDS	24, 48, 96 hour summations of long-shore and cross-shore wind stress	NOAA weather station data from Fernandina and Brunswick
INSOLATION	1-7 day summations of incident light	Coastal AEMN weather station data interpolated to station latitude
RIVER DISCHARGE	1, 3, 7, 14, & 28 day cumulative discharge	USGS gages



DO %SAT AND POTENTIAL ENVIRONMENTAL DRIVERS DIFFER IN STRENGTH BETWEEN YEARS?



Interannual variation in the mean %SAT residuals. Years sharing the same letter are not significantly different.

2014	A								.0998	
2010		B							.0642	
2009		B							.0605	
2016		B							.0579	
2006		B							.0553	
2008		B	C						.0517	
2007		B	C						.0495	
2015			C	D					.0324	
2011				D	E				.0249	
2012					E	F			.0056	
2000					E	F			.0048	
2013						F	G		-.0036	
2005						F	G		-.0045	
2002							G	H	-.0158	
2004							G	H	-.0196	
2001								H	-.0291	
2003									I	-.1661

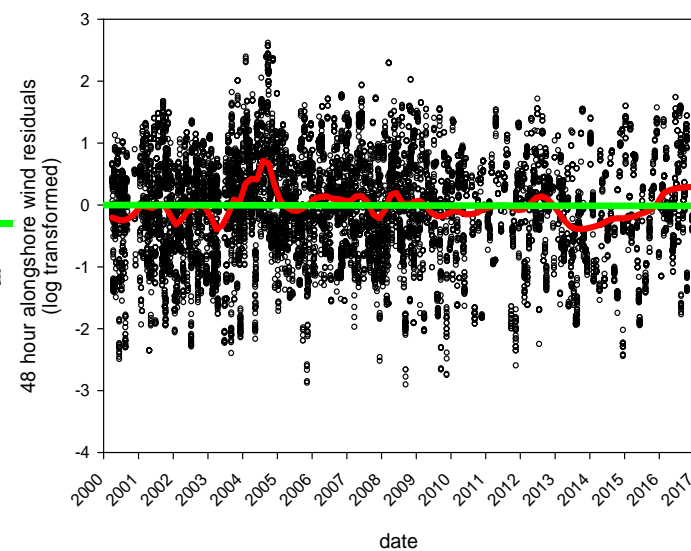
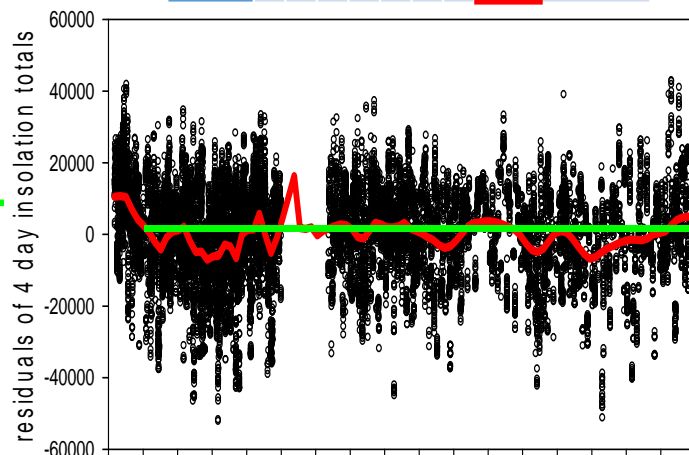
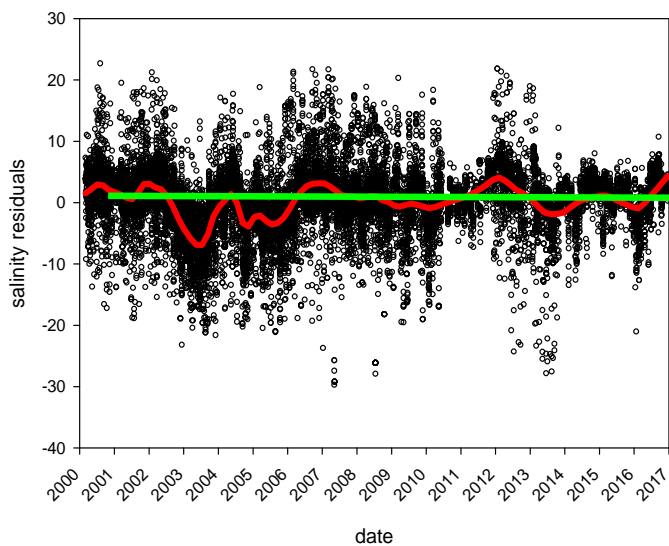


	SAL				RES.
YEAR					
2012	A				2.91
2000	A	B			2.47
2011	A	B	C		1.98
2006		B	C		1.95
2007		B	C		1.85
2001			C		1.69
2015				D	0.65
2014				D	0.65
2008				D	.057
2016				D	0.52
2002				D	0.36
2009				D	0.18
2004				E	-0.94
2010				E	-0.99
2013				E	-1.34
2005				F	-2.65
2003				G	-5.18

Table 7: Differences in the SOL4 light flux residuals among years. Years having the same letter are not significantly different (Tukey's HSD, experimentwise $\alpha=.05$).

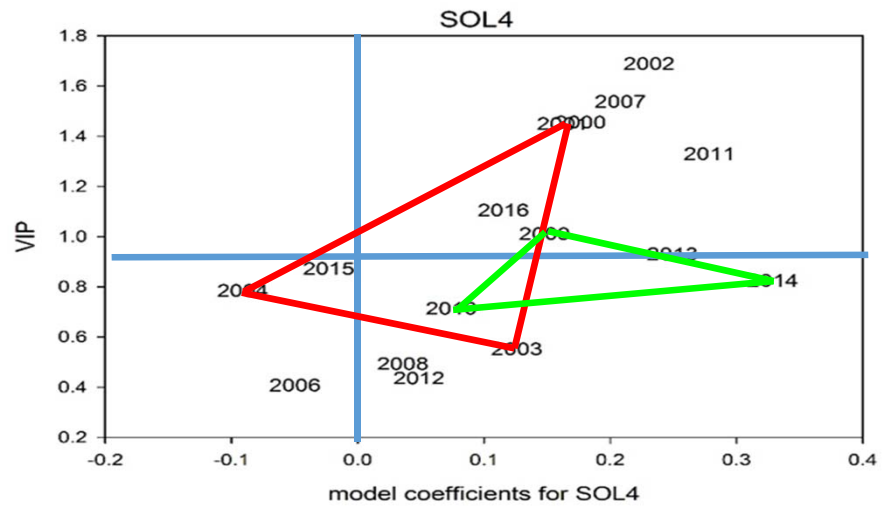
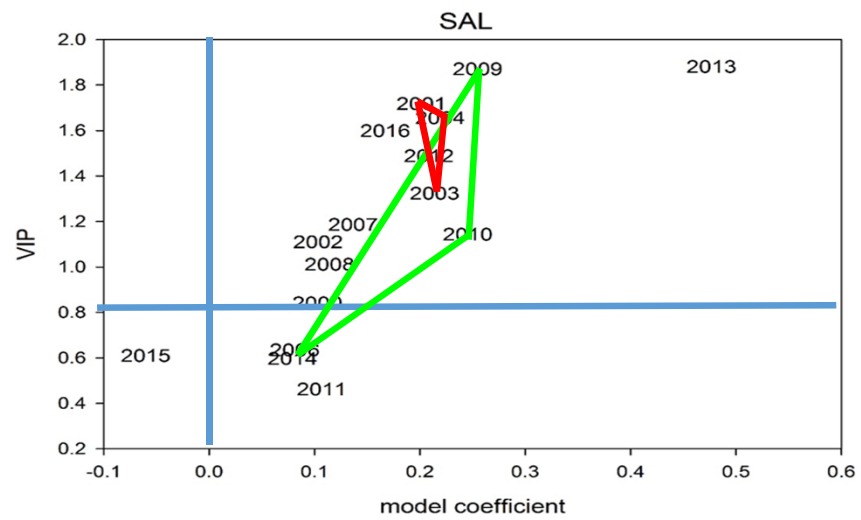
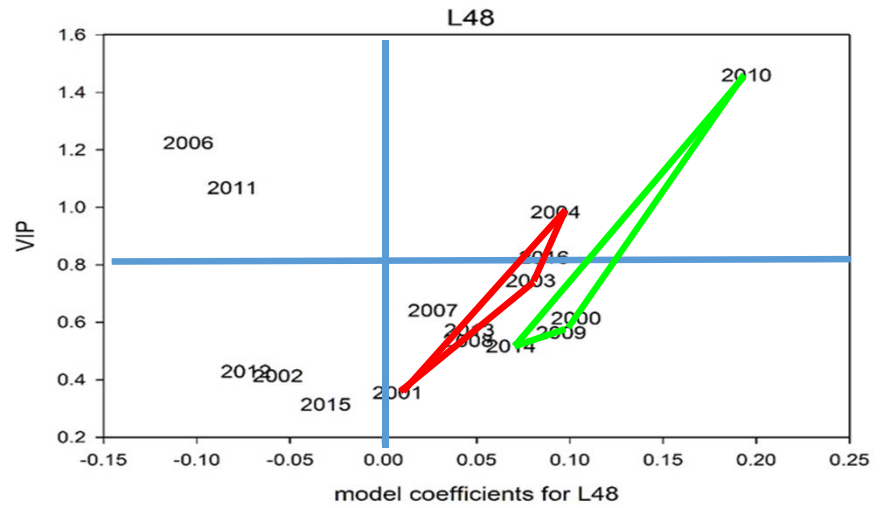
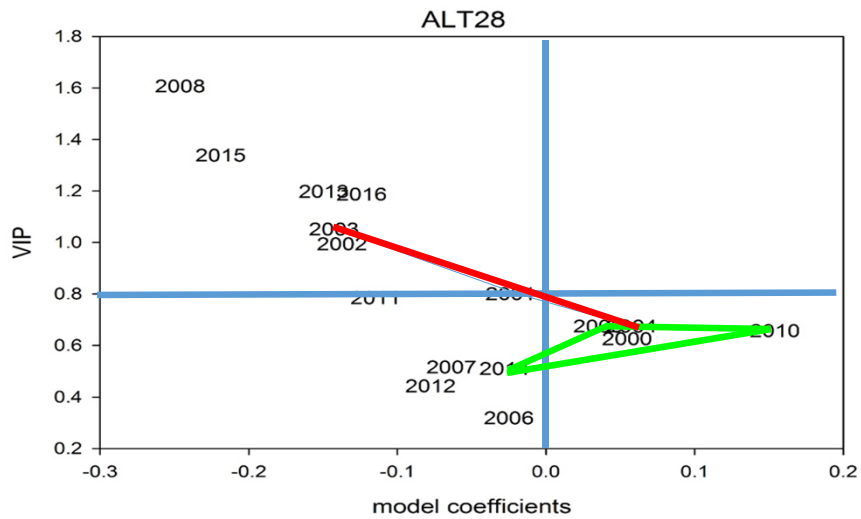
YEAR					RESIDUAL				
2000	A				7934				
2016	B				3296				
2010	B	C			2953				
2006	B	C			2603				
2011	B	C	D		1823				
2008	B	C	D		1738				
2007		C	D	E	1040				
2004			D	E	F	238			
2001				E	F	G	-528		
2013				F	G	H	-1449		
2009						H	I	-2536	
2015						G	H	I	-2580
2014						G	H	I	-2605
2003							H	I	-3155
2002							H	I	-3327
2012								I	-3889

	Along-shore 48 hours										
2004	A							.54			
2016		B						.24			
2012		B	C					.10			
2006			C					.07			
2008			C	D				.04			
2007			C	D	E			.02			
2001			C	D	E	F		-.02			
2011			C	D	E	F	G	-.03			
2015			C	D	E	F	G	-.04			
2005				D	E	F	G	-.06			
2010					E	F	G	H	-.11		
2003							G	H	-.13		
2009						F	G	H	-.13		
2002							G	H	-.15		
2000								H	I	-.25	
2014									I	-.30	
2013										I	-.36



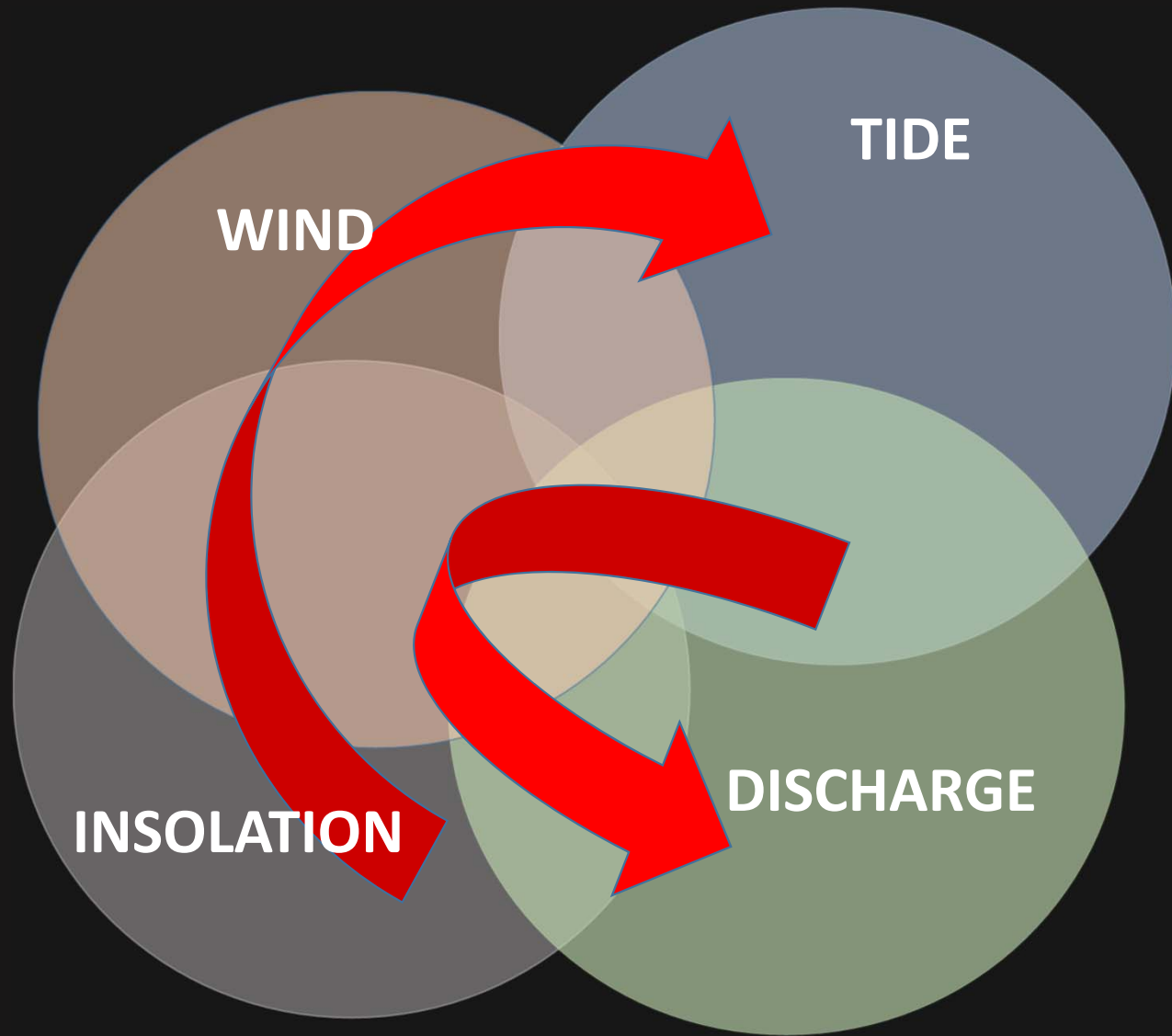
WHAT PROCESSES CONTRIBUTE SIGNIFICANTLY TO THE INTERANNUAL VARIABILITY OF %SAT?

HOW DO THEY AFFECT THE SEASONAL EXPRESSION OF %SAT VARIABILITY?

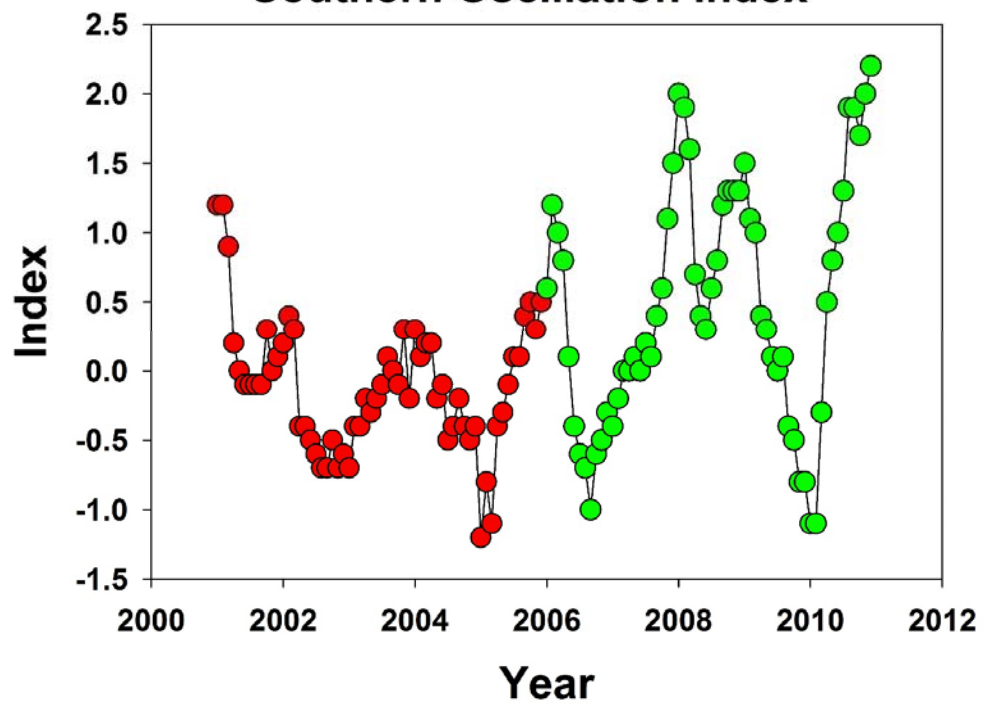


P-values of rank correlation of annual means
of environmental variables

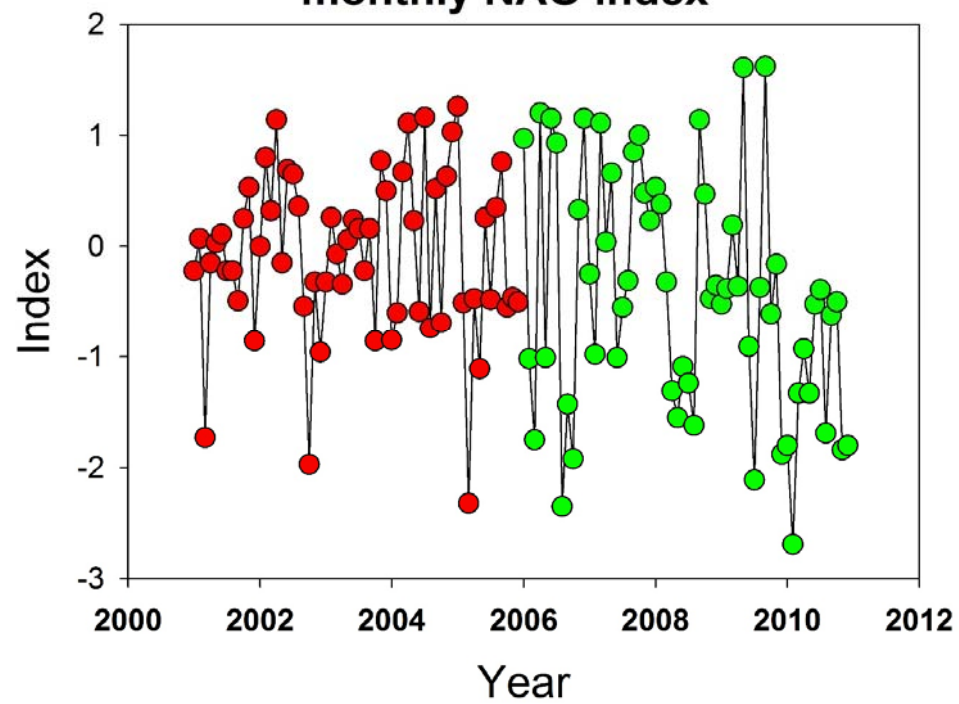
	TIDEHT	TEMP	SAL	X48	L48	SOL4	ALT28
%SATres	.72	.52	.38	.69	.76	(+).08	.82
TIDEHT		.87	.92	.51	.74	.21	.59
TEMP			(+).06	.94	(+).09	.79	(-).06
SAL				.39	.12	.83	(-)0.0
X48					(+).07	(+).001	.93
L48						.15	(-).05
SOL4							.81



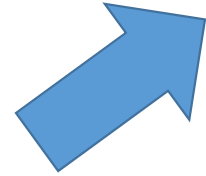
Southern Oscillation Index



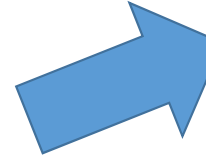
monthly NAO index



INSIDIOUS ALIASING!



TIDES



TIME OF DAY



LOCATION/TIMING



SAMPLING DENSITY