

**APPENDIX B**  
**MODEL RESULTS**

# UPHAM BEACH STABILIZATION PROJECT

## APPENDIX B

### NUMERICAL MODELING RESULTS

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## I. 2004 Conditions

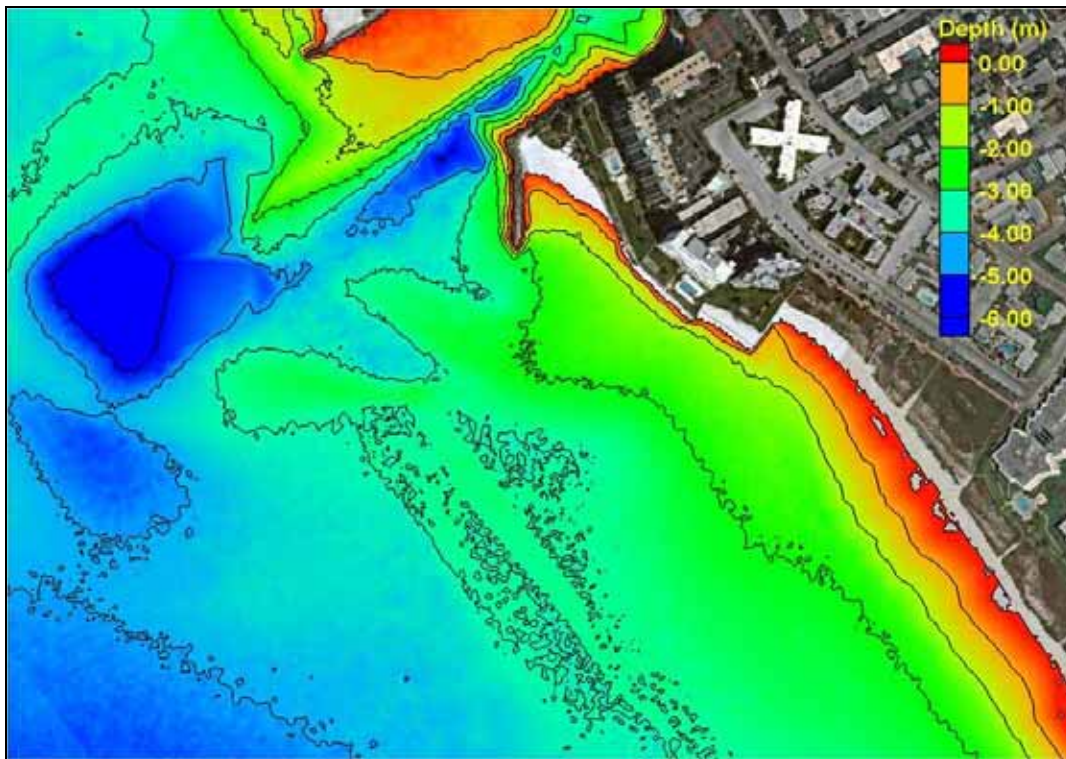


Figure 1. 2004 Bathymetry.

## 2004 Conditions, Cold Front A

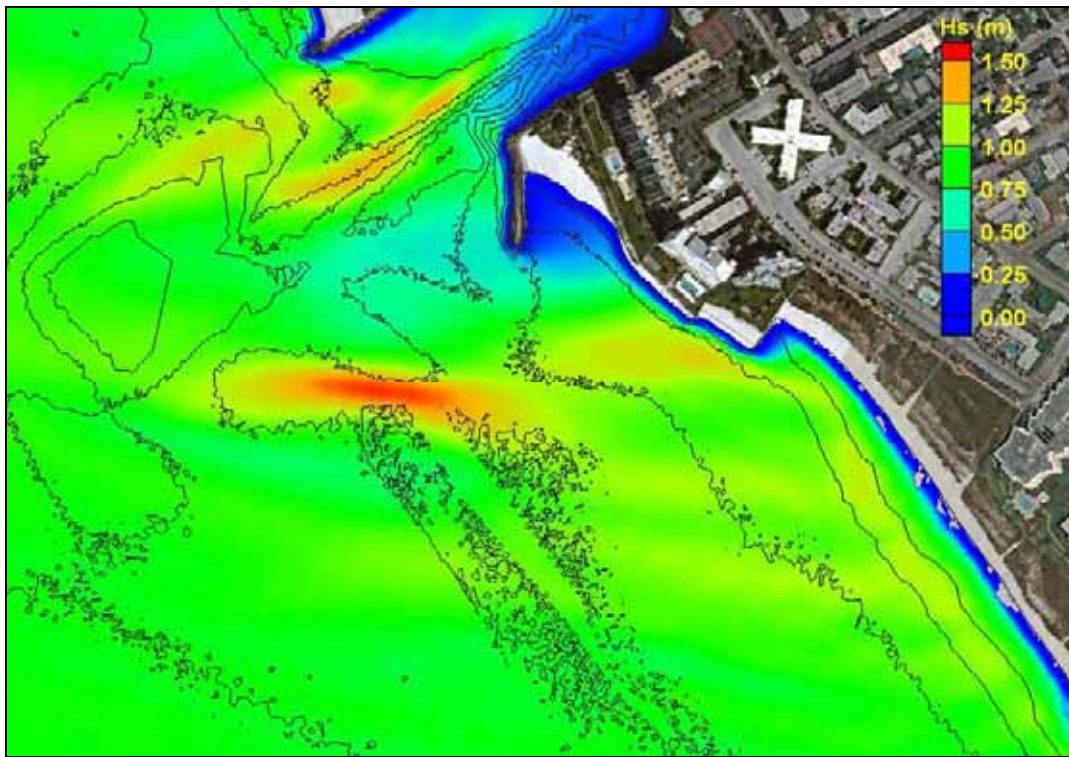


Figure 2. Wave Height, Cold Front A.

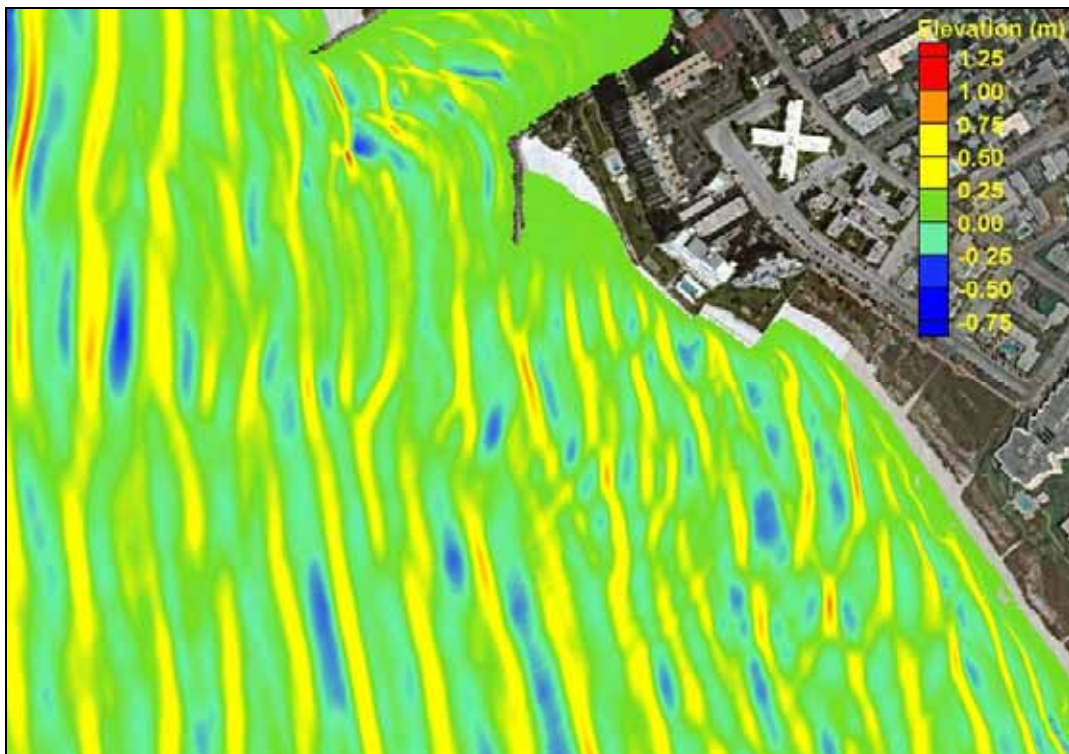


Figure 3. Surface Elevation, Cold Front A.



## 2004 Conditions, Cold Front A



Figure 4. Wave Breaking, Cold Front A.



Figure 5. Wave Breaking with Currents, Cold Front A.

2004 Conditions, Cold Front A (b)

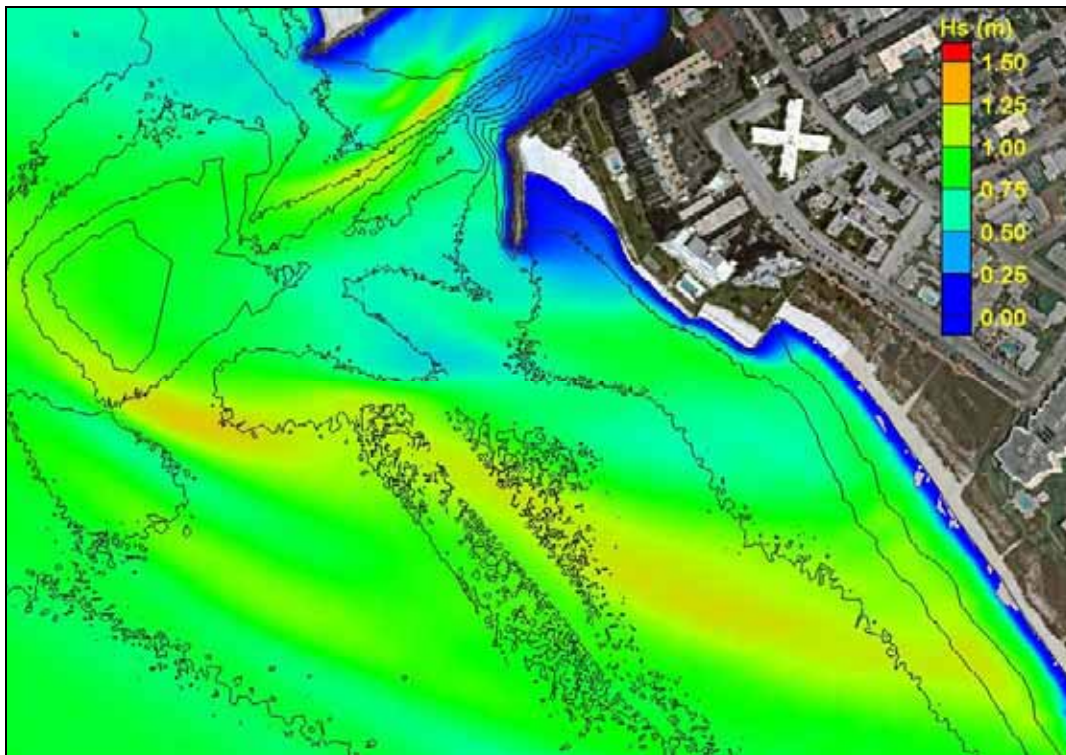


Figure 6. Wave Height, Cold Front A (b).

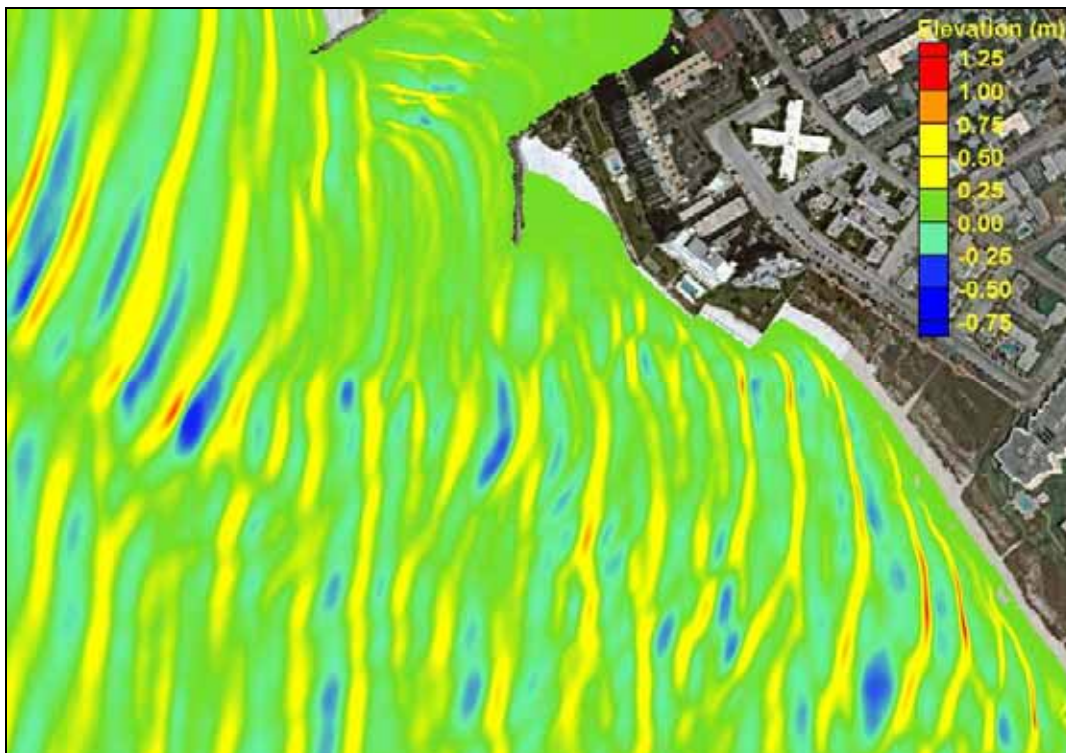


Figure 7. Surface Elevation, Cold Front A (b).



**2004 Conditions, Cold Front A (b)**



Figure 8. Wave Breaking, Cold Front A (b).



Figure 9. Wave Breaking with Currents, Cold Front A (b).

## 2004 Conditions, Cold Front B

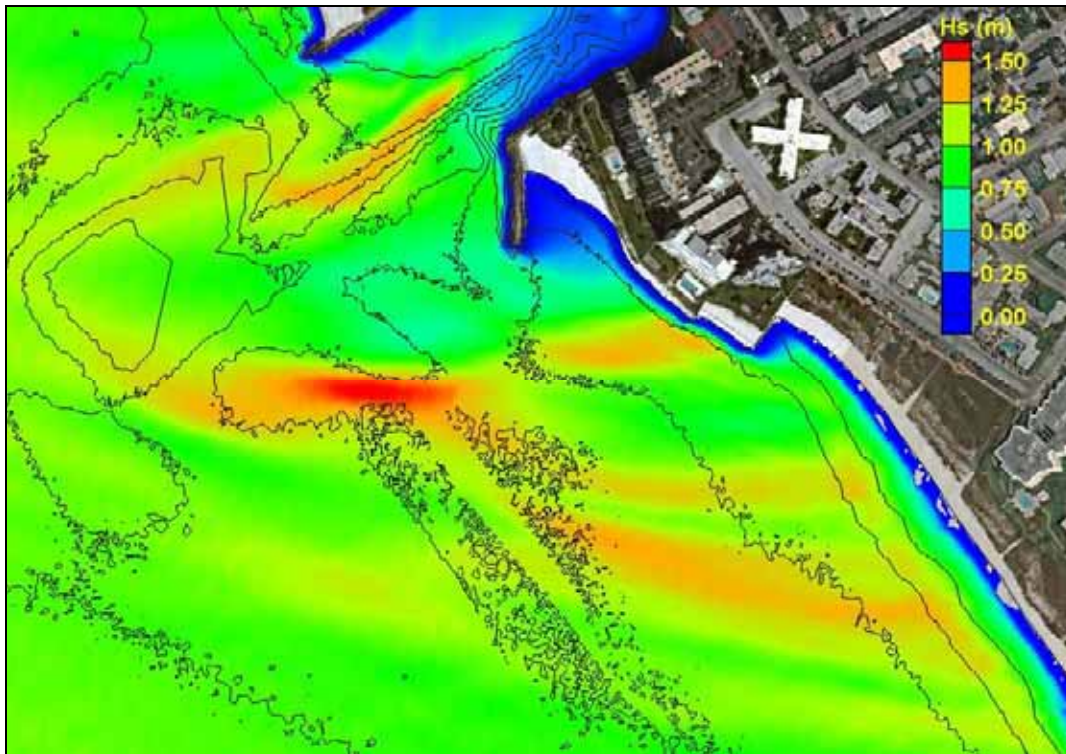


Figure 10. Wave Height, Cold Front B.

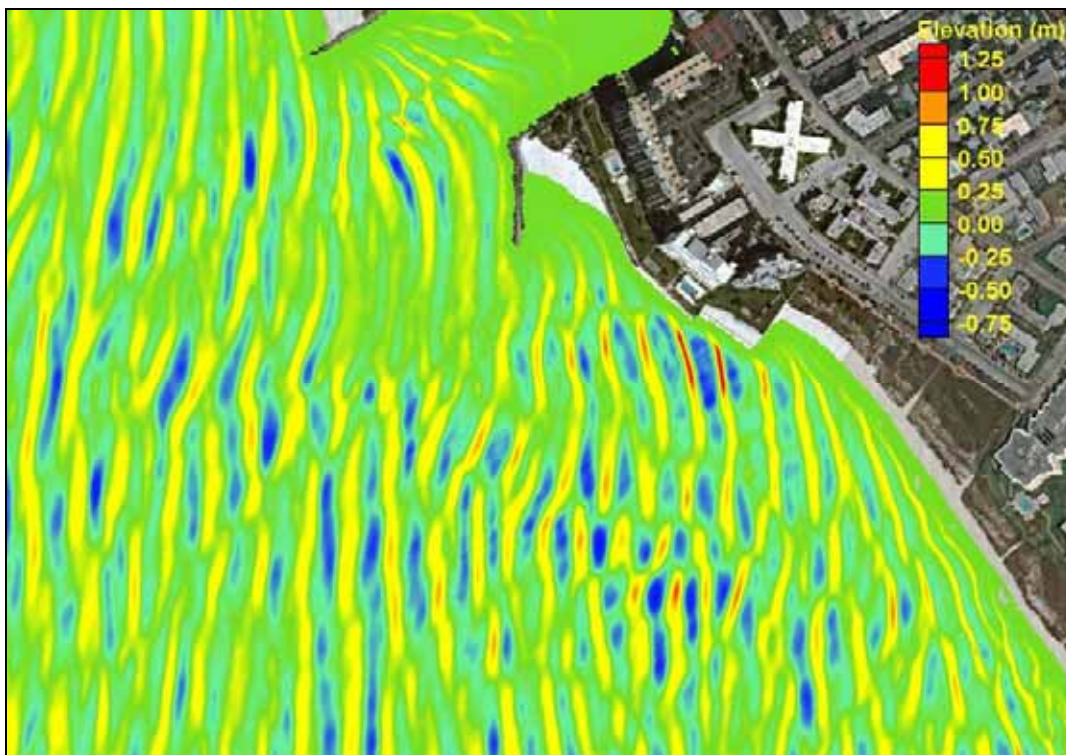


Figure 11. Surface Elevation, Cold Front B.



## 2004 Conditions, Cold Front B



Figure 12. Wave Breaking, Cold Front B.



Figure 13. Wave Breaking with Currents, Cold Front B.

## 2004 Conditions, Hurricane Ivan

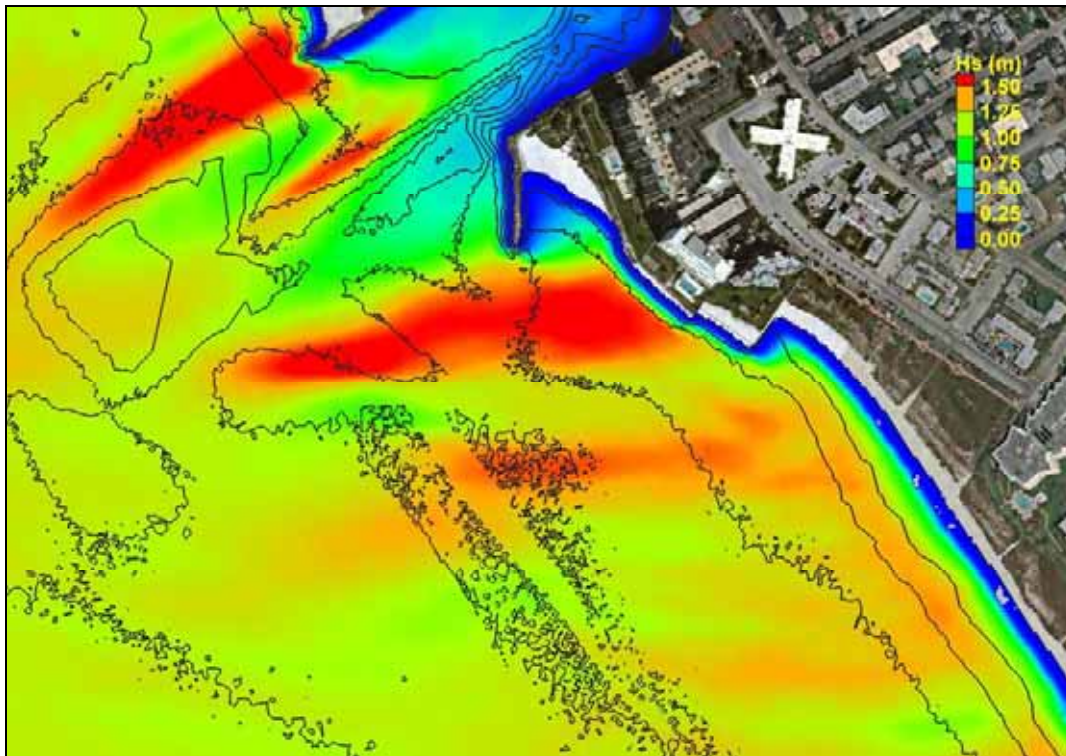


Figure 14. Wave Height, Hurricane Ivan.

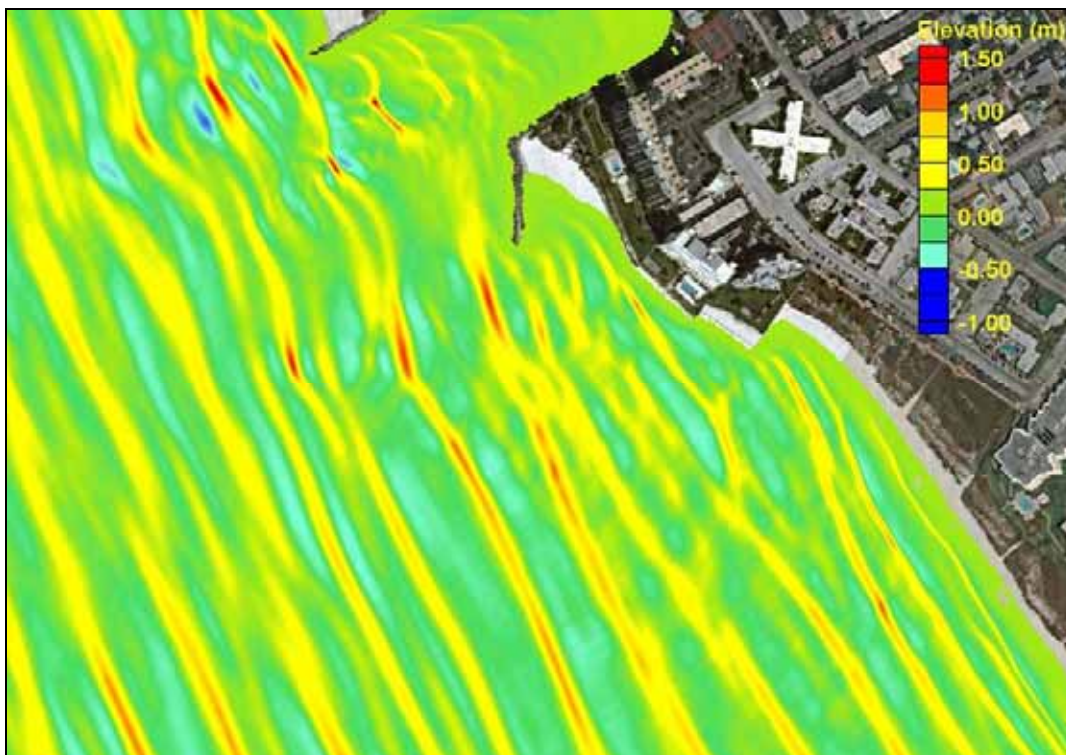


Figure 15. Surface Elevation, Hurricane Ivan.



## 2004 Conditions, Hurricane Ivan



Figure 16. Wave Breaking, Hurricane Ivan.



Figure 17. Wave Breaking with Currents, Hurricane Ivan.

## II. 2006 Conditions

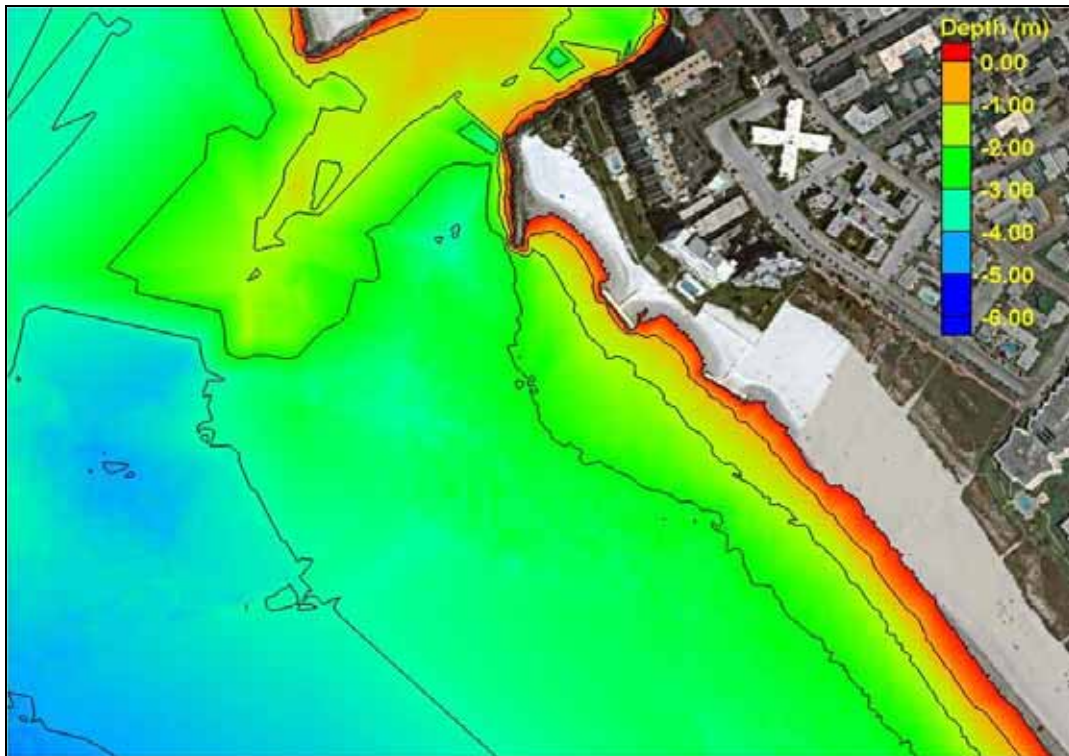


Figure 18. 2006 Bathymetry.



2006 Conditions, Cold Front A

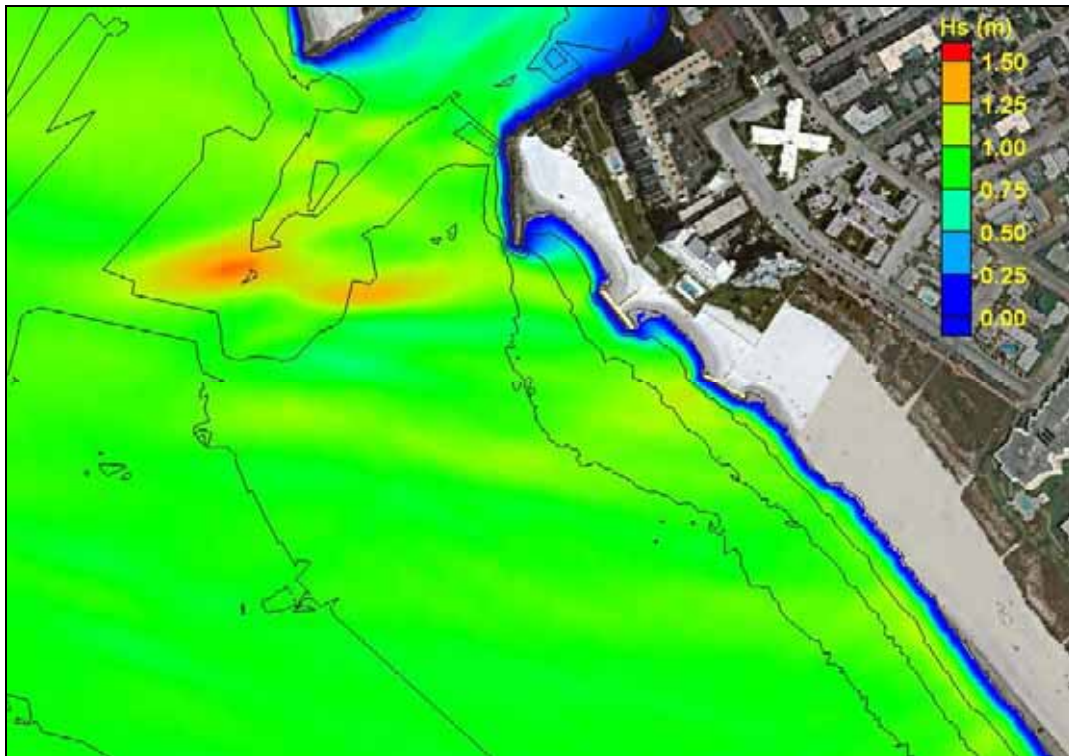


Figure 19. Wave Height, Cold Front A.

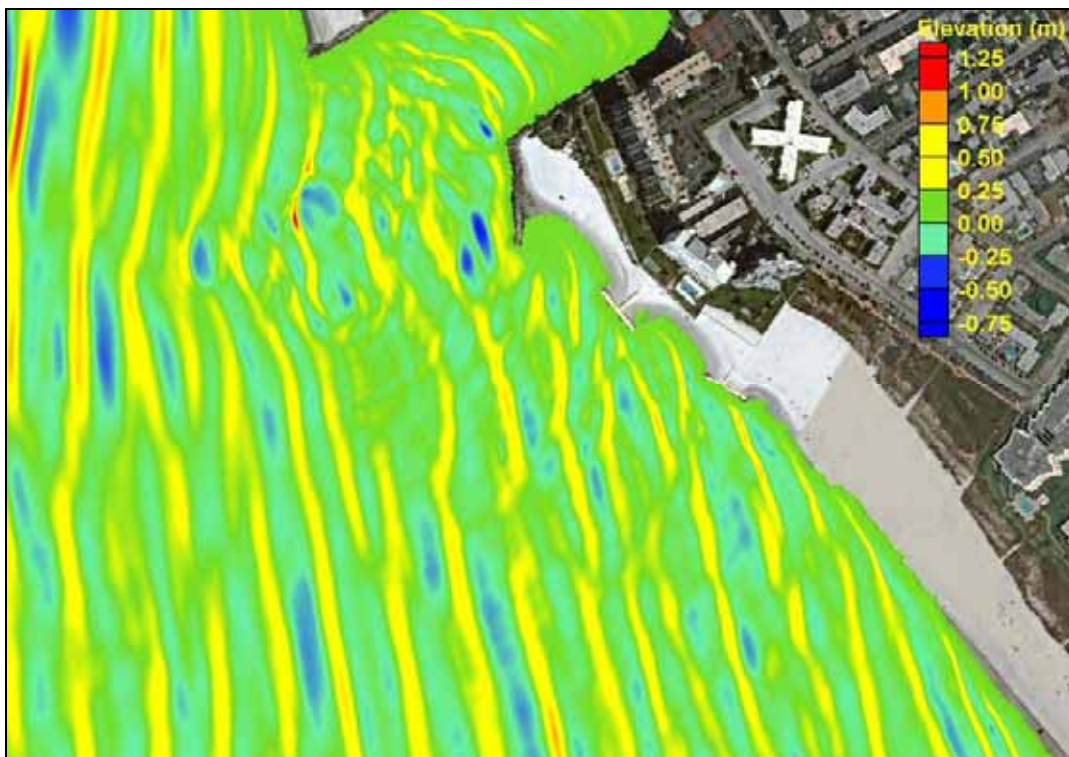


Figure 20. Surface Elevation, Cold Front A.

## 2006 Conditions, Cold Front A



Figure 21. Wave Breaking, Cold Front A.

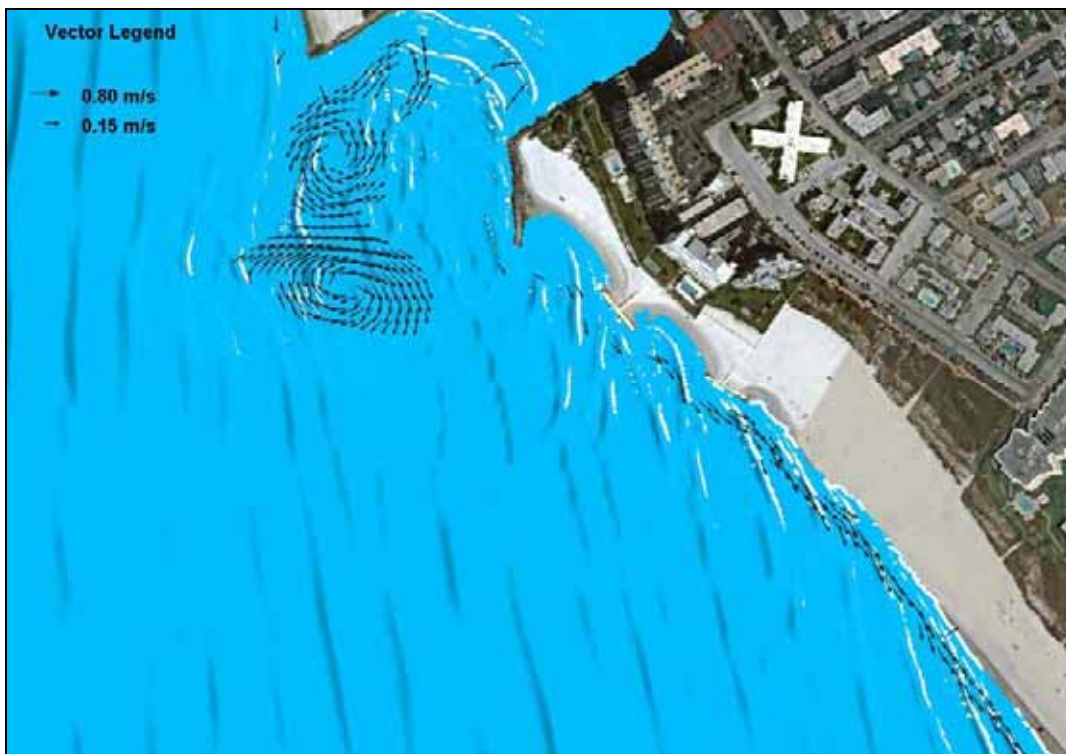


Figure 22. Wave Breaking with Currents, Cold Front A.



2006 Conditions, Cold Front A (b)

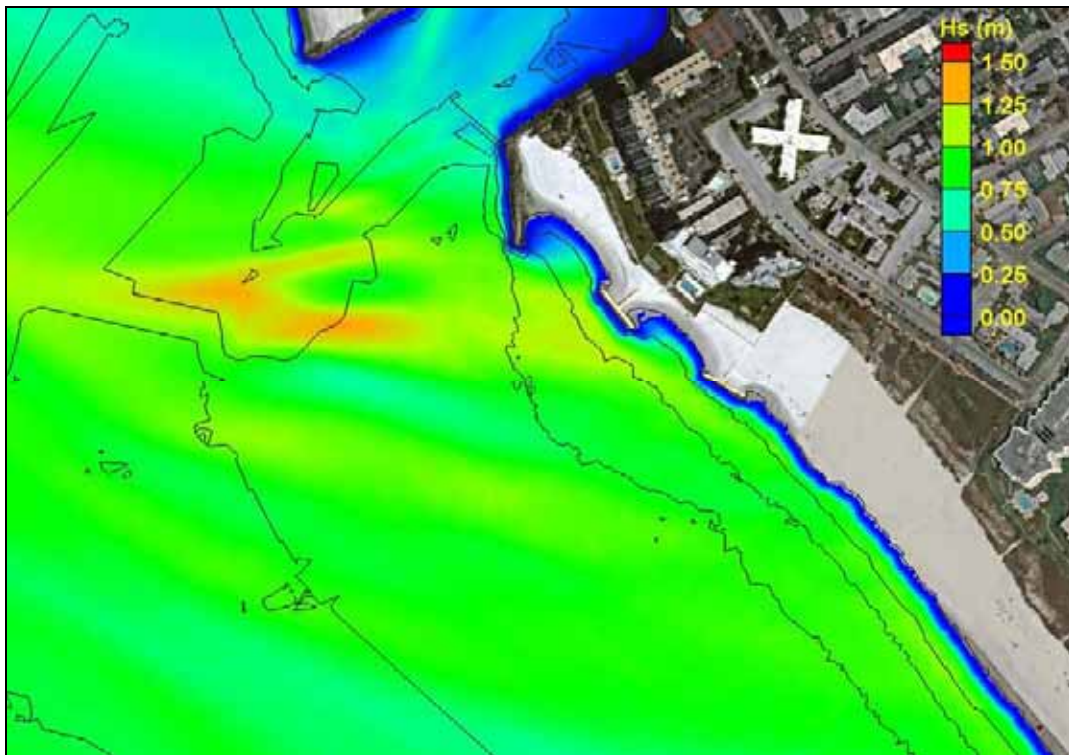


Figure 23. Wave Height, Cold Front A (b).

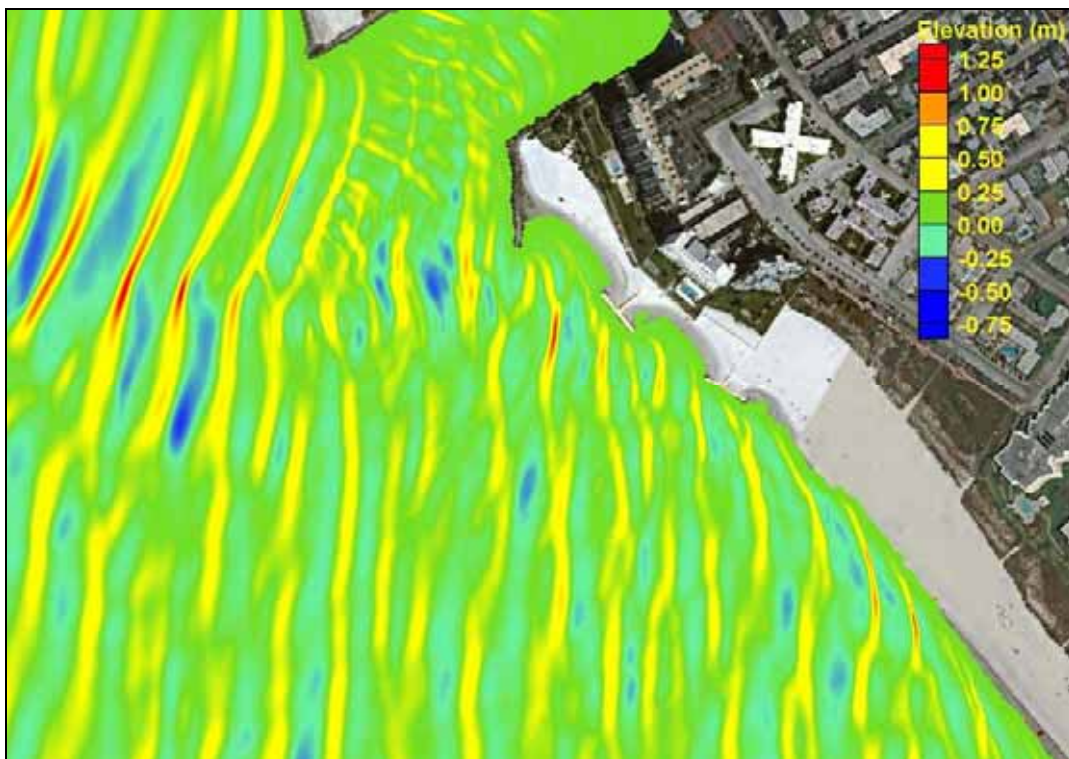


Figure 24. Surface Elevation, Cold Front A (b).

**2006 Conditions, Cold Front A (b)**



Figure 25. Wave Breaking, Cold Front A (b).

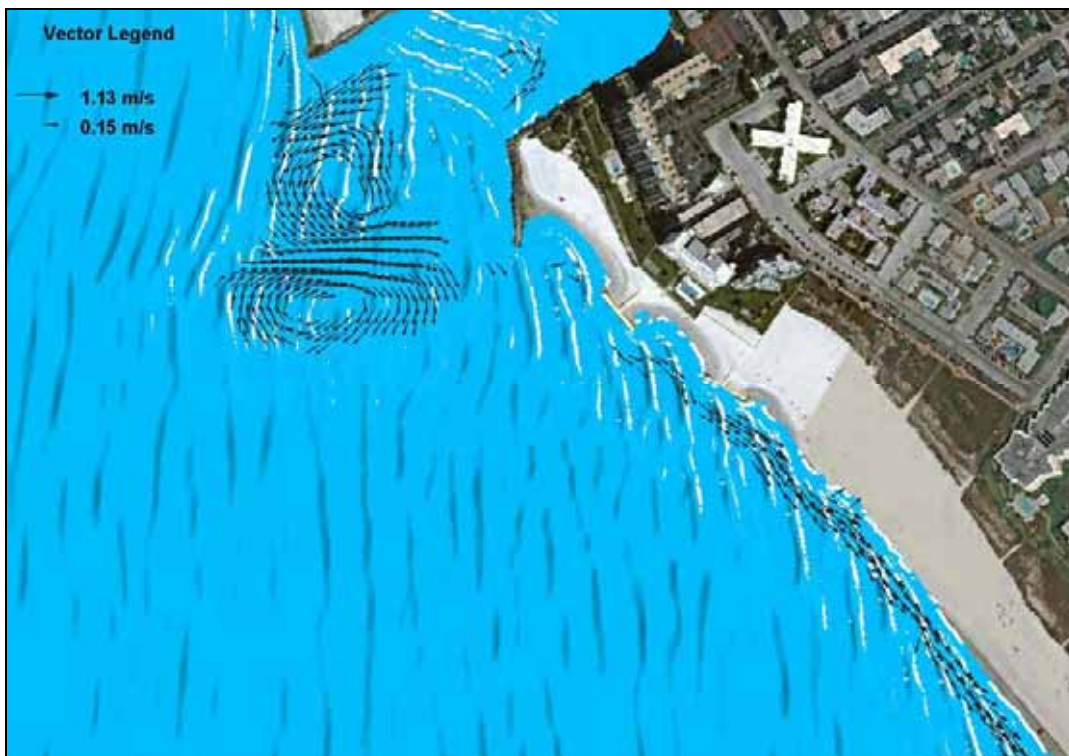


Figure 26. Wave Breaking with Currents, Cold Front A (b).



## 2006 Conditions, Cold Front B

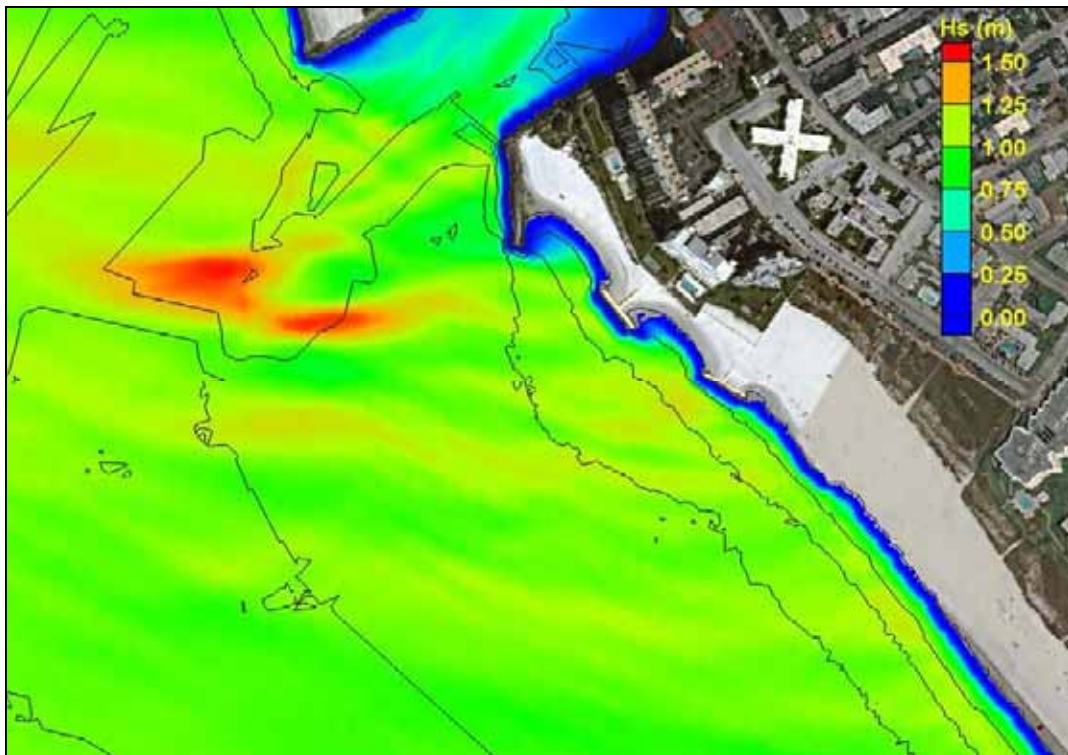


Figure 27. Wave Height, Cold Front B.

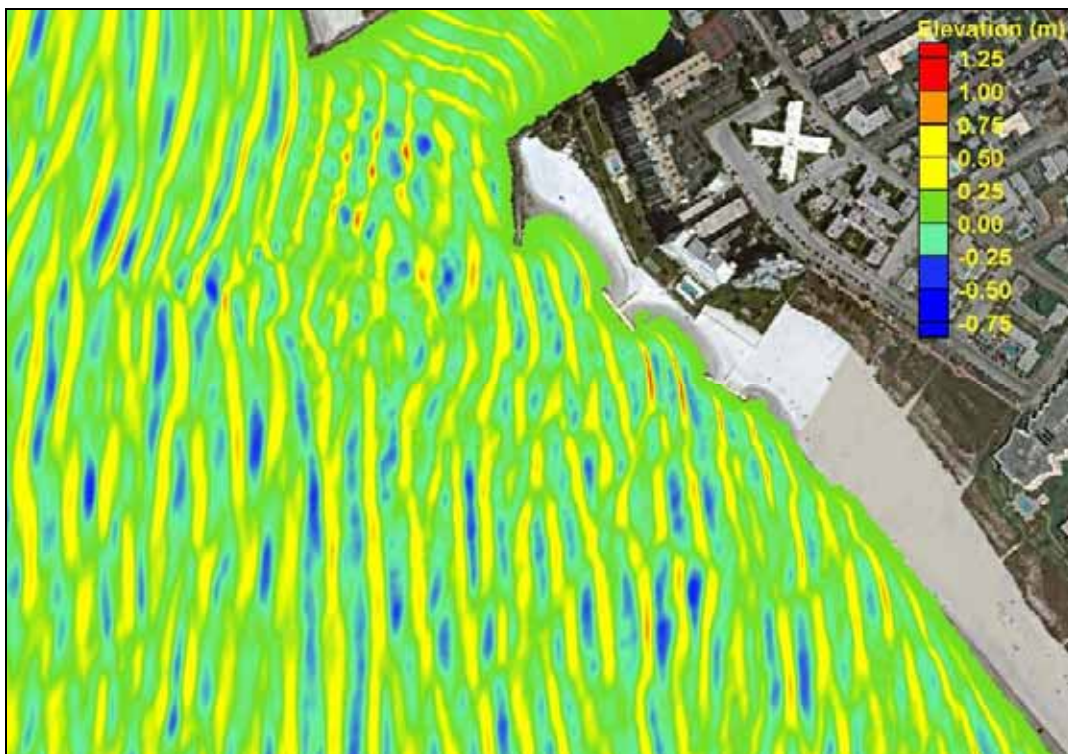


Figure 28. Surface Elevation, Cold Front B.

## 2006 Conditions, Cold Front B



Figure 29. Wave Breaking, Cold Front B.

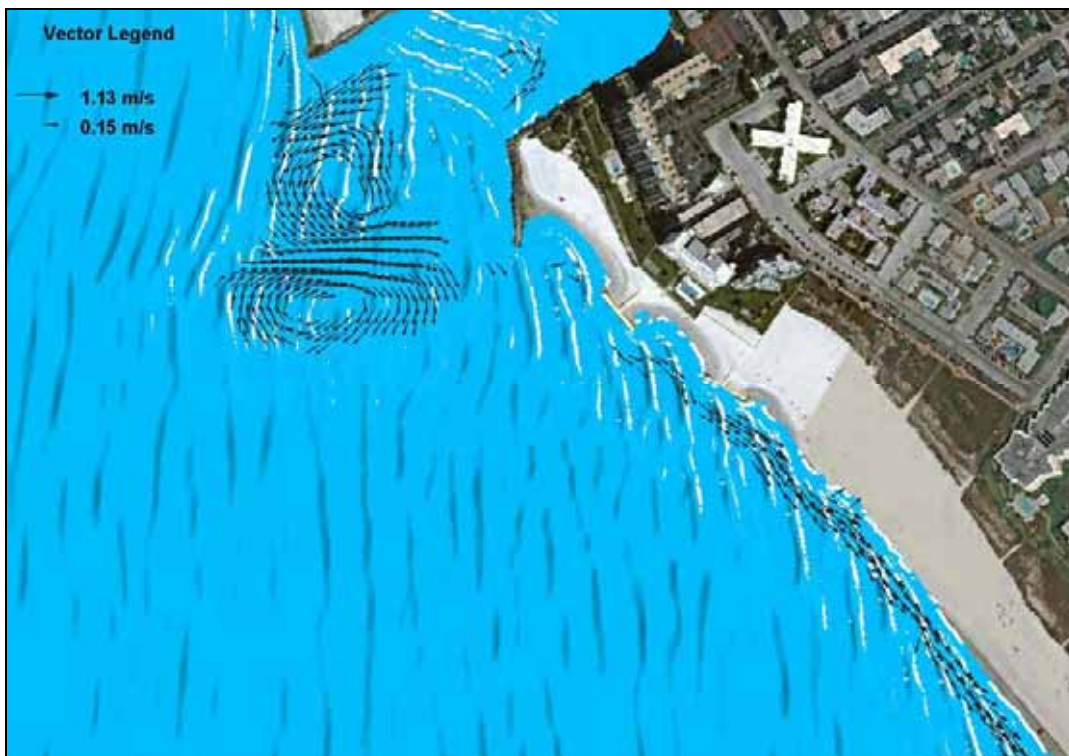


Figure 30. Wave Breaking with Currents, Cold Front B.



## 2006 Conditions, Hurricane Ivan

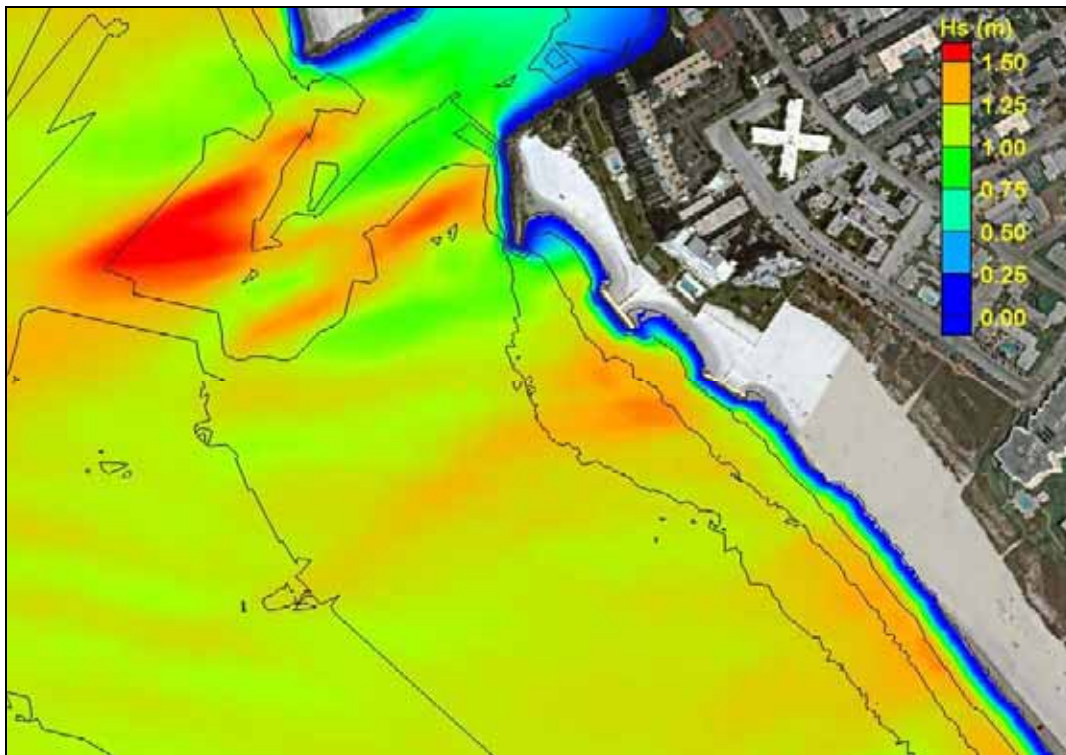


Figure 31. Wave Height, Hurricane Ivan.

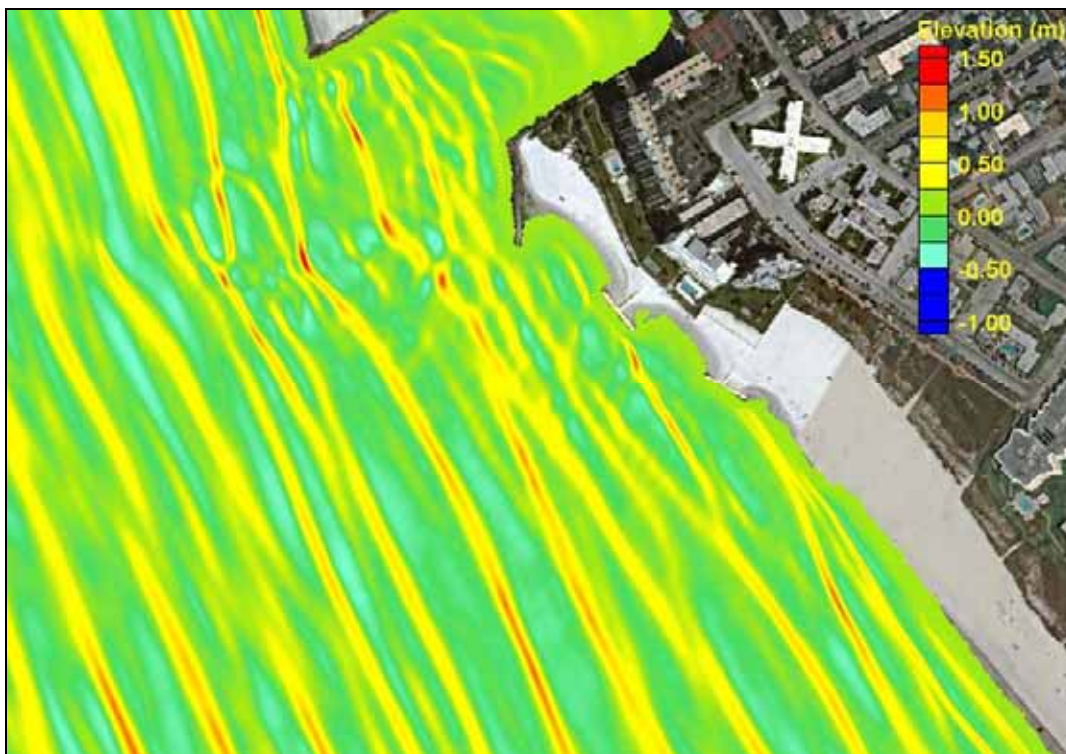


Figure 32. Surface Elevation, Hurricane Ivan.

## 2006 Conditions, Hurricane Ivan



Figure 33. Wave Breaking, Hurricane Ivan.

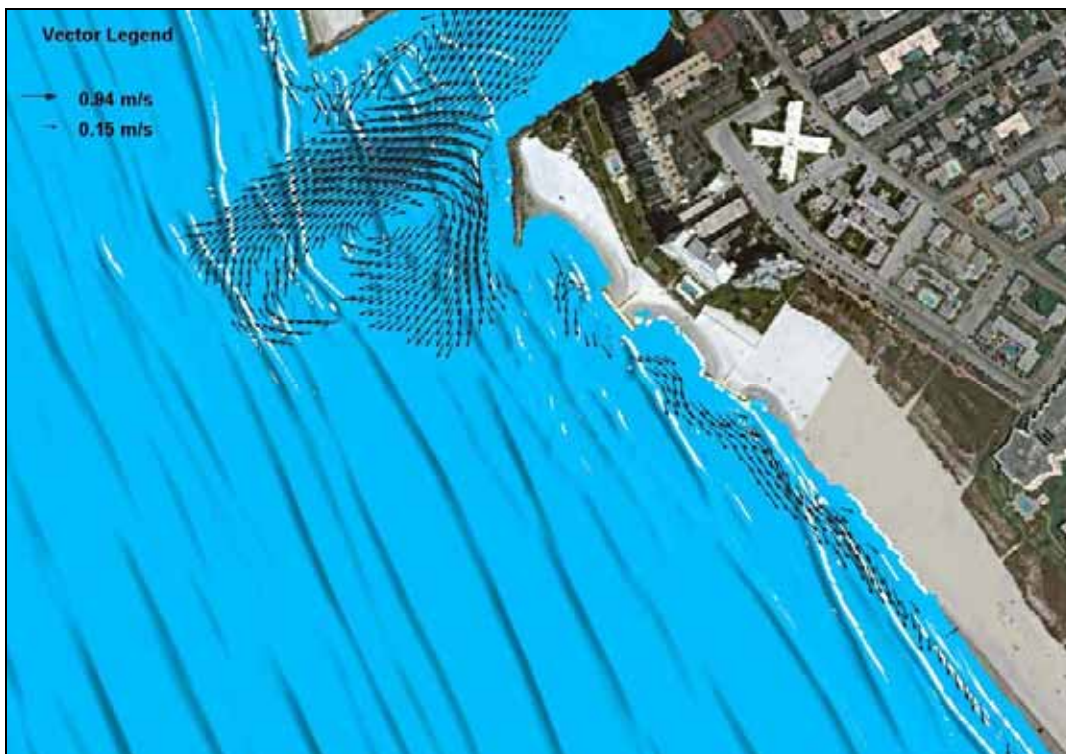


Figure 34 – Wave Breaking and Currents, Hurricane Ivan.



### III. 2009 Conditions

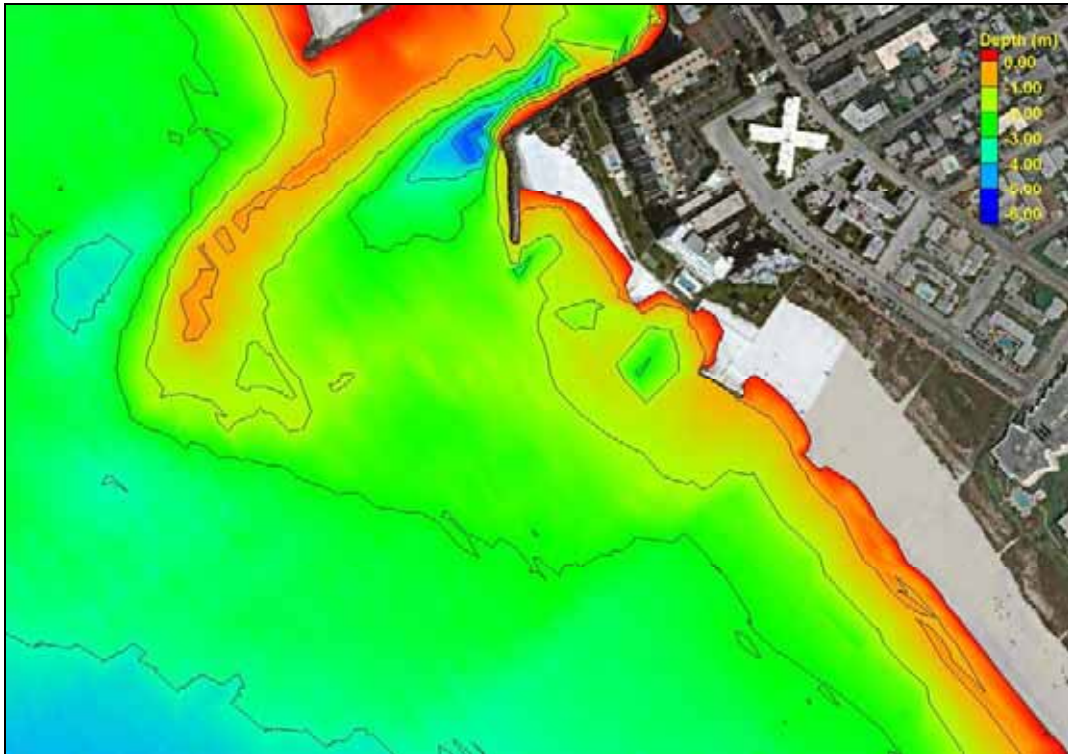


Figure 35. 2009 Bathymetry.

## 2009 Conditions, Cold Front A

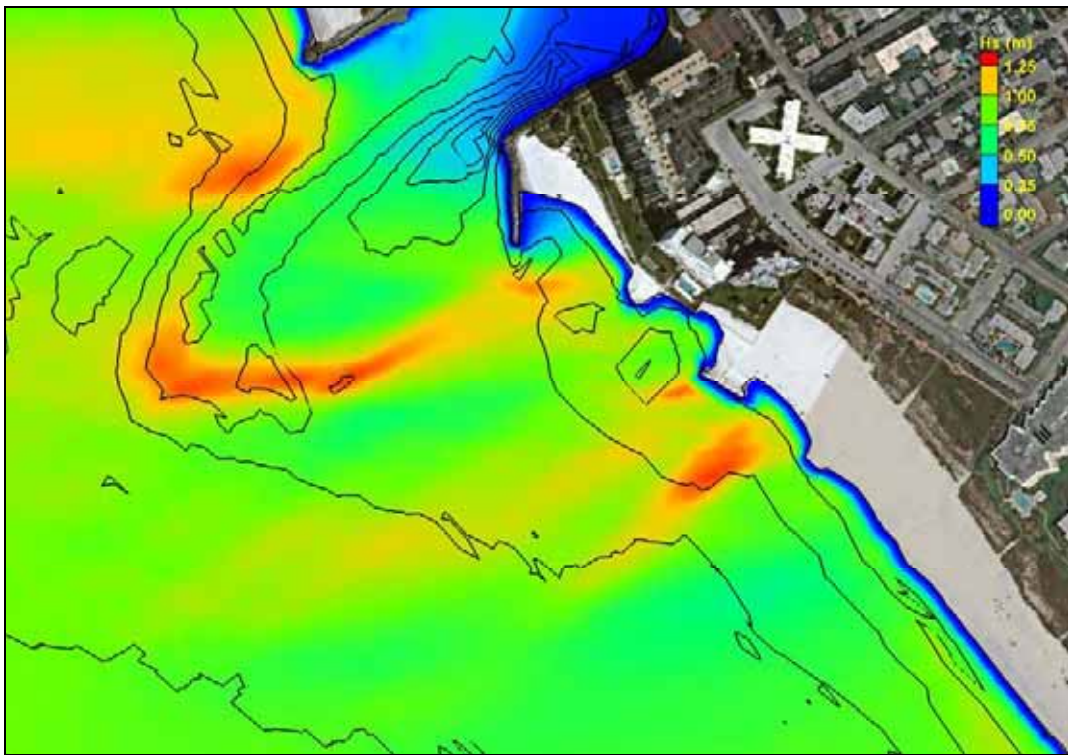


Figure 36. Wave Height, Cold Front A.

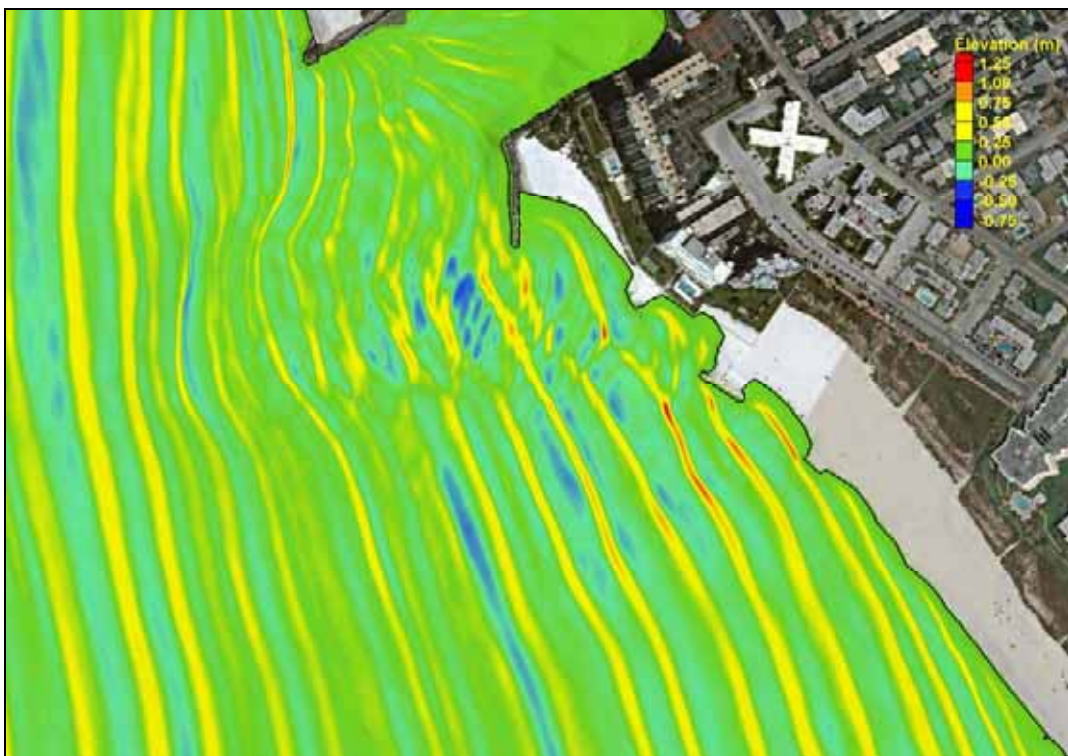


Figure 37. Surface Elevation, Cold Front A.



2009 Conditions, Cold Front A



Figure 38. Wave Breaking, Cold Front A.

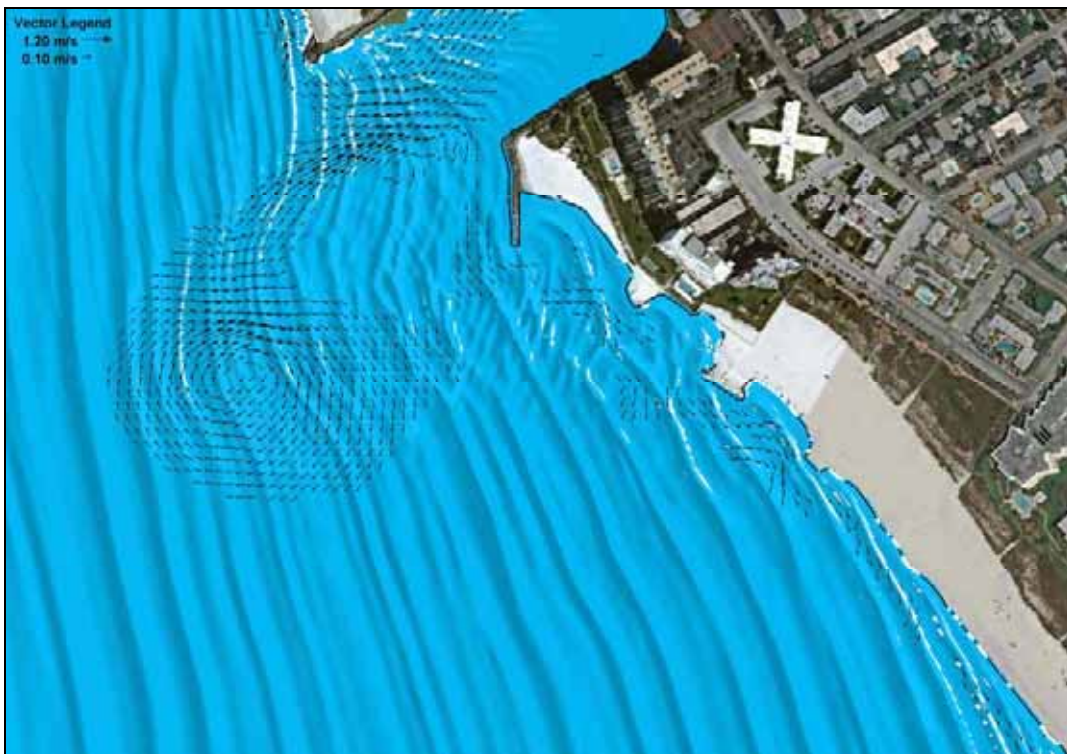


Figure 39. Wave Breaking with Currents, Cold Front A.

2009 Conditions, Cold Front A (b)

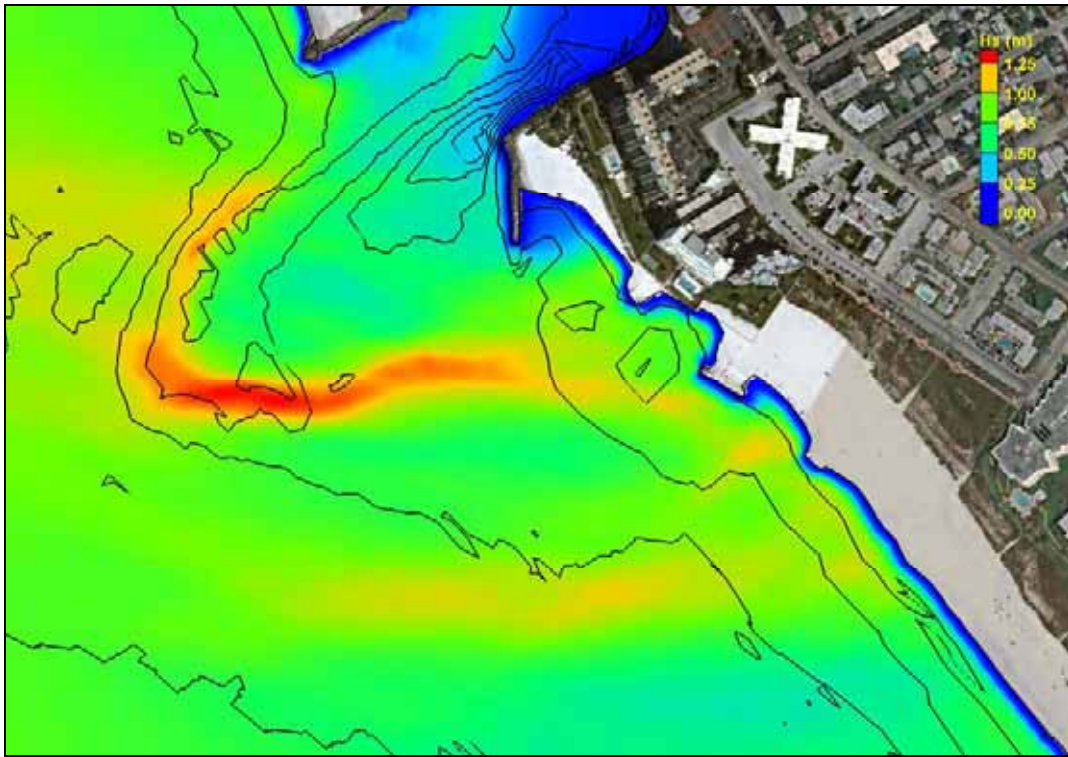


Figure 40. Wave Height, Cold Front A (b).

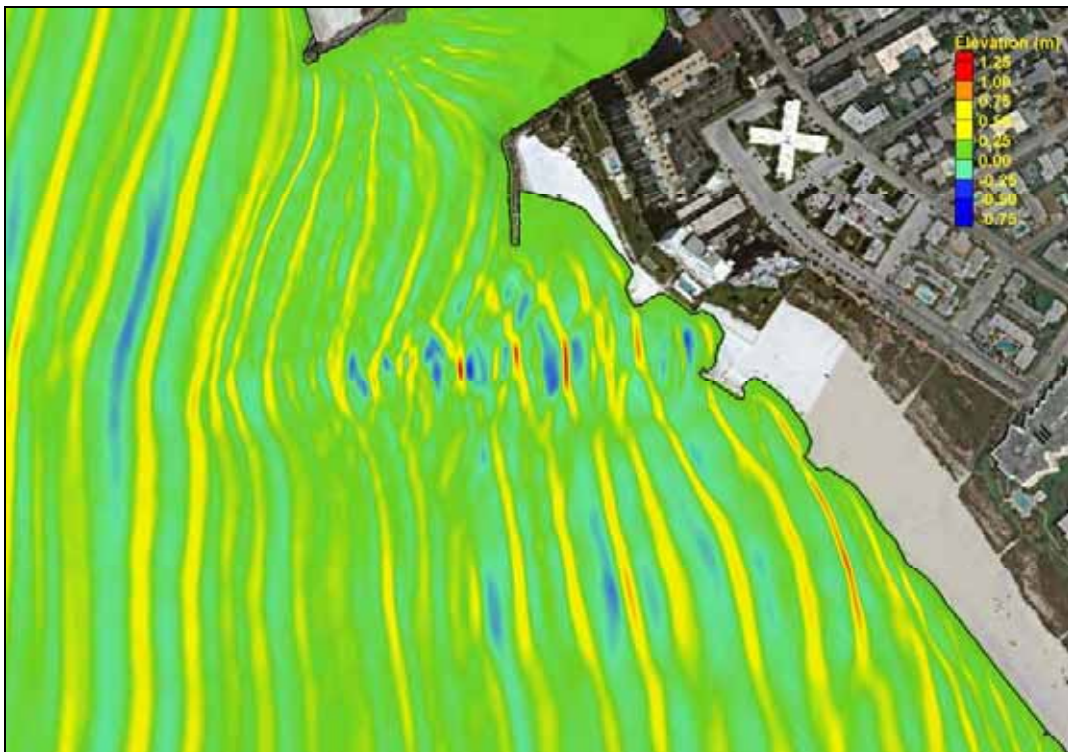


Figure 41. Surface Elevation, Cold Front A (b).



**2009 Conditions, Cold Front A (b)**



Figure 42. Wave Breaking, Cold Front A (b).



Figure 43. Wave Breaking with Currents, Cold Front A (b).

## 2009 Conditions, Cold Front B

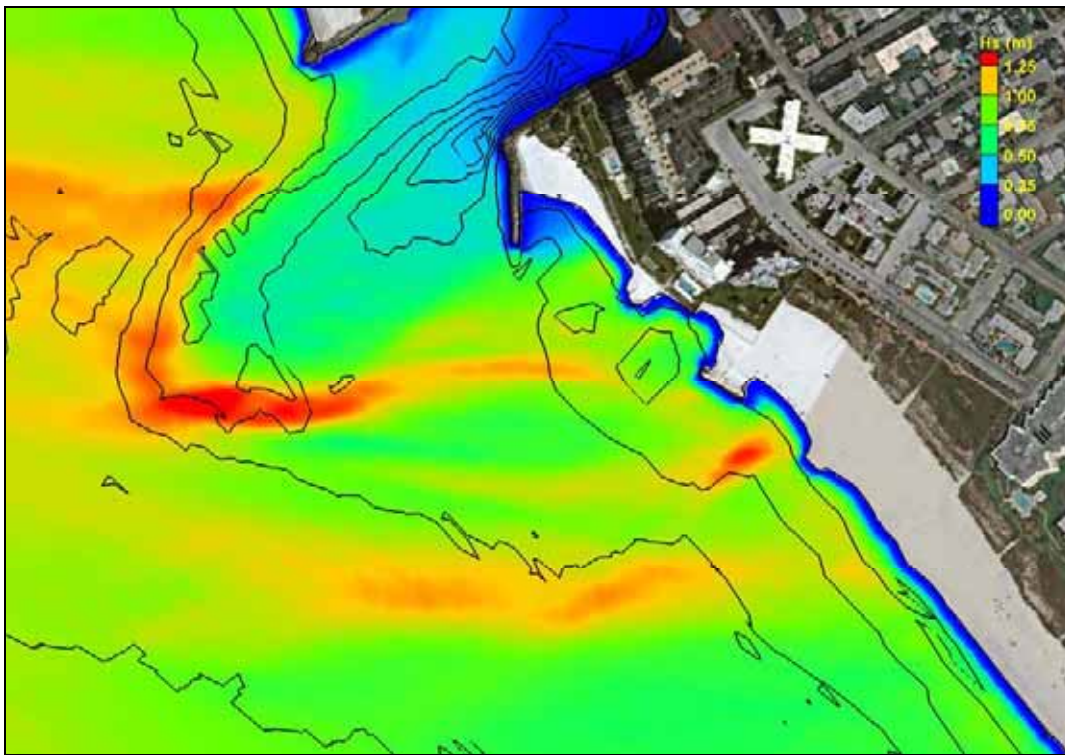


Figure 44. Wave Height, Cold Front B.

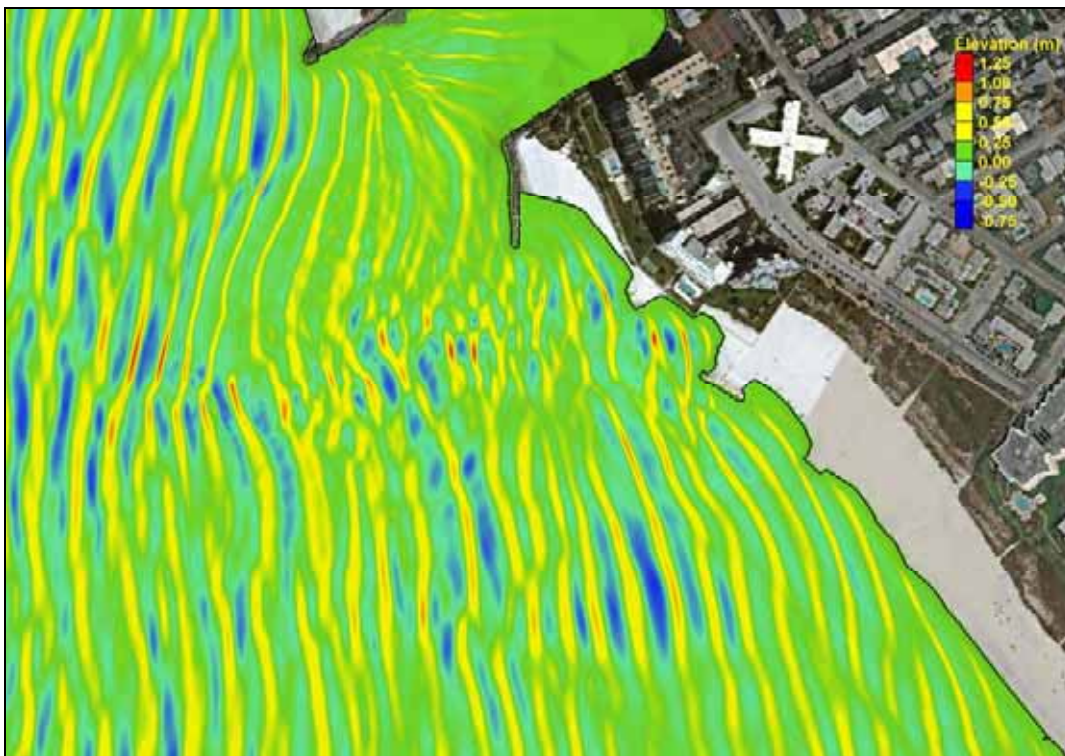


Figure 45. Surface Elevation, Cold Front B.



## 2009 Conditions, Cold Front B



Figure 46. Wave Breaking, Cold Front B.



Figure 47. Wave Breaking and Currents, Cold Front B.

## 2009 Conditions, Hurricane Ivan

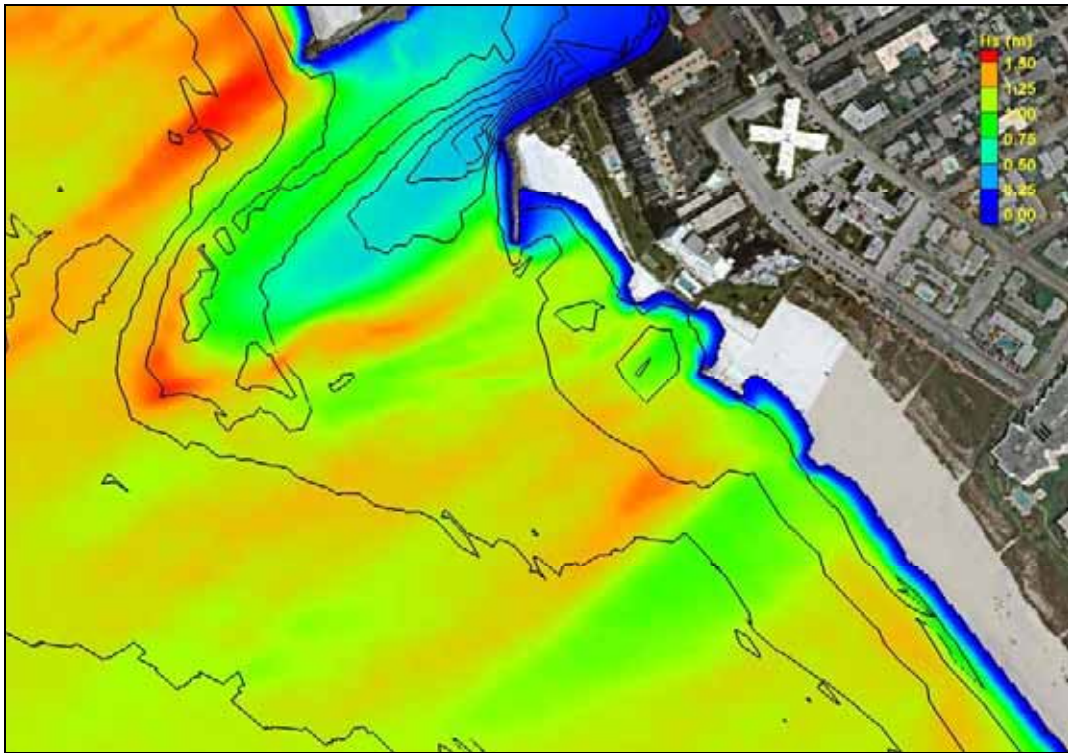


Figure 48. Wave Height, Hurricane Ivan.

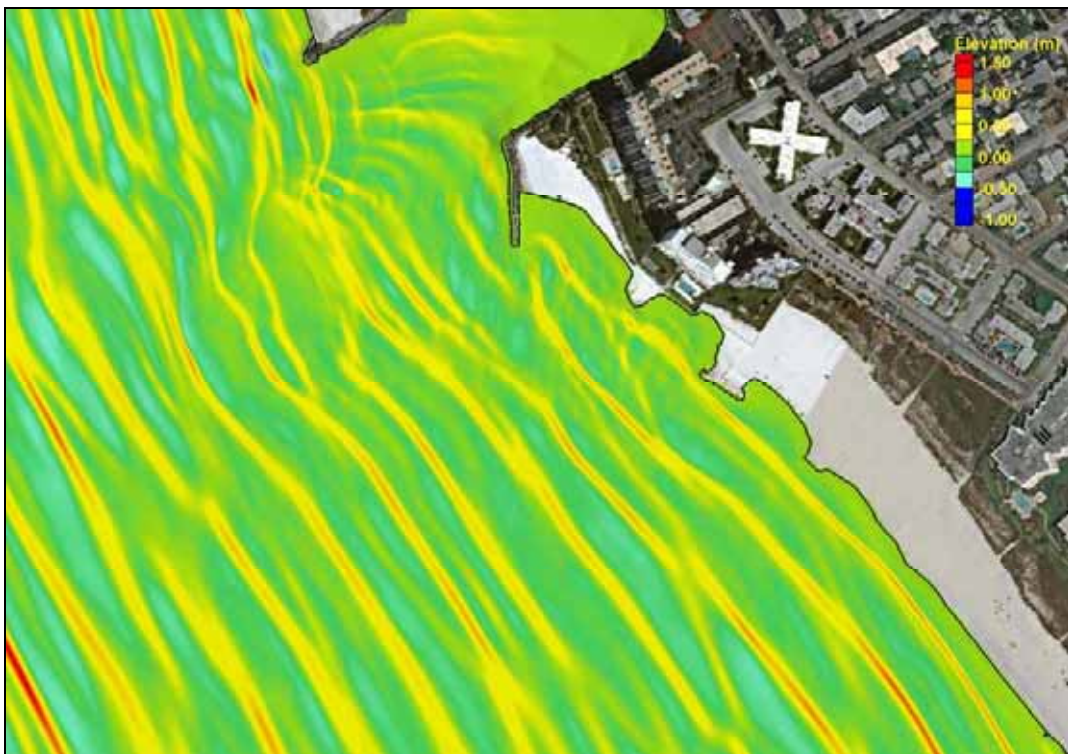


Figure 49. Surface Elevation, Hurricane Ivan.



## 2009 Conditions, Hurricane Ivan



Figure 50. Wave Breaking, Hurricane Ivan.

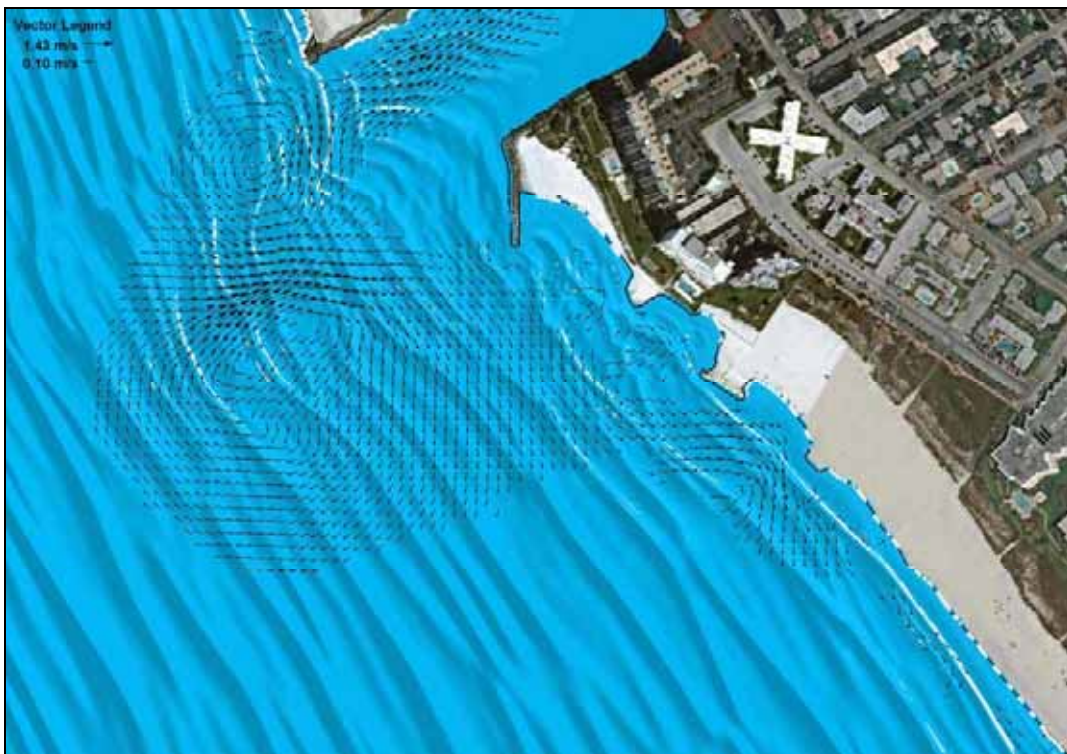


Figure 51. Wave Breaking with Currents, Hurricane Ivan.

#### IV. Alternative 1 with 2009 Bathymetry

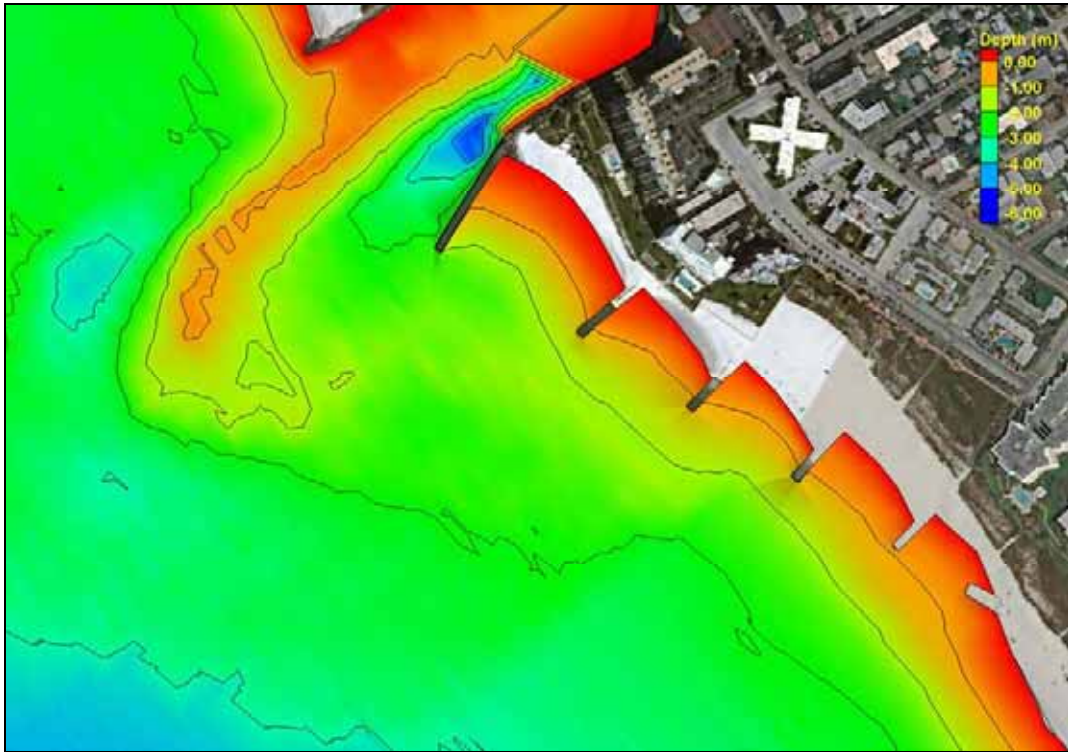


Figure 52. Alternative 1, 2009 Bathymetry.



### Alternative 1, Cold Front A

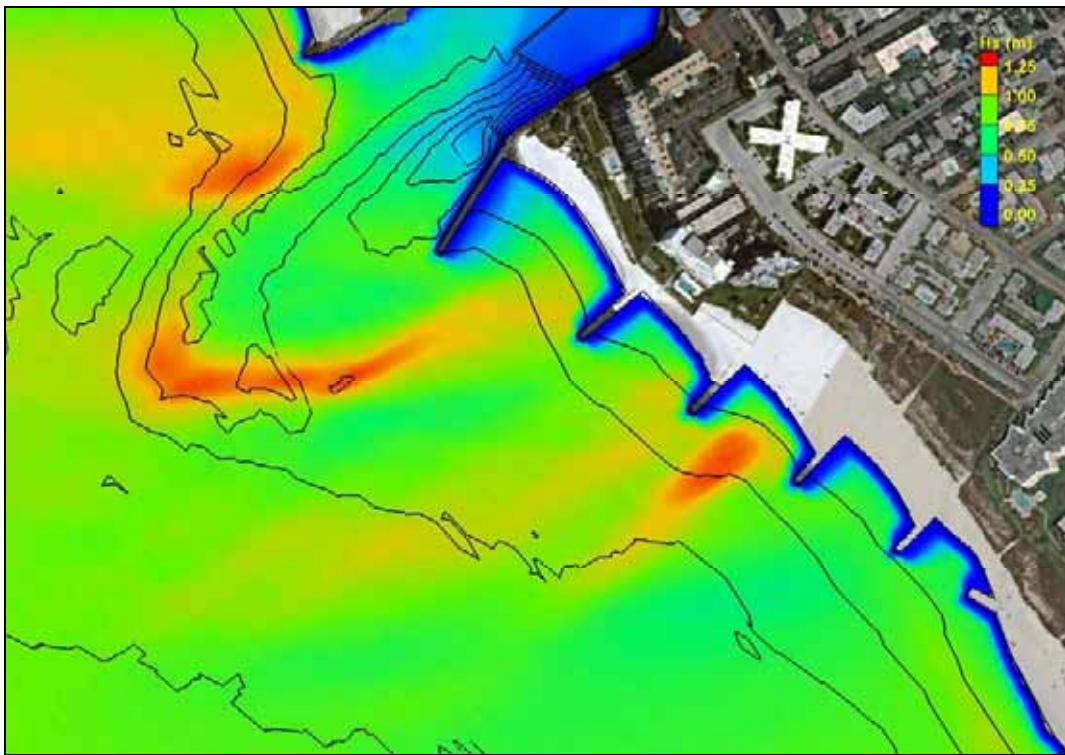


Figure 53. Wave Height, Cold Front A.

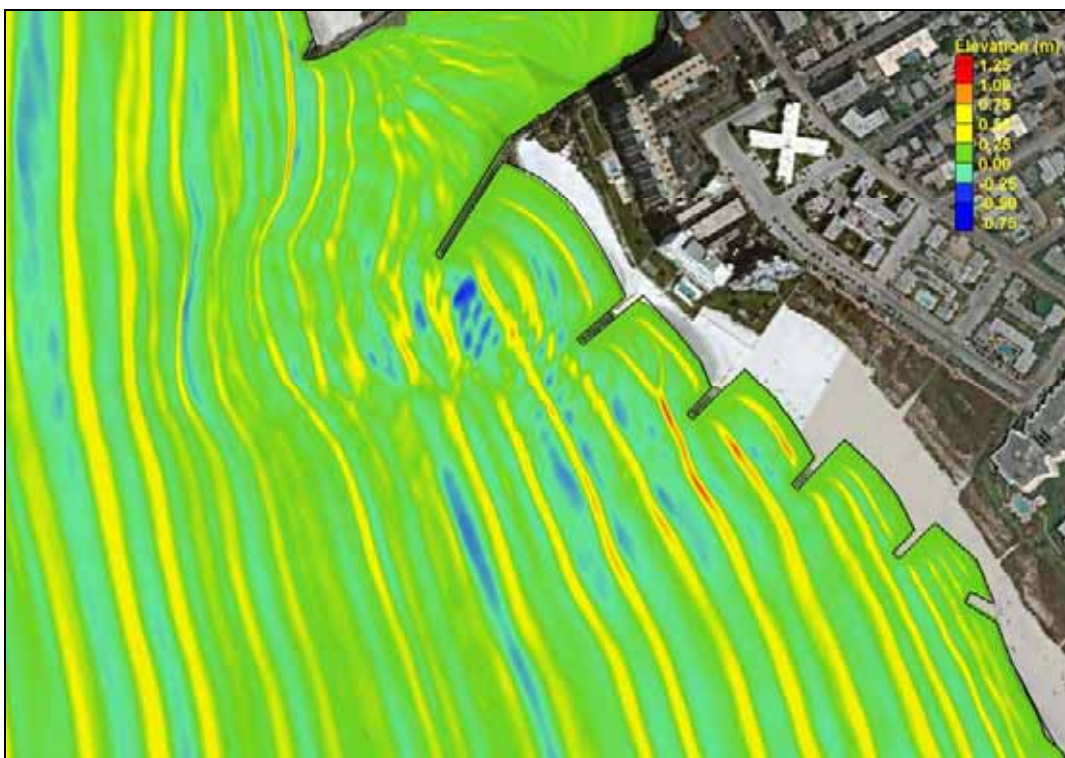


Figure 54. Surface Elevation, Cold Front A.

### Alternative 1, Cold Front A



Figure 55. Wave Breaking, Cold Front A.



Figure 56. Wave Breaking with Currents, Cold Front A.



Alternative 1, Cold Front A (b)

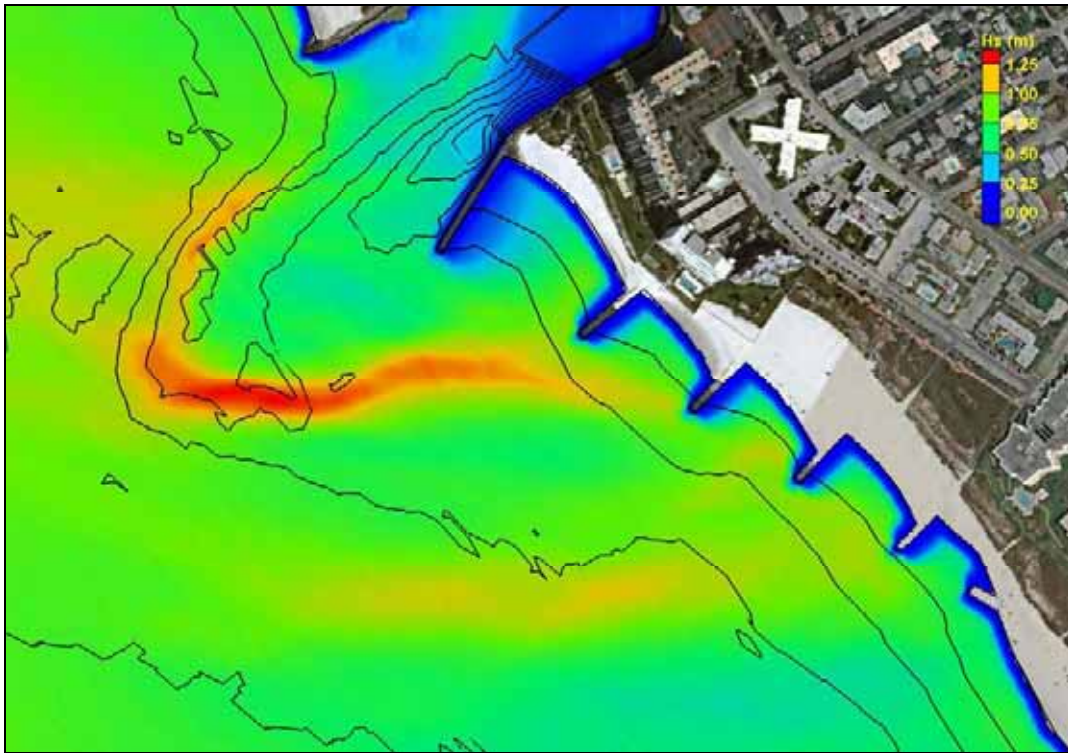


Figure 57. Wave Height, Cold Front A (b).

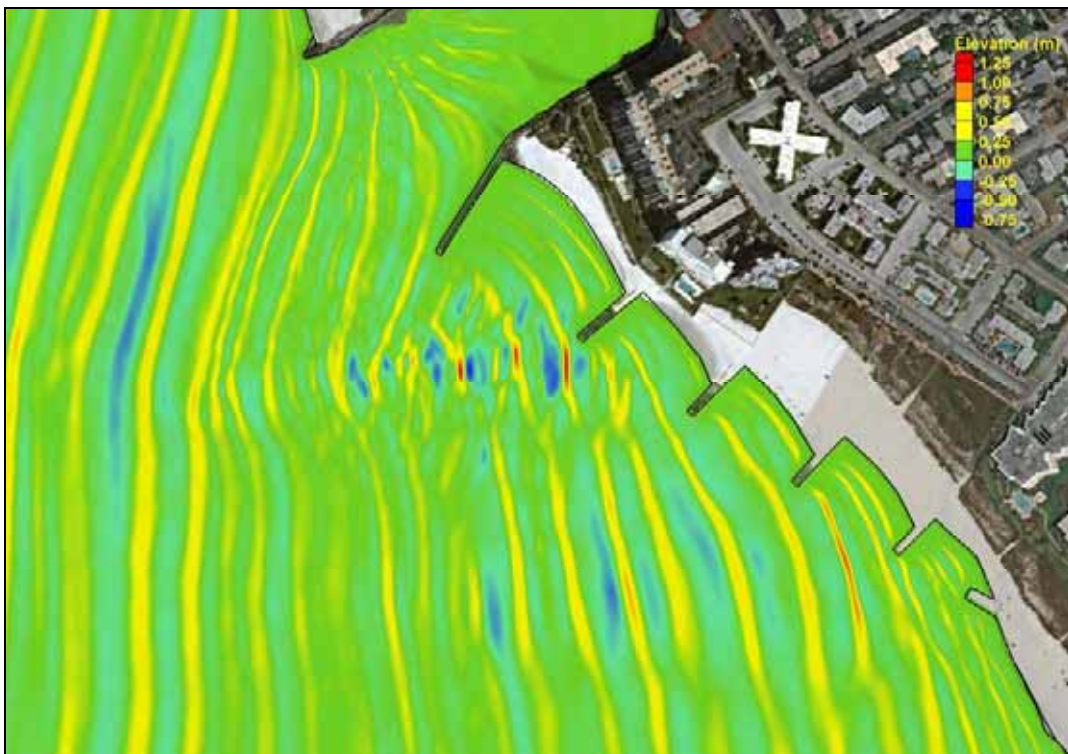


Figure 58. Surface Elevation, Cold Front A (b).

Alternative 1, Cold Front A (b)



Figure 59. Wave Breaking, Cold Front A (b).



Figure 60. Wave Breaking with Currents, Cold Front A (b).



### Alternative 1, Cold Front B

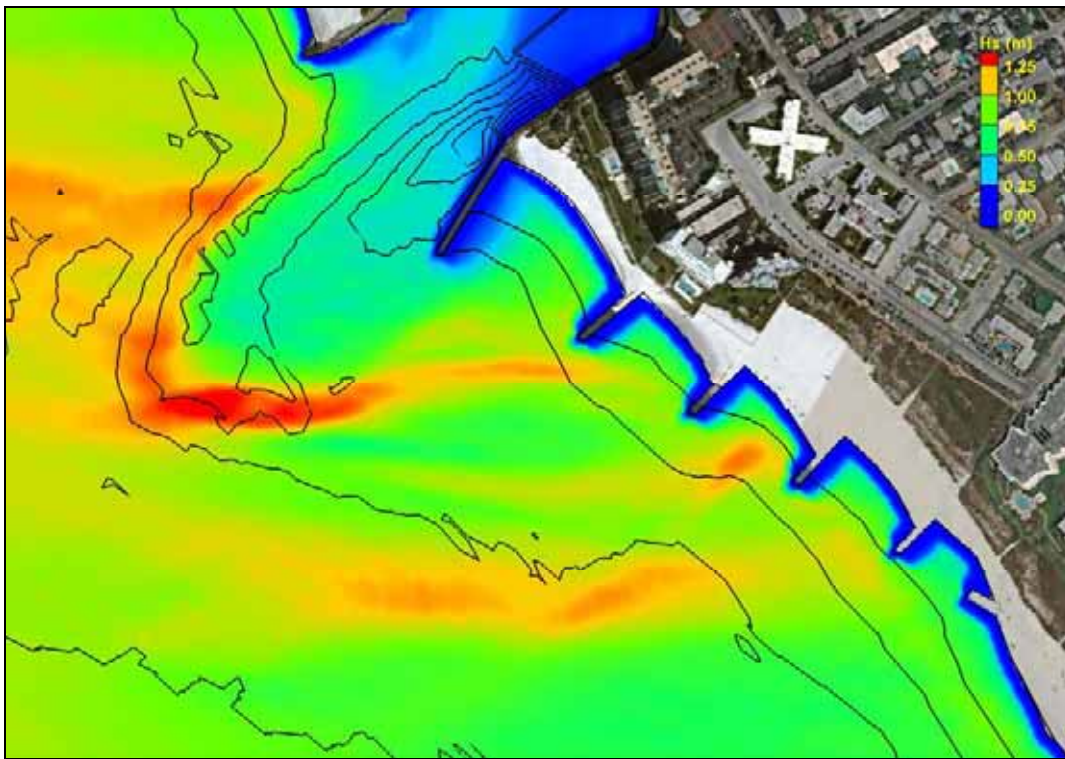


Figure 61. Wave Height, Cold Front B.

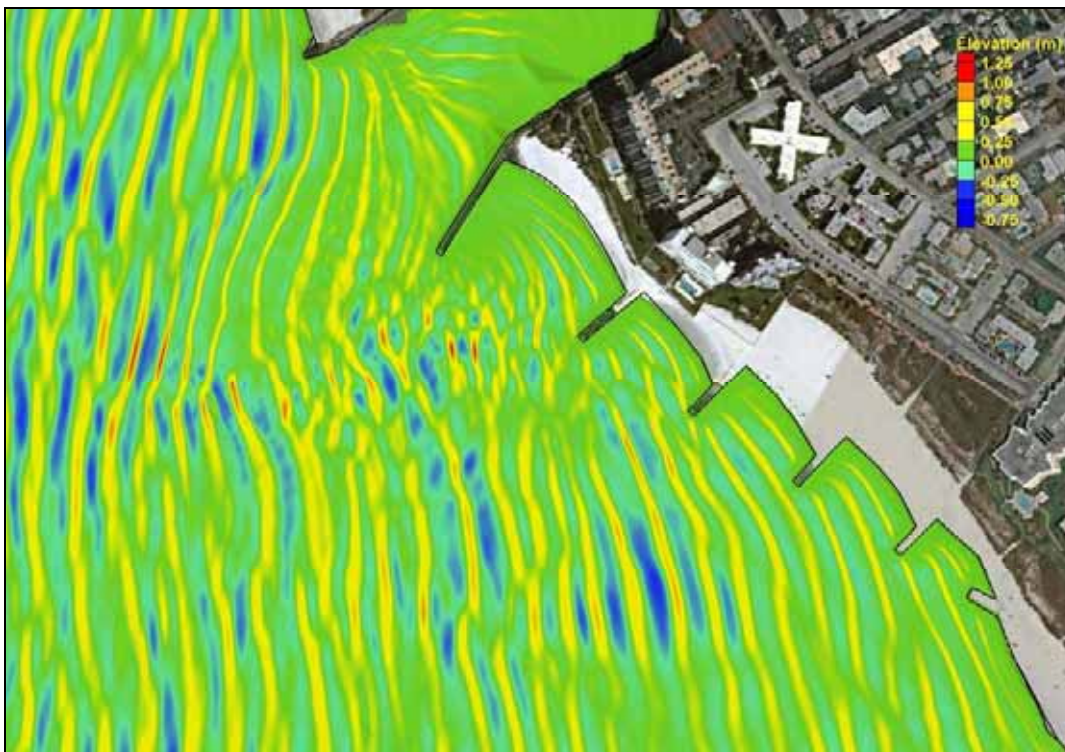


Figure 62. Surface Elevation, Cold Front B.

### Alternative 1, Cold Front B



Figure 63. Wave Breaking, Cold Front B.



Figure 64. Wave Breaking with Currents, Cold Front B.



## Alternative 1, Hurricane Ivan

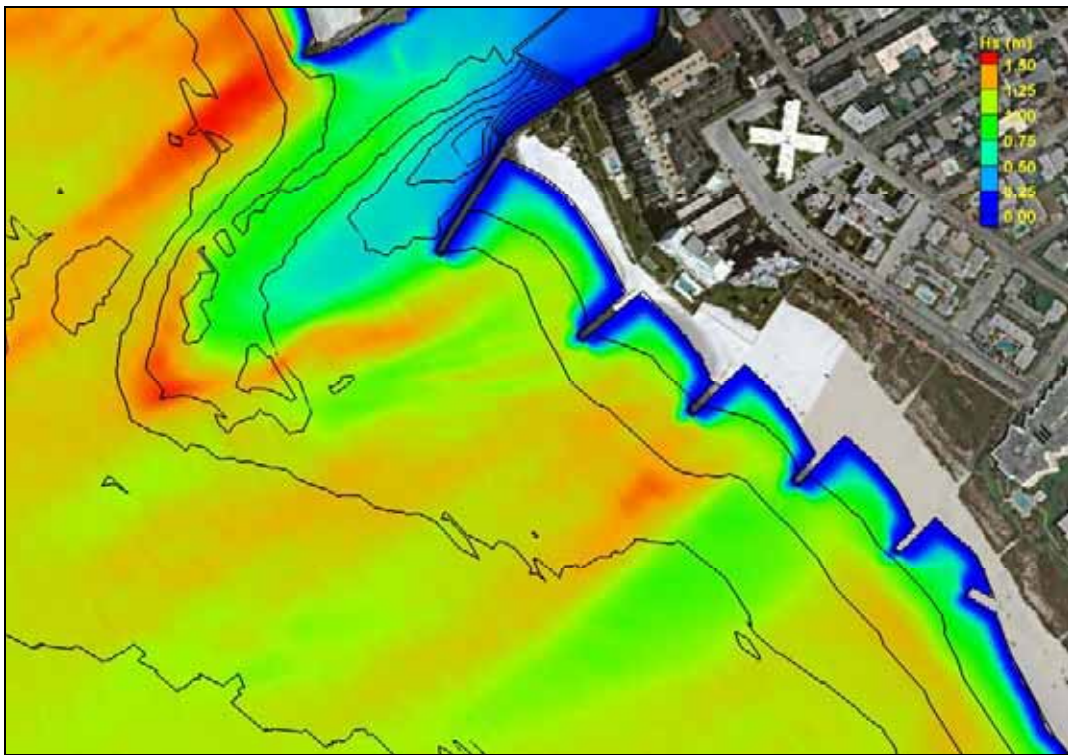


Figure 65. Wave Height, Hurricane Ivan.

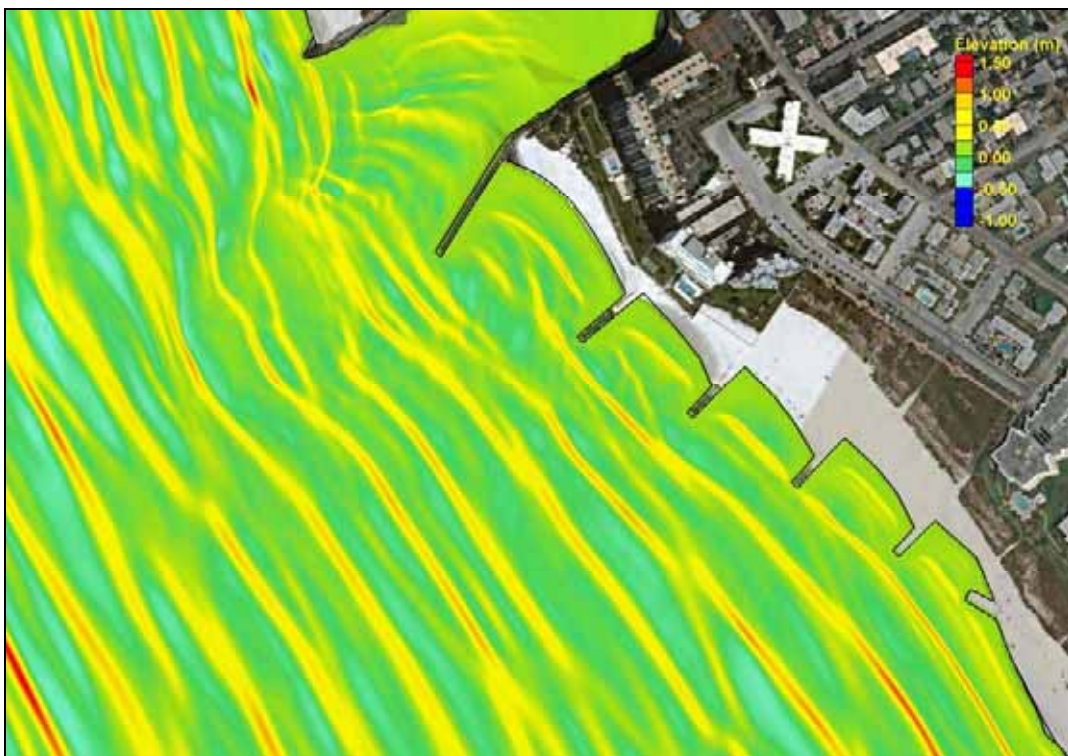


Figure 66. Surface Elevation, Hurricane Ivan.



## Alternative 1, Hurricane Ivan



Figure 67. Wave Breaking, Hurricane Ivan.



Figure 68. Wave Breaking with Currents, Hurricane Ivan.



## V. Alternative 2 with 2009 Bathymetry

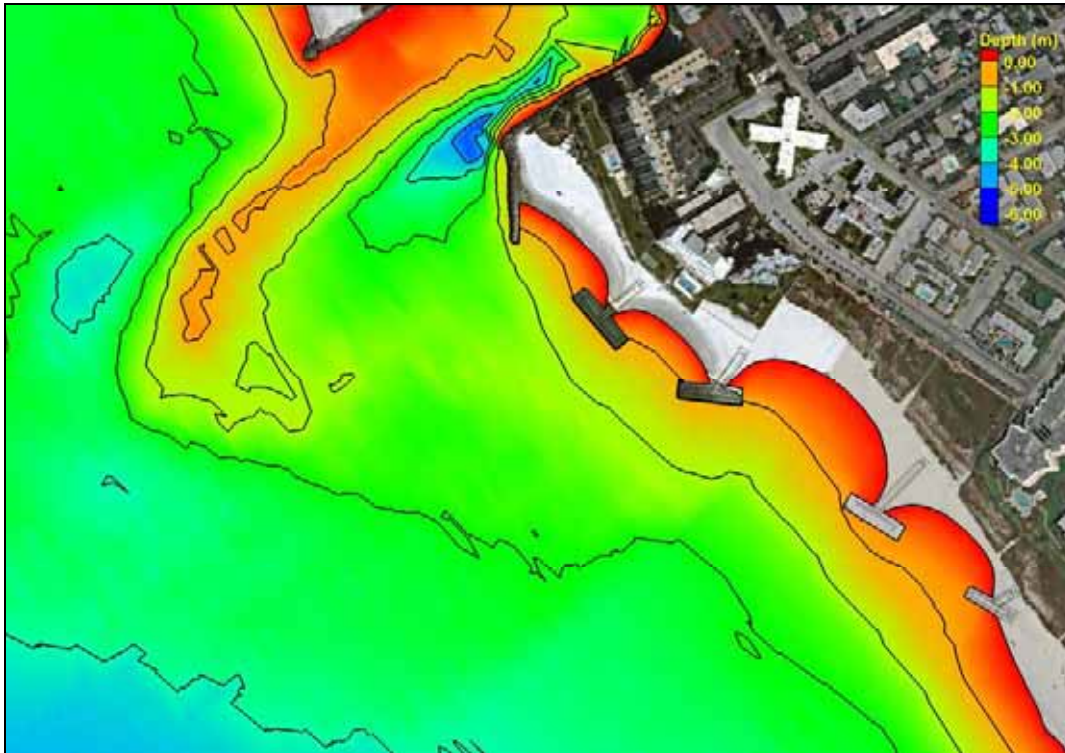


Figure 69 – Alternative 2, 2009 Bathymetry.

## Alternative 2, Cold Front A

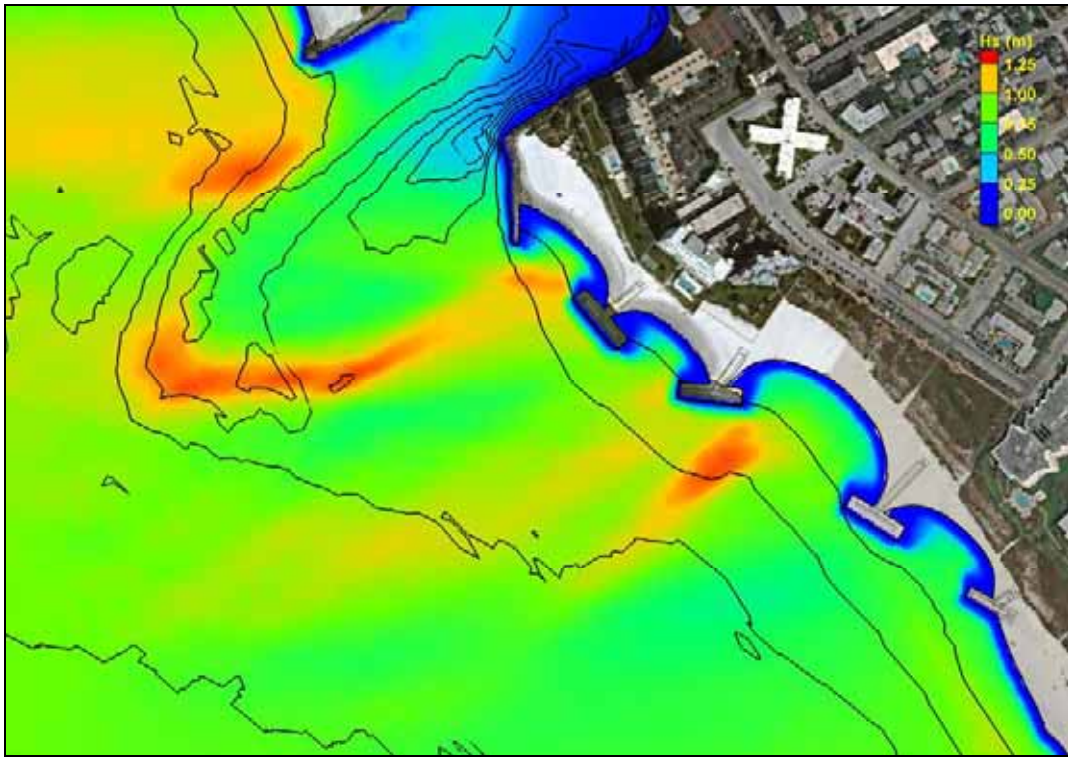


Figure 70. Wave Height, Cold Front A.

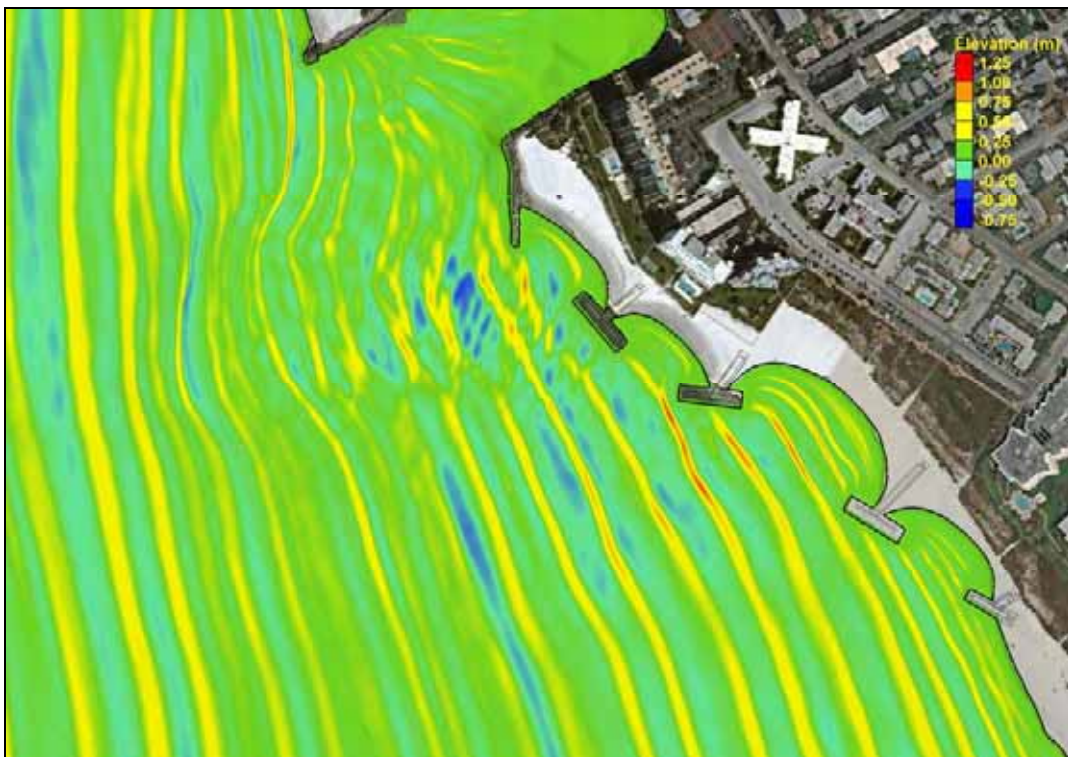


Figure 71. Surface Elevation, Cold Front A.



## Alternative 2, Cold Front A



Figure 72. Wave Breaking, Cold Front A.



Figure 73. Wave Breaking and Currents, Cold Front A.

Alternative 2, Cold Front A (b)

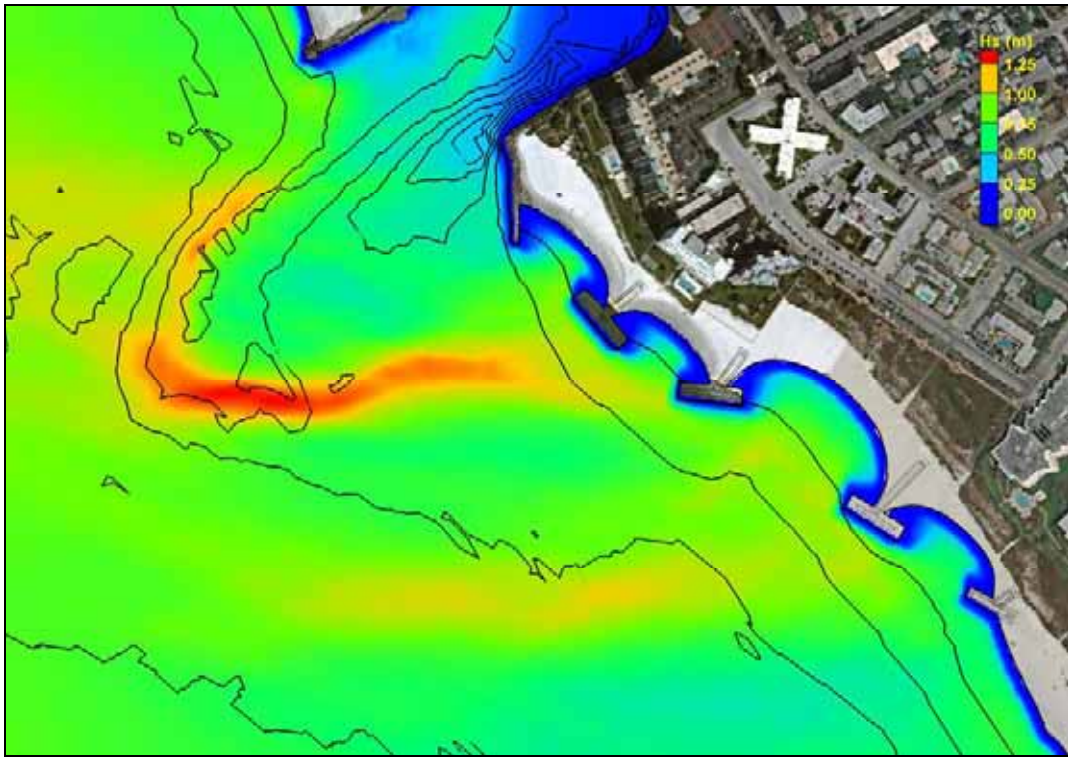


Figure 74. Wave Height, Cold Front A (b).

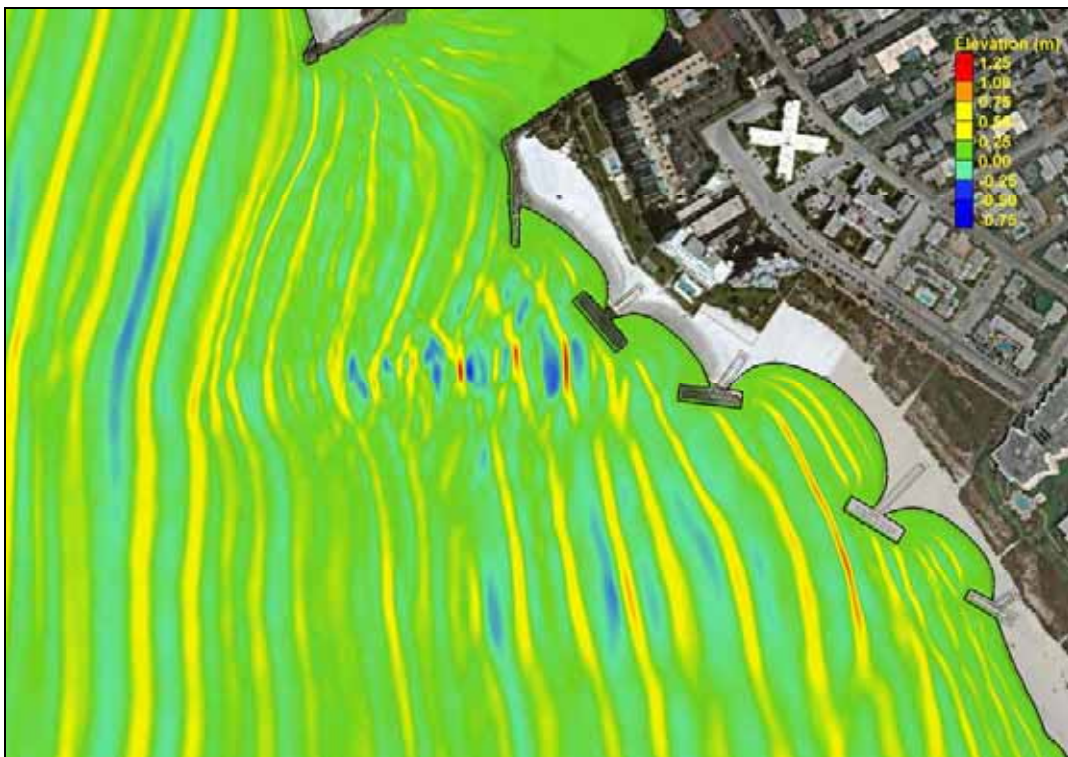


Figure 75. Surface Elevation, Cold Front A (b).



Alternative 2, Cold Front A (b)



Figure 76. Wave Breaking, Cold Front A (b).



Figure 77. Wave Breaking and Currents, Cold Front A (b).

## Alternative 2, Cold Front B

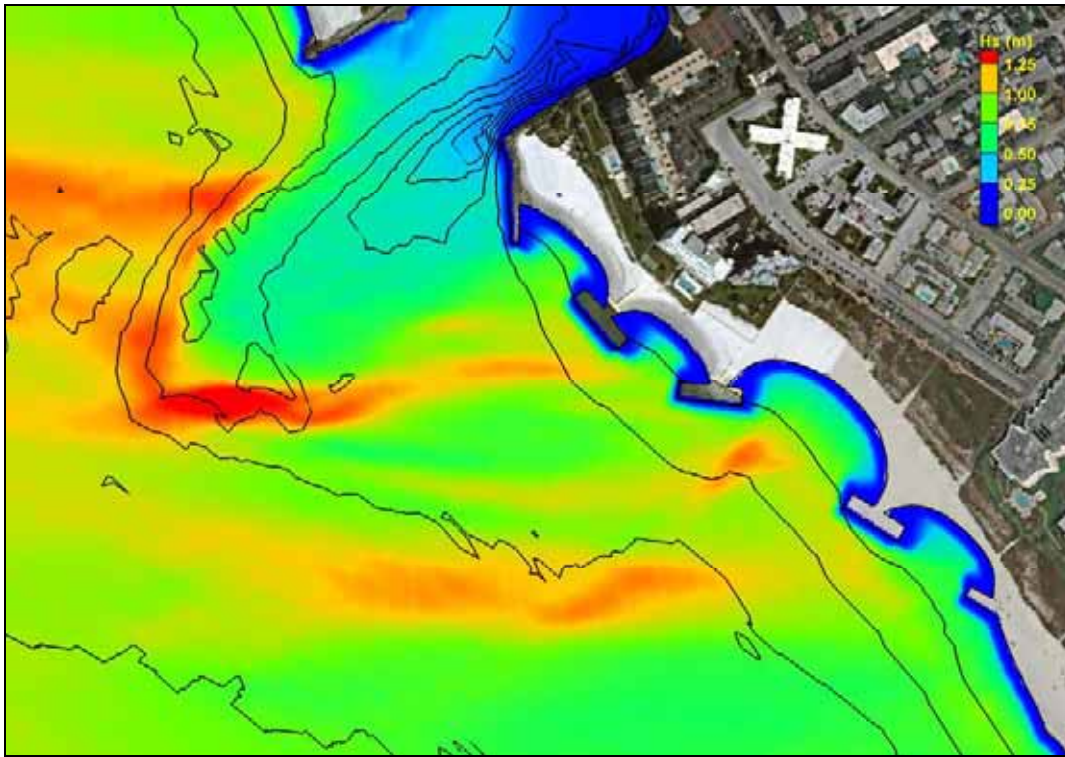


Figure 78. Wave Height, Cold Front B.

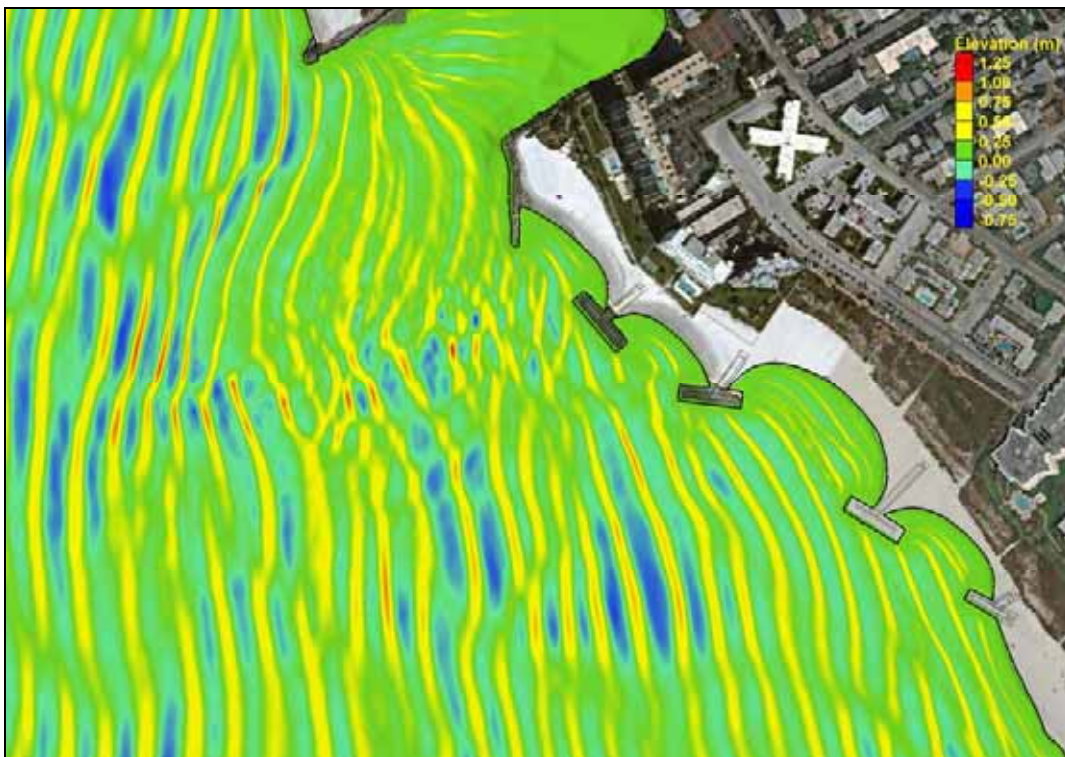


Figure 79. Surface Elevation, Cold Front B.



## Alternative 2, Cold Front B



Figure 80. Wave Breaking, Cold Front B.



Figure 81. Wave Breaking and Currents, Cold Front B.

## Alternative 2, Hurricane Ivan

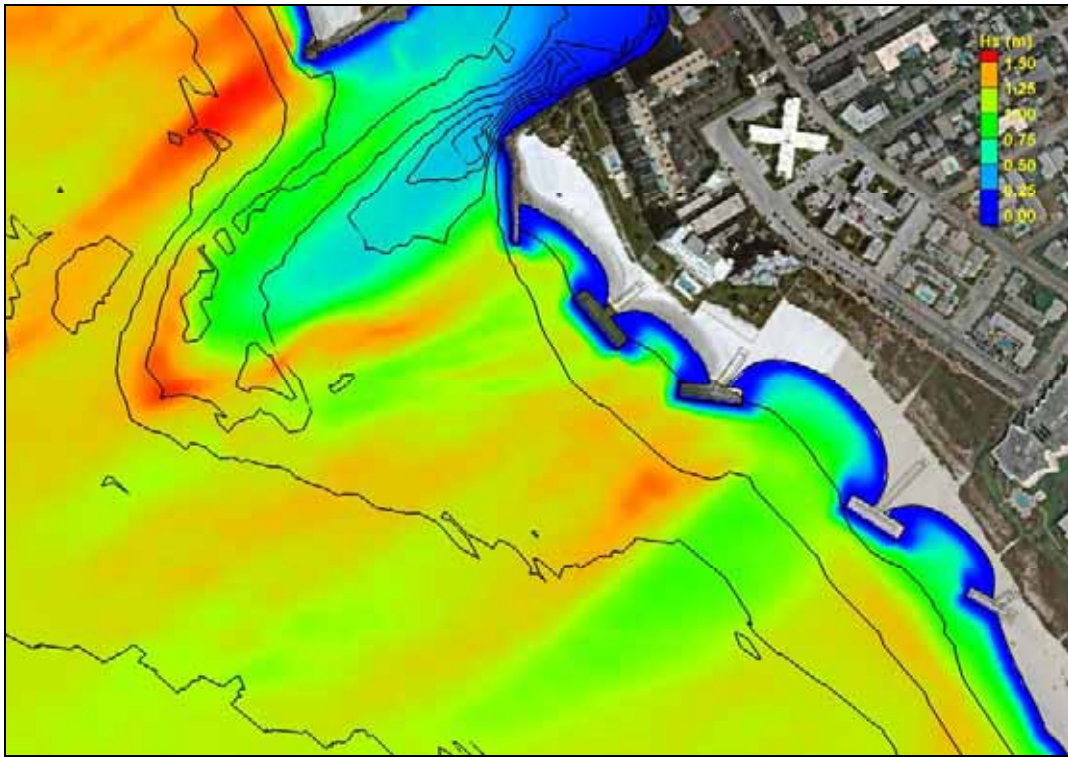


Figure 82. Wave Height, Hurricane Ivan.

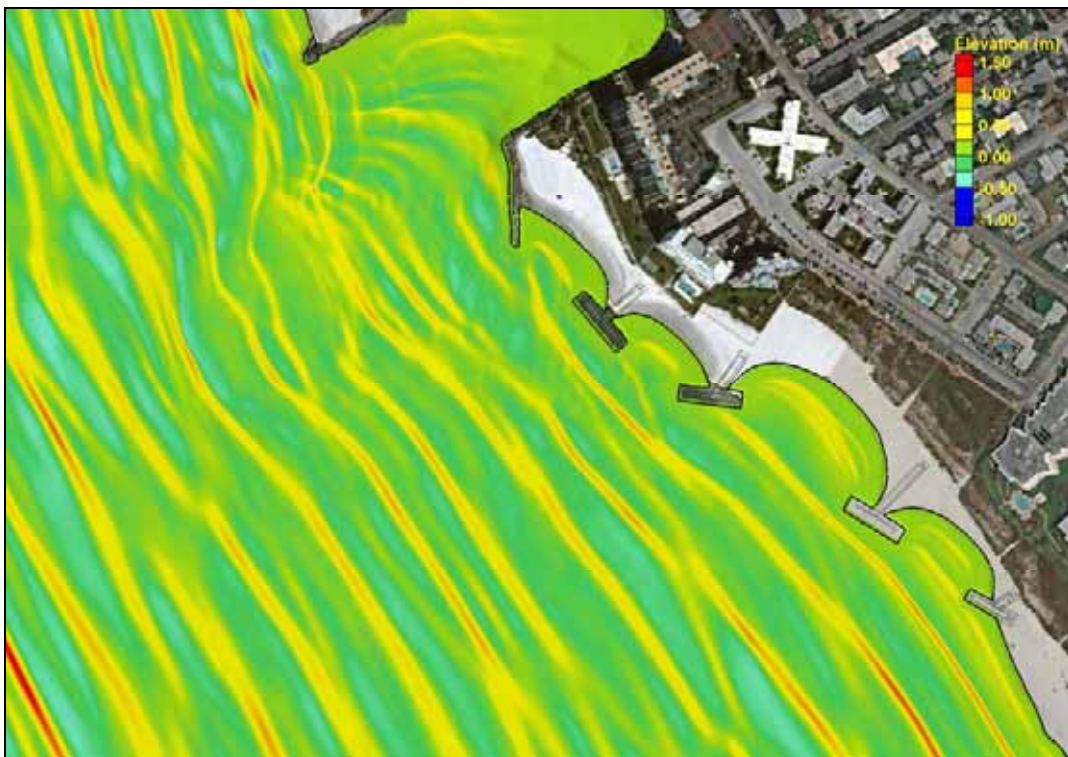


Figure 83. Surface Elevation, Hurricane Ivan.



## Alternative 2, Hurricane Ivan



Figure 84. Wave Breaking, Hurricane Ivan.



Figure 85. Wave Breaking and Currents, Hurricane Ivan.

## VI. Alternative 3 with 2009 Bathymetry

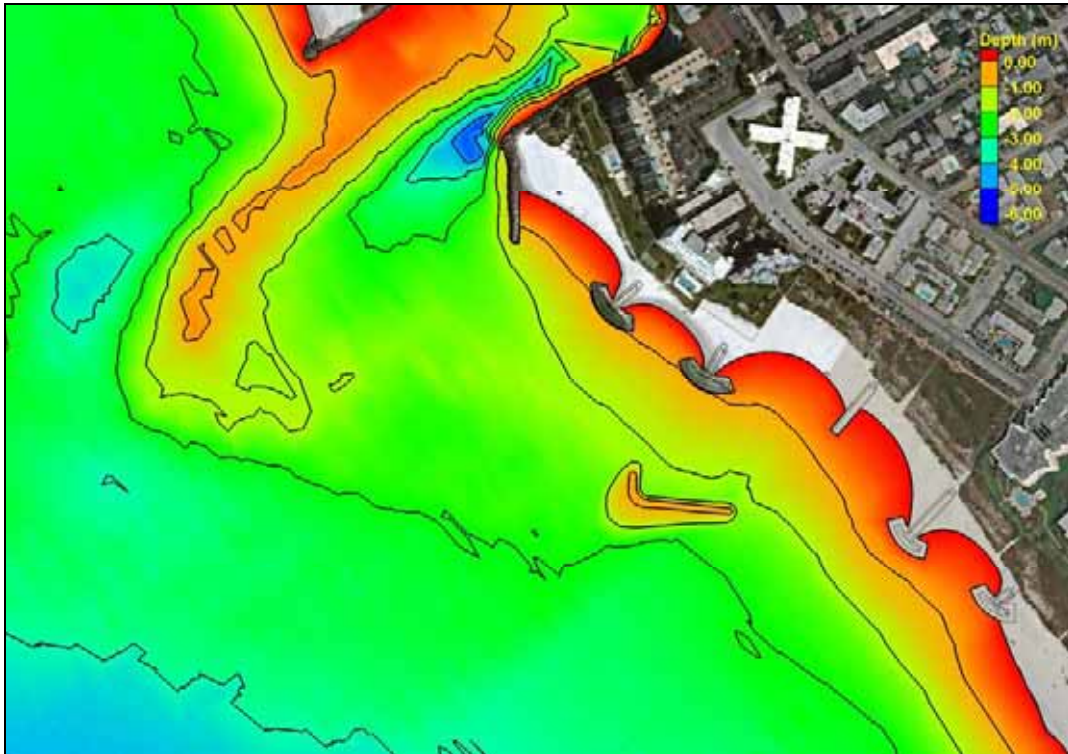


Figure 86. Alternative 3, 2009 Bathymetry.



### Alternative 3, Cold Front A

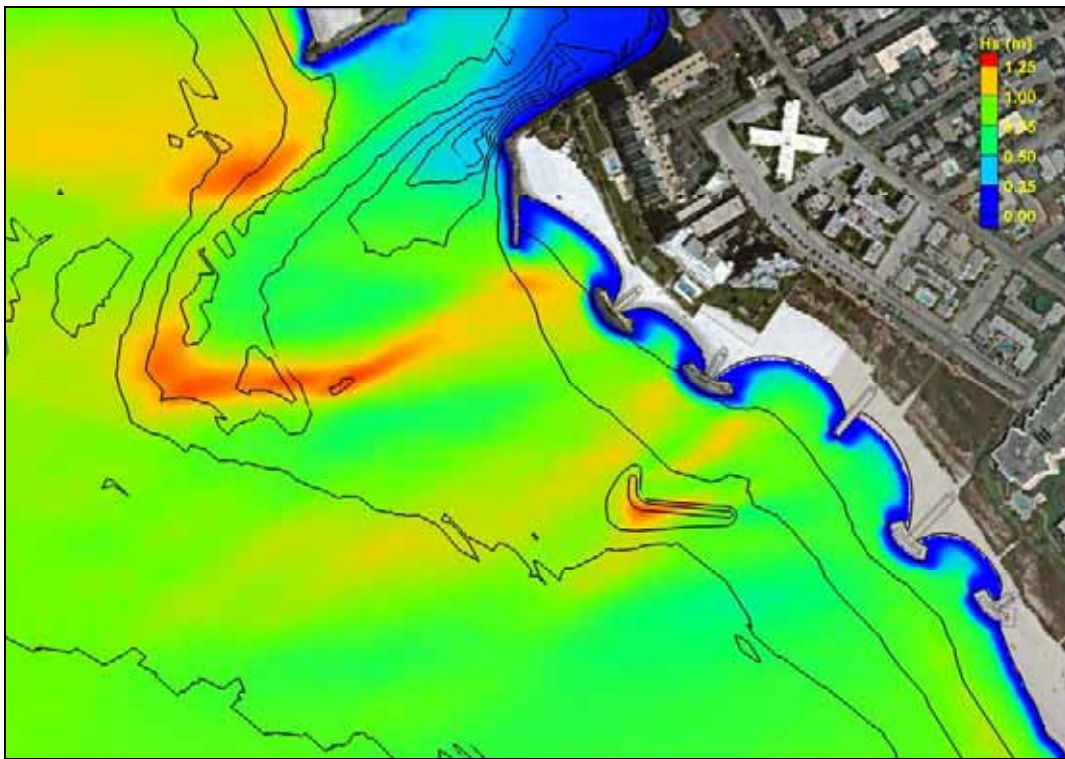


Figure 87. Wave Height, Cold Front A.

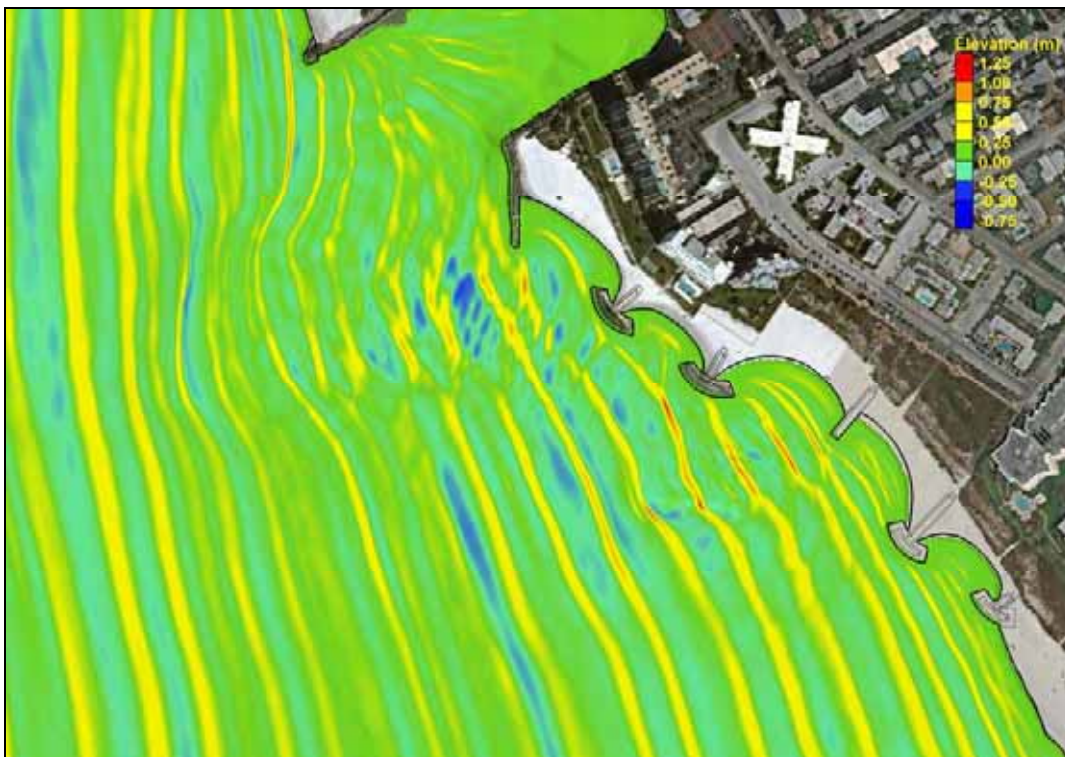


Figure 88. Surface Elevation, Cold Front A.

### Alternative 3, Cold Front A



Figure 89. Wave Breaking, Cold Front A.



Figure 90. Wave Breaking and Currents, Cold Front A.



Alternative 3, Cold Front A (b)

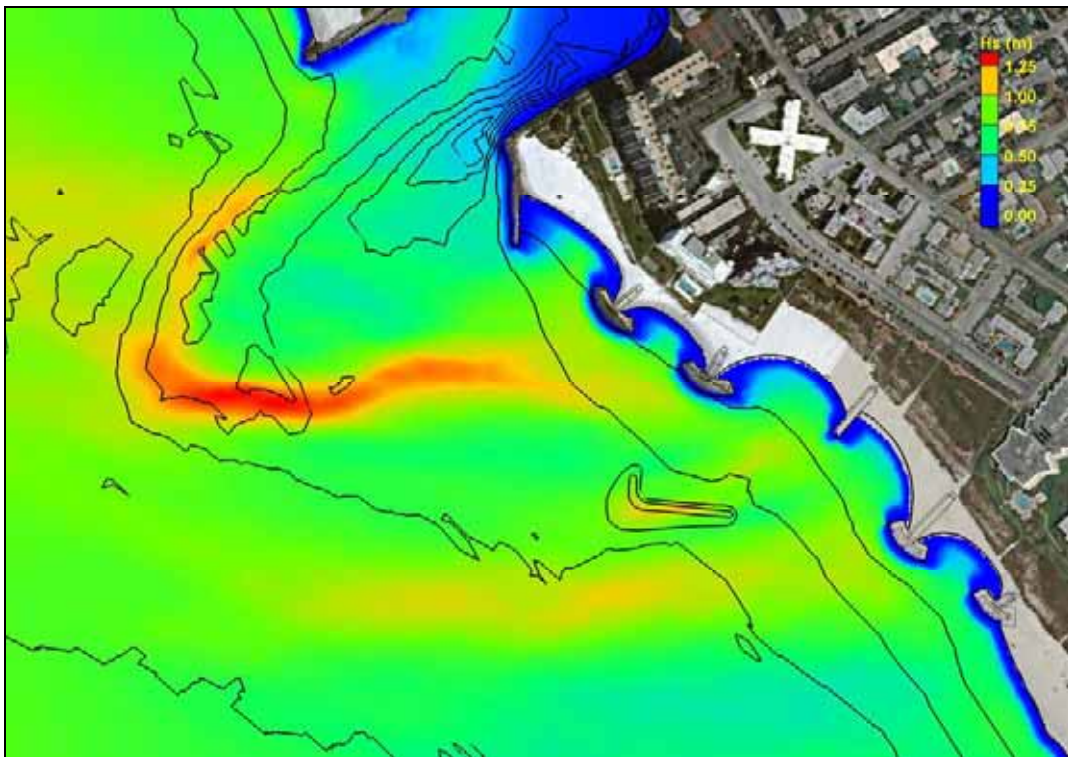


Figure 91. Wave Height, Cold Front A (b).

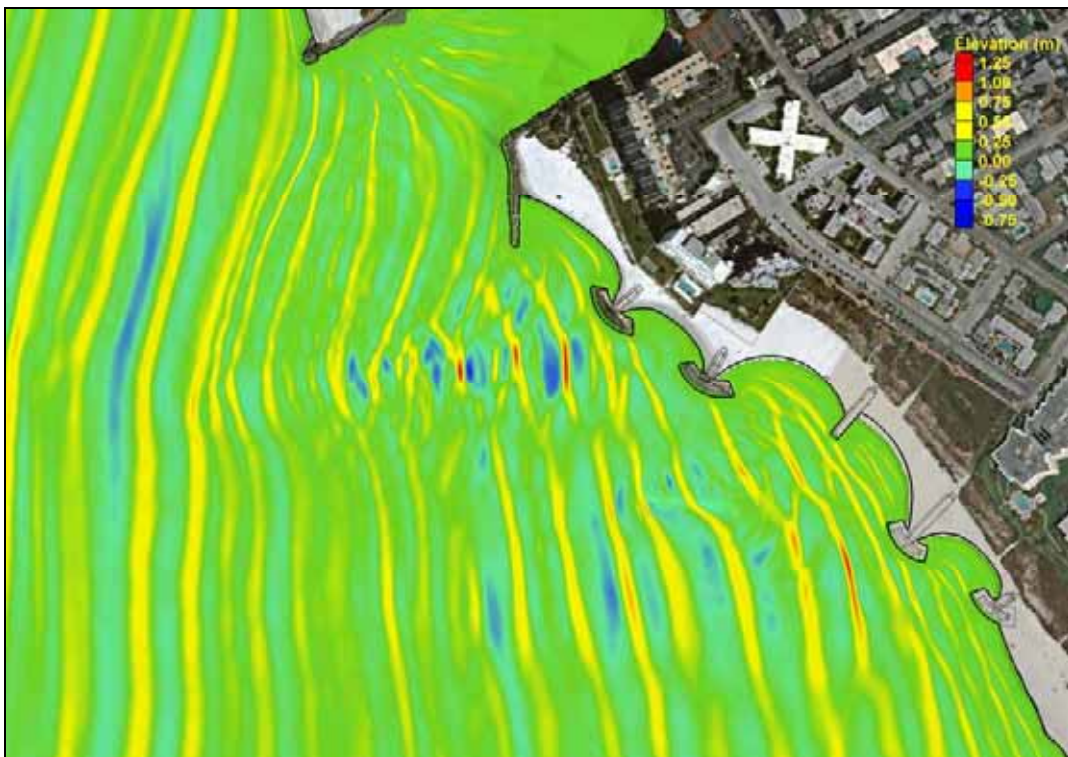


Figure 92. Surface Elevation, Cold Front A (b).

Alternative 3, Cold Front A (b)



Figure 93. Wave Breaking, Cold Front A (b).



Figure 94. Wave Breaking and Currents, Cold Front A (b).



### Alternative 3, Cold Front B

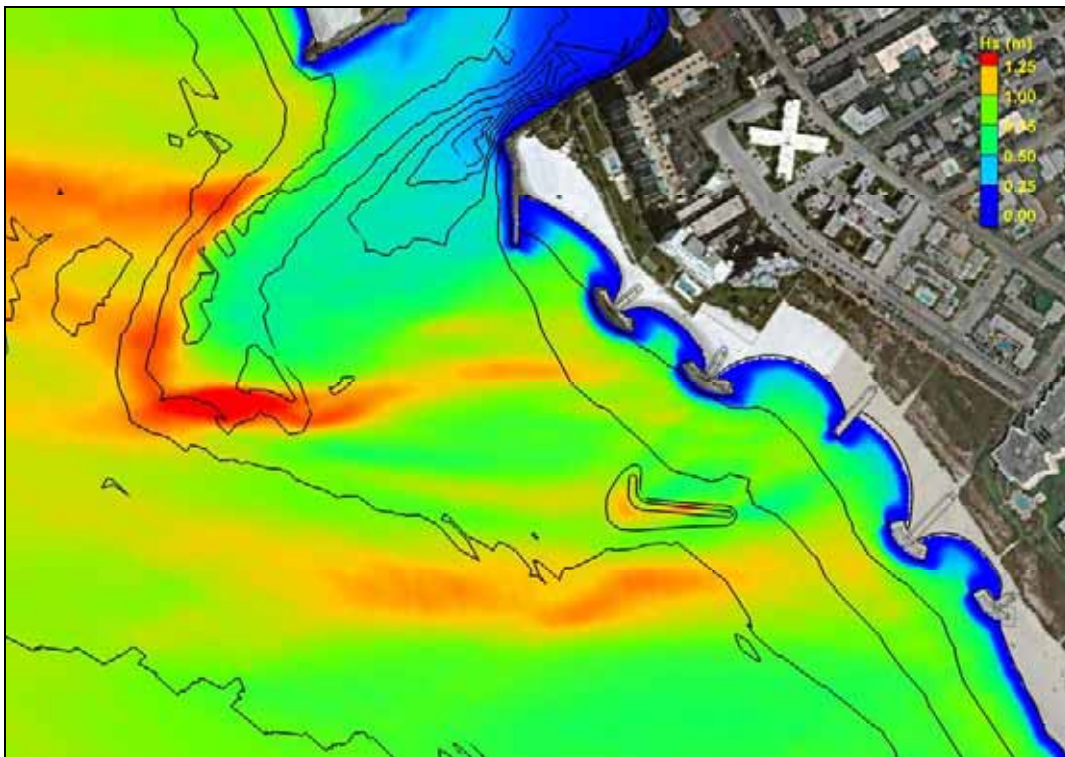


Figure 95. Wave Height, Cold Front B.

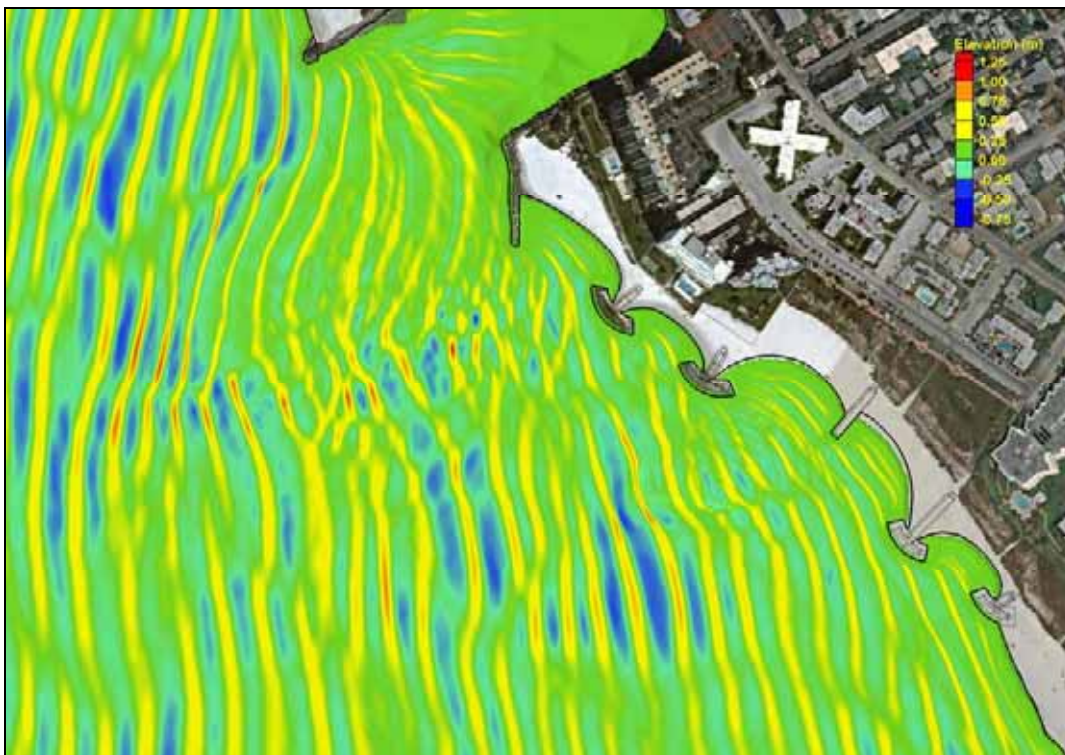


Figure 96. Surface Elevation, Cold Front B.

### Alternative 3, Cold Front B



Figure 97. Wave Breaking, Cold Front B.



Figure 98. Wave Breaking and Currents, Cold Front B.



### Alternative 3, Hurricane Ivan

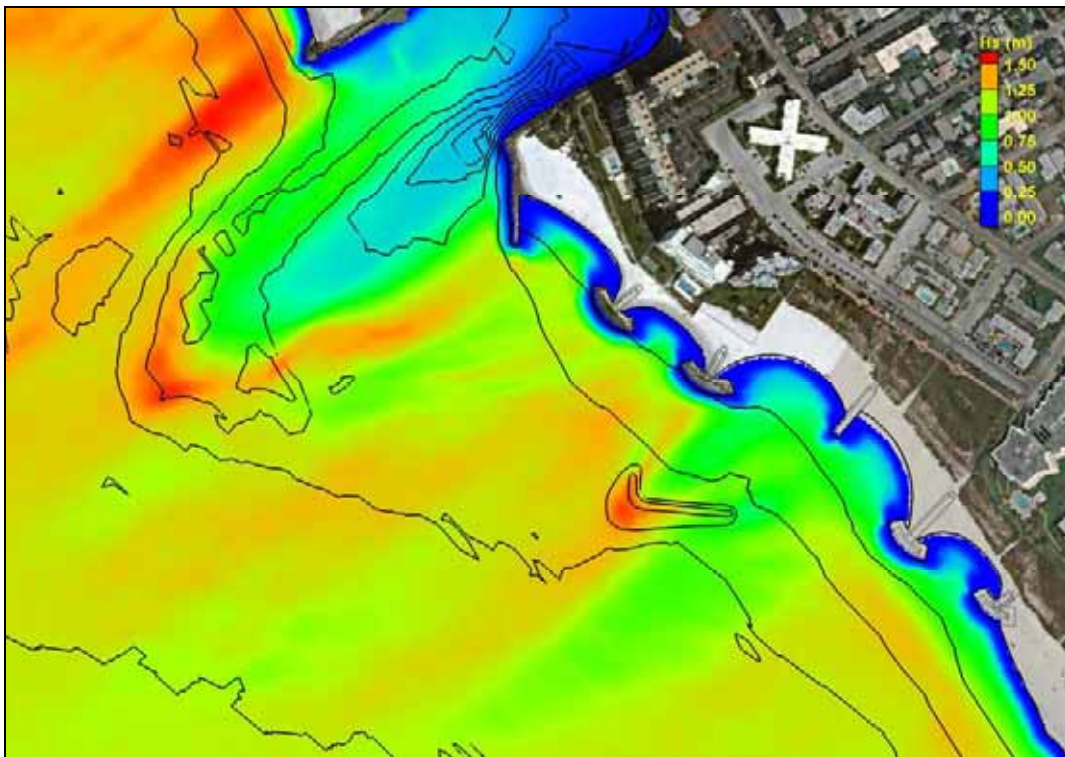


Figure 99. Wave Height, Hurricane Ivan.

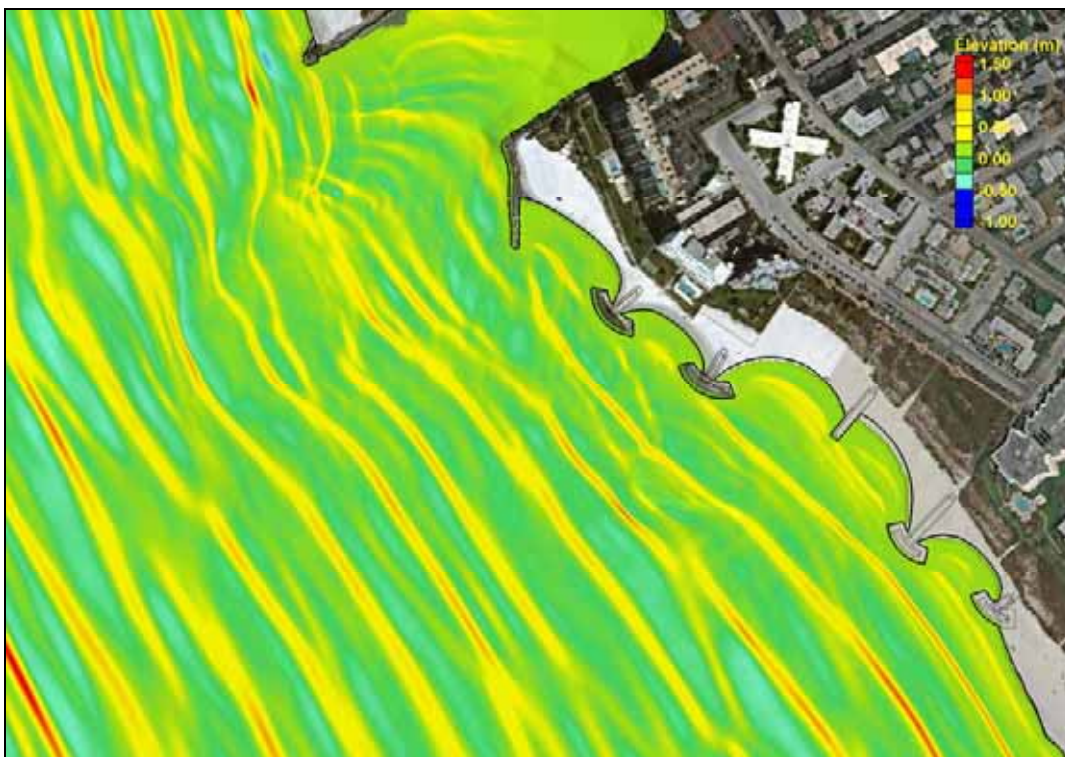


Figure 100. Surface Elevation, Hurricane Ivan.



### Alternative 3, Hurricane Ivan



Figure 101. Wave Breaking, Hurricane Ivan.



Figure 102. Wave Breaking and Currents, Hurricane Ivan.



## VII. Alternative 4 with 2009 Bathymetry

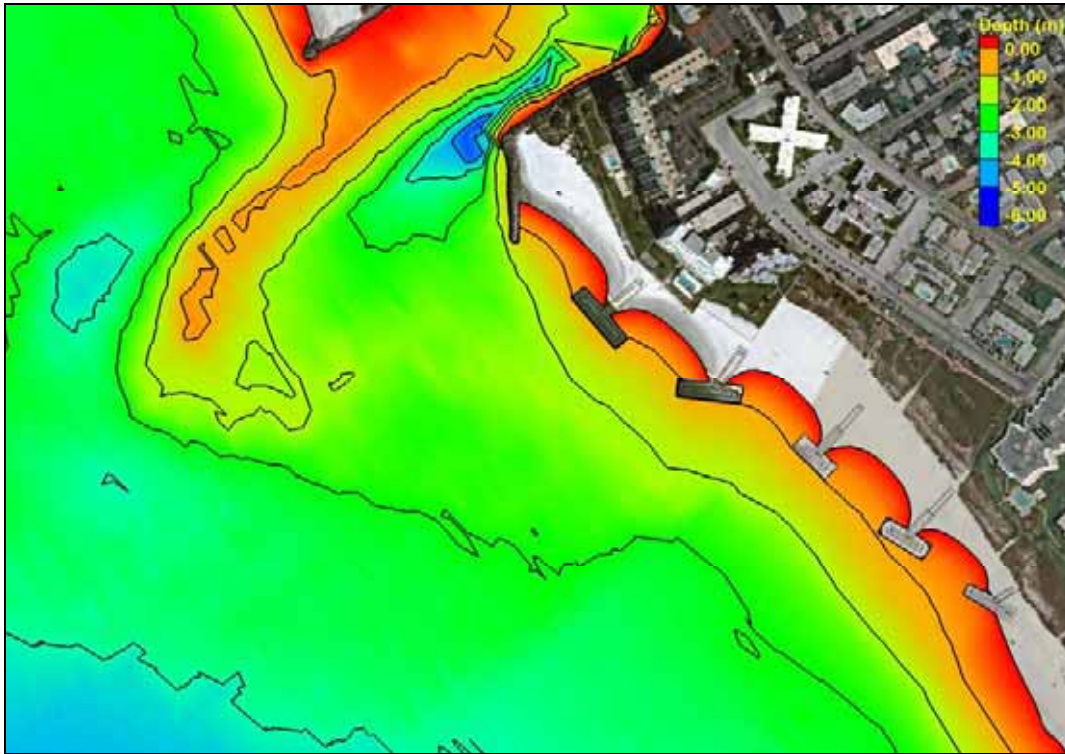


Figure 103. Alternative 4, 2009 bathymetry.

#### Alternative 4, Cold Front A

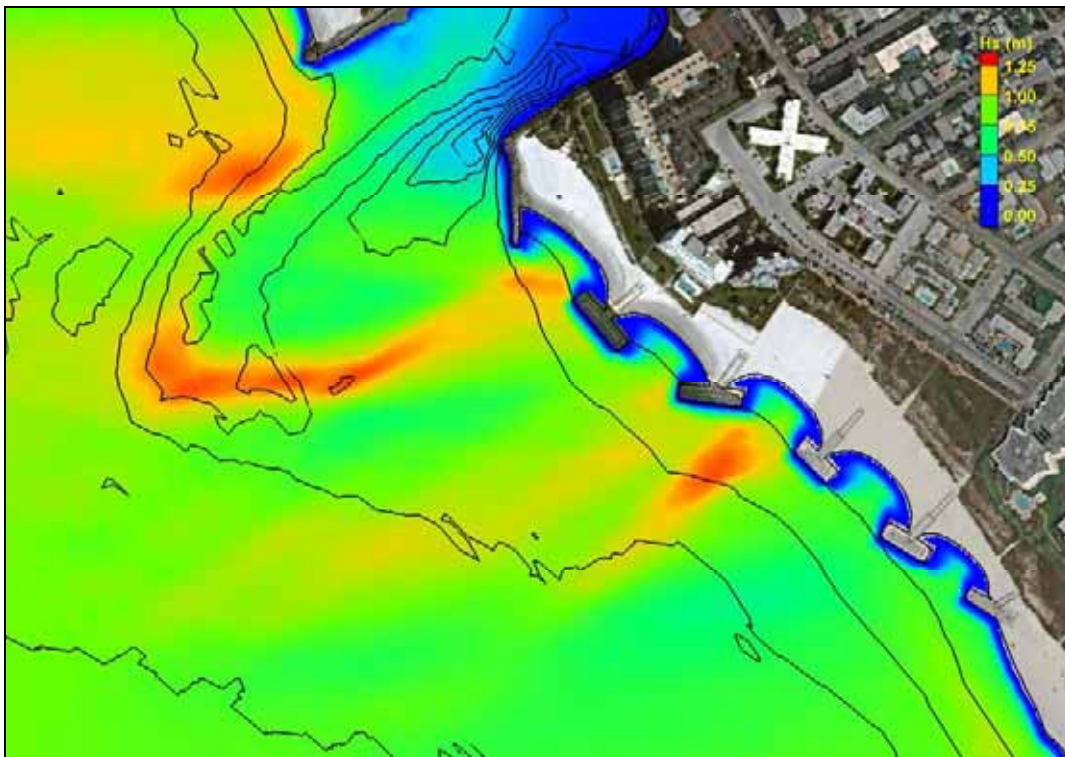


Figure 104. Wave Height, Cold Front A.

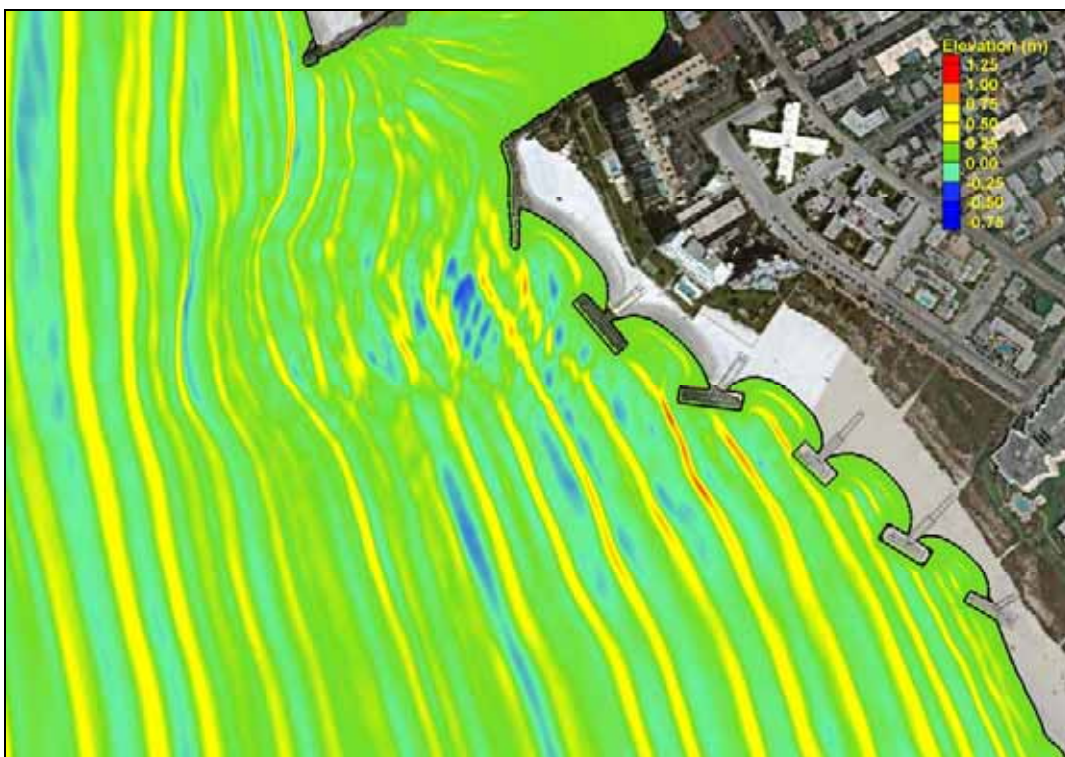


Figure 105. Surface Elevation, Cold Front A.



#### Alternative 4, Cold Front A



Figure 106. Wave Breaking, Cold Front A.



Figure 107. Wave Breaking and Currents, Cold Front A.

Alternative 4, Cold Front A(b)

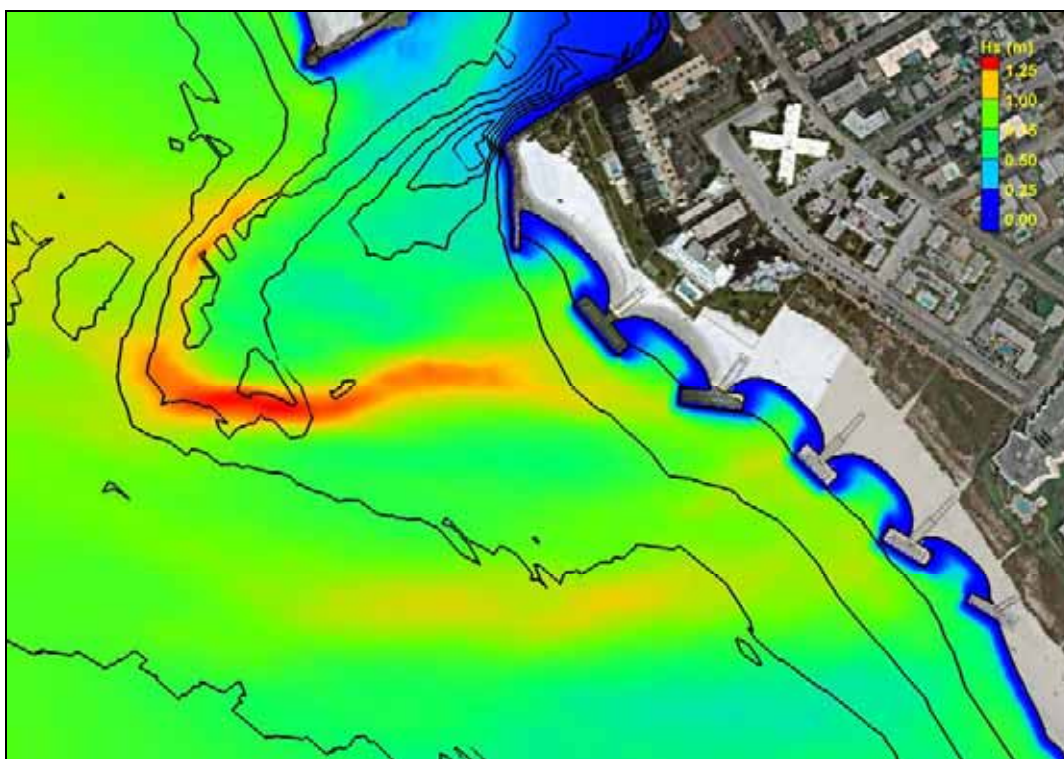


Figure 108. Wave Height, Cold Front A(b).

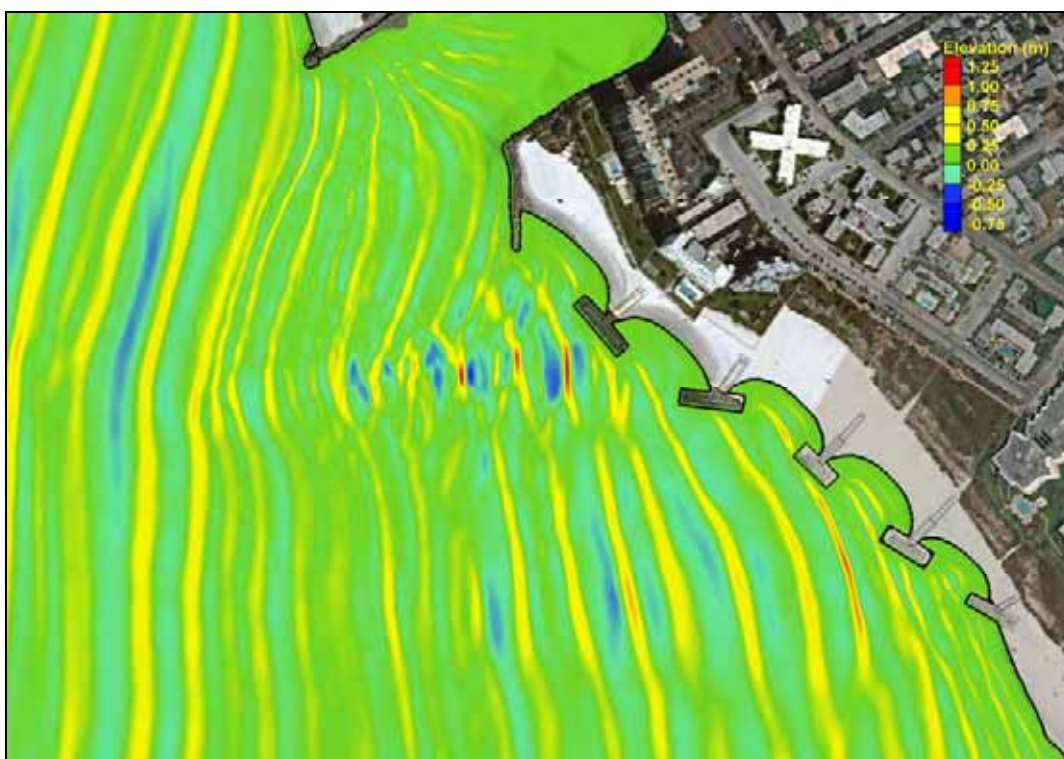


Figure 109. Surface Elevation, Cold Front A(b).



**Alternative 4, Cold Front A(b)**



Figure 110. Wave Breaking, Cold Front A(b).



Figure 111. Wave Breaking and Currents, Cold Front A(b).

#### Alternative 4, Cold Front B

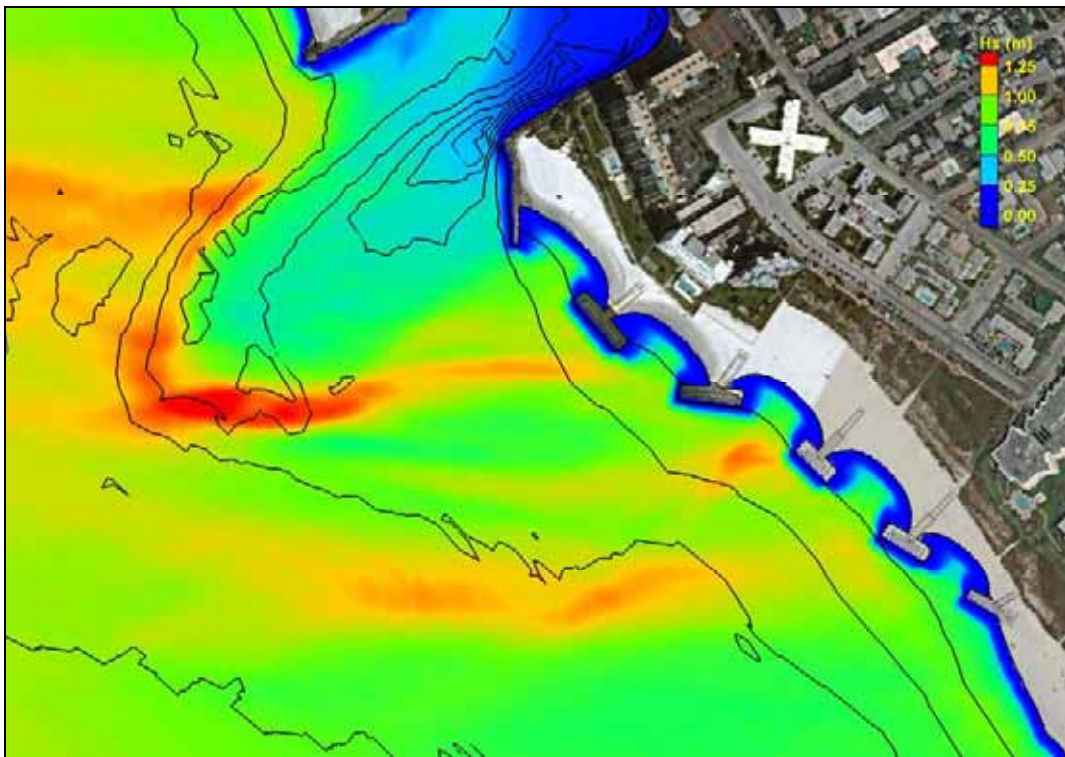


Figure 112. Wave Height, Cold Front B.

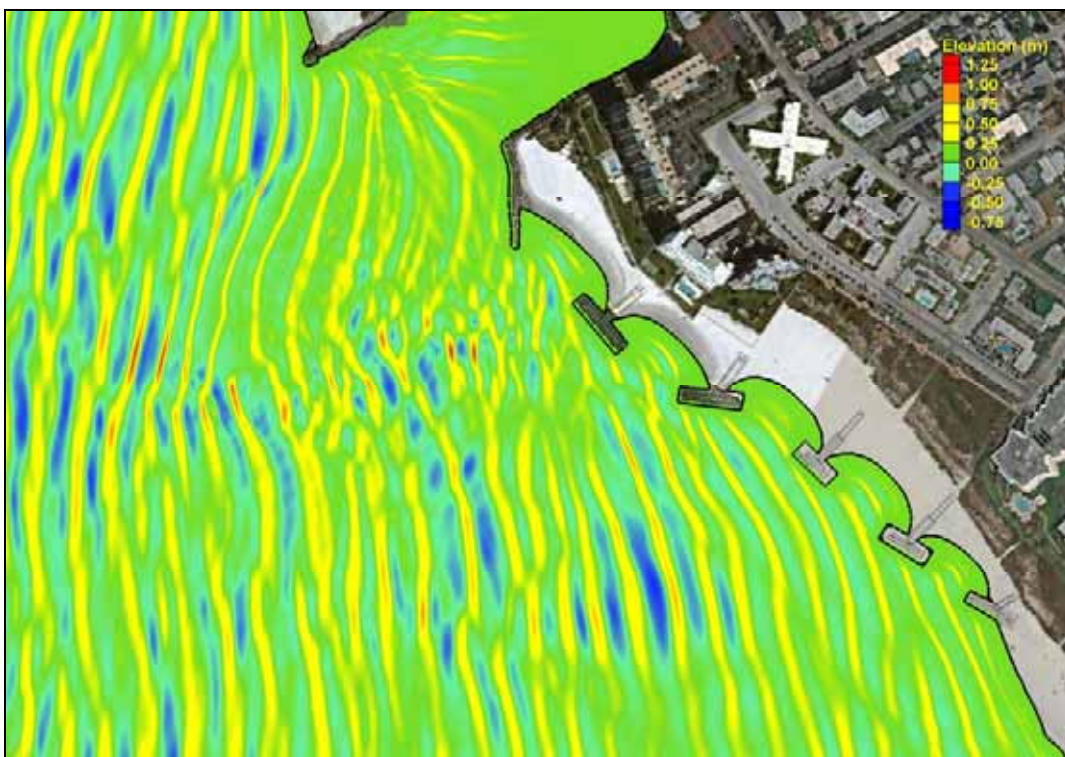


Figure 113. Surface Elevation, Cold Front B.



#### Alternative 4, Cold Front B



Figure 114. Wave Breaking, Cold Front B.

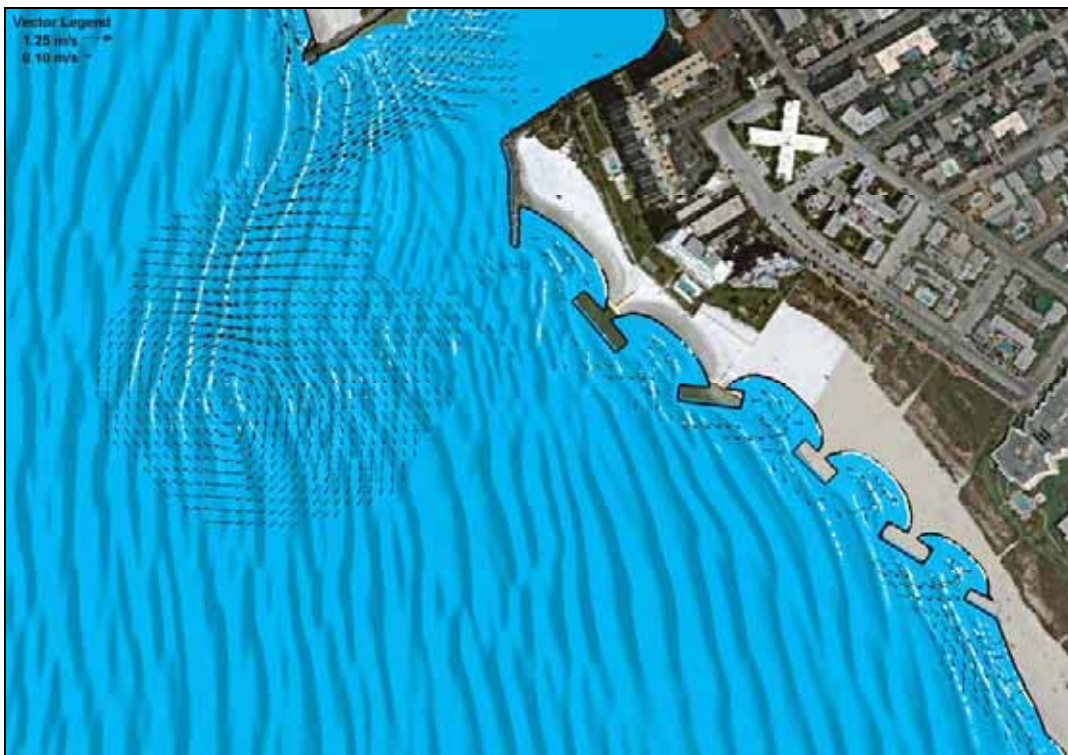


Figure 115. Wave Breaking and Currents, Cold Front B.

#### Alternative 4, Hurricane Ivan

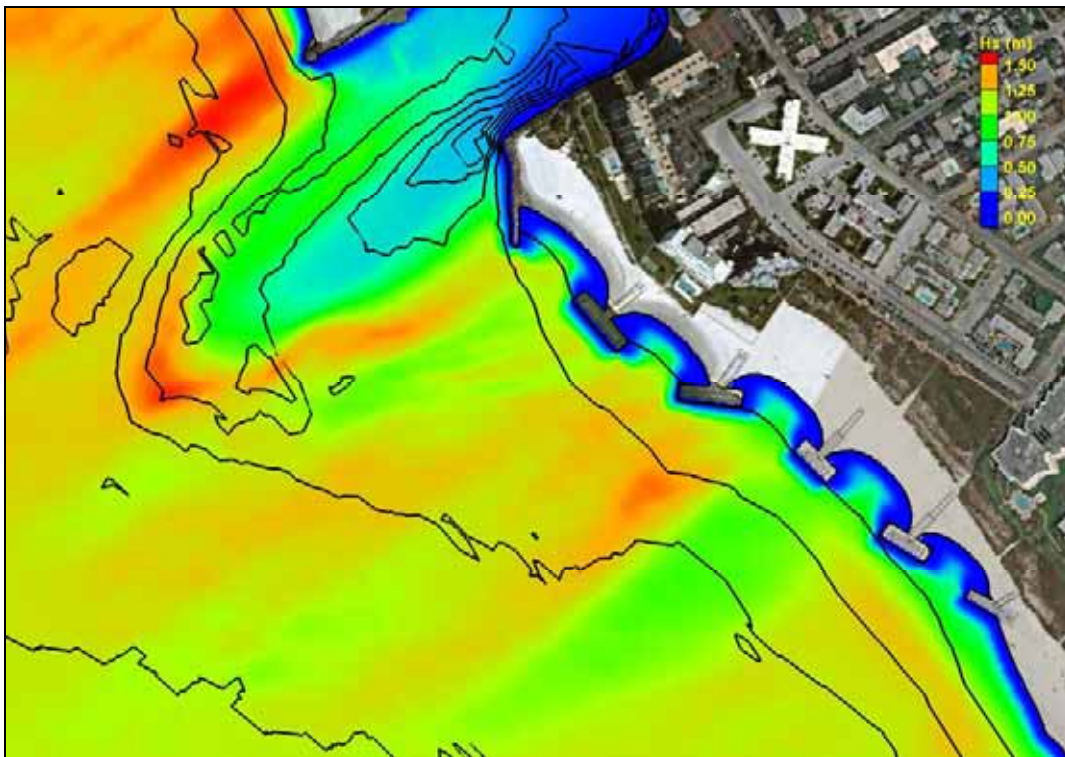


Figure 116. Wave Height, Hurricane Ivan.

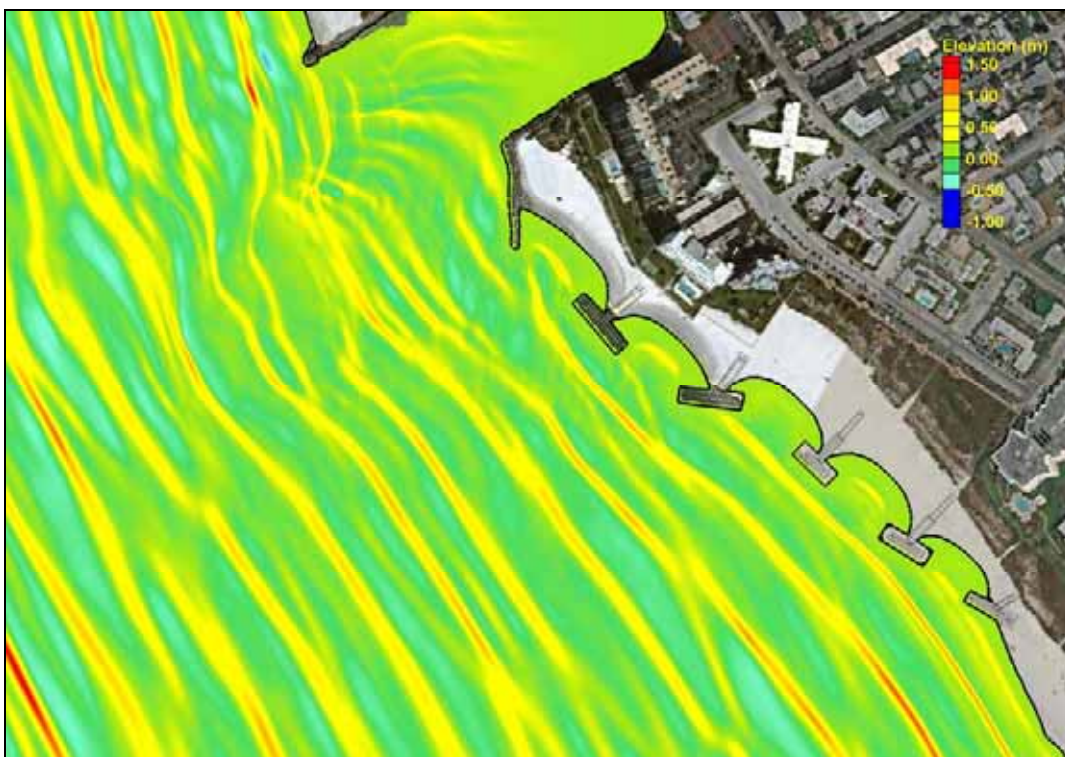


Figure 117. Surface Elevation, Hurricane Ivan.



#### Alternative 4, Hurricane Ivan



Figure 118. Wave Breaking, Hurricane Ivan.

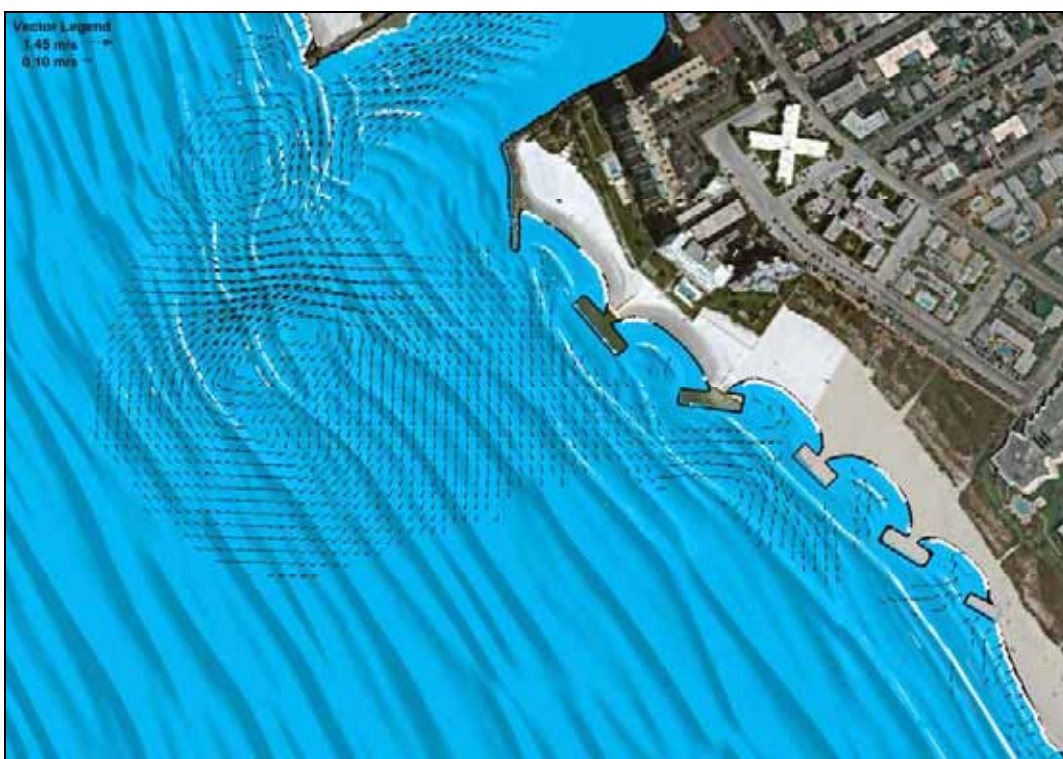


Figure 119. Wave Breaking and Currents, Hurricane Ivan.