

## 0.1 1991-01

### 1. Problems

- (a) No issues running
- (b) Archived

### 2. Results

#### (a) Level 1

##### i. - Map

A. - Max = 19.00-m, Mean = 5.55-m, U10 = 32.92-m/s

B. - Maximum wave height in northeast corner

##### ii. - Validation

A. - Active wave month with peak wave heights between 4- and 6-m. The same general trend is followed with northern buoy locations under-estimating peaks and southern buoy locations having a positive bias.

#### (b) Level 2

##### i. - Map

A. - Max = 12.21-m, Mean = 3.40-m, U10 = 31.29-m/s

##### ii. - Validation

A. - Similar to level 1

#### (c) Level 3N

##### i. - Map

A. - Max = 5.64-m, Mean = 2.09-m, U10 = 19.77-m/s

##### ii. - Validation

A. - 44005 - negative bias

B. - 44007 - big under-estimation on the 13th by 3-m

C. - 44011 - sporadic data near peaks and no general trend

D. - 44013 - follows trend of the month well, but slightly under-estimates peaks on the 13th and 22nd.

#### (d) Level 3C

##### i. - Map

- A. - Max = 6.57-m, Mean = 2.18-m, U10 = 20.60-m/s
- ii. - Validation
  - A. - 44001 - Over-estimation of largest peak on the 9th, low for rest of the month
  - B. - 44009 - similar to 44001
  - C. - 44012 - similar to 44001
  - D. - 44014 - good fit
  - E. - 44015 - good fit overall, little low on mean period
  - F. - 44023 - way off
  - G. - 44056 - good fit, sporadic data
- (e) Level 3S1
  - i. - Map
    - A. - Max = 4.91-m, Mean = 2.13-m, U10 = 20.62-m/s
  - ii. - Validation
    - A. - 41002 - wave heights are too high early and negatively bias late
    - B. - 41008 - not a good result
    - C. - 41009 - positively bias
    - D. - 41010 - too high early in month and too low later
- (f) Level 3S2
  - i. - Map
    - A. - Max = 3.38-m, Mean = 2.06-m, U10 = 13.95-m/s
  - ii. - Validation
    - A. - 41009 - positive bias early, negative bias later

## 0.2 1991-02

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1

- i. - Map
    - A. - Max = 24.58-m, Mean = 5.08-m, U10 = 33.27-m/s
    - B. - Maximum wave height in Northeast corner.
  - ii. - Validation
    - A. - High wave energy with some maximums in the +6-m range. One big miss at 41002 with the model estimating 5-m and the buoy measuring 9-m. This is the largest event measured for the month. Most peaks were still under-estimated.
- (b) Level 2
- i. - Map
    - A. - Max = 8.53-m, Mean = 3.20-m, U10 = 23.70-m
  - ii. - Validation
    - A. - Similar to level 1
- (c) Level 3N
- i. - Map
    - A. - Max = 5.00-m, Mean = 2.16-m, U10 = 18.82-m/s
  - ii. - Validation
    - A. - 44005 - Negative bias in both wave height and mean period
    - B. - 44007 - under-estimated peak by 2-m on 15th
    - C. - 44011 - Negative bias, higher at peaks
    - D. - 44013 - Similar to 44007
- (d) Level 3C
- i. - Map
    - A. - Max = 5.58-m, Mean = 2.04-m, U10 = 20.45-m/s
  - ii. - Validation
    - A. - 44001 - negative bias
    - B. - 44009 - good fit early, positive bias later
    - C. - 44012 - good fit
    - D. - 44014 - negative bias
    - E. - 44015 - under-estimated all the peaks

- F. - 44023 - bad, really bad
- G. - 44056 - not enough data
- (e) Level 3S1
  - i. - Map
    - A. - Max = 5.59-m, Mean = 2.22-m, U10 = 20.45-m/s
  - ii. - Validation
    - A. - 41002 - big miss for peak on the 16th
    - B. - 41008 - negative bias at peaks, positive bias rest of the month
    - C. - 41009 - pretty good fit
    - D. - 41010 - not bad, a little low for peak on the 16th
- (f) Level 3S2
  - i. - Map
    - A. - Max = 5.08-m, Mean = 2.22-m, U10 = 17.45-m/s
  - ii. - Validation
    - A. - 41009 - not bad, a little under-estimation of peak on the 16th, good fit on the 3rd.

### 0.3 1991-03

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 25.23-m, Mean = 4.79-m, U10 = 29.53-m/s
      - B. - Maximum wave height in Northeast corner
    - ii. - Validation
      - A. - Still an active wave energy month. Similar trends to the previous months with under-estimation of peak wave

heights for most of the central and northern buoy sites. The southern buoys tend to be more similar to the measurements.

(b) Level 2

i. - Map

A. - Max = 11.88-m, Mean = 3.73-m, U10 = 26.28-m/s

ii. - Validation

A. - Similar to level 1

(c) Level 3N

i. - Map

A. - Max = 6.11-m, Mean = 2.82-m, U10 = 19.71-m/s

ii. - Validation

A. - 44005 - negative bias

B. - 44007 - negative bias

C. - 44011 - negative bias

D. - 44013 - under-estimated only peak by 1-m

(d) Level 3C

i. - Map

A. - Max = 6.04-m, Mean = 2.55-m, U10 = 23.44-m/s

ii. - Validation

A. - 44001 - negative bias

B. - 44009 - under-estimated largest peak on 15th

C. - 44012 - similar to 44009

D. - 44014 - similar to 44009

E. - 44015 - negative bias

F. - 44023 - way off

G. - 44056 - major phase issues

(e) Level 3S1

i. - Map

A. - Max = 4.84-m, Mean = 2.41-m, U10 = 19.93-m/s

ii. - Validation

A. - 41002 - negative bias

- B. - 41008 - not a bad fit, data is kind of all over the place
- C. - 41009 - good fit for wave height
- D. - 41010 - good fit, some slight under-estimation of peaks
- (f) Level 3S2
  - i. - Map
    - A. - Max = 5.00-m, Mean = 2.08-m, U10 = 17.73-m/s
  - ii. - Validation
    - A. - 41009 - good fit

## 0.4 1991-04

### 1. Problems

- (a) No issues running
- (b) Archived

### 2. Results

- (a) Level 1
  - i. - Map
    - A. - Max = 10.32-m, Mean = 3.43-m, U10 = 24.20-m/s
  - ii. - Validation
    - A. - Peak wave conditions are just over 4-m. The largest peaks across most of the buoys occurred on the 22nd. The model does a decent job but there is still some under-estimation of the peak.
- (b) Level 2
  - i. - Map
    - A. - Max = 5.80-m, Mean = 2.53-m, U10 = 21.59-m/s
  - ii. - Validation
    - A. - Similar to level 1
- (c) Level 3N
  - i. - Map
    - A. - Max = 4.88-m, Mean = 1.77-m, U10 = 19.57-m/s

- ii. - Validation
  - A. - 44005 - negative bias
  - B. - 44007 - under-estimated peak by 2-m
  - C. - 44011 - phase issues, negative bias
  - D. - 44013 - similar to 44007
- (d) Level 3C
  - i. - Map
    - A. - Max = 3.86-m, Mean = 1.52-m, U10 = 17.62-m/s
  - ii. - Validation
    - A. - 44001 - not enough data
    - B. - 44009 - not bad, slight phase issue for peak on 21st
    - C. - 44012 - similar to 44009
    - D. - 44014 - similar to 44009
    - E. - 44015 - not enough data
    - F. - 44023 - not enough data
    - G. - 44056 - under-estimated peak on the 21st
- (e) Level 3S1
  - i. - Map
    - A. - Max = 4.96-m, Mean = 1.68-m, U10 = 15.70-m/s
  - ii. - Validation
    - A. - 41002 - decent fit, phase issues, under-estimation of peak
    - B. - 41008 - over-estimation of peaks
    - C. - 41009 - positive bias
    - D. - 41010 - similar to 41008
- (f) Level 3S2
  - i. - Map
    - A. - Max = 4.91-m, Mean = 1.78-m, U10 = 15.44-m/s
  - ii. - Validation
    - A. - 41009 - positive bias for wave height

## 0.5 1991-05

### 1. Problems

- (a) No issues running
- (b) Archived

### 2. Results

#### (a) Level 1

##### i. - Map

A. - Max = 8.02-m, Mean = 2.92-m, U10 = 23.49-m/s

##### ii. - Validation

A. - Largest event occurred on the 19th with not a lot of other wave events during the month. Most of the buoys under-estimated the event, but 41001 over-estimated it by 0.5-m.

#### (b) Level 2

##### i. - Map

A. - Max = 4.95-m, Mean = 1.96-m, U10 = 19.04-m/s

##### ii. - Validation

A. - Similar to level 1

#### (c) Level 3N

##### i. - Map

A. - Max = 3.75-m, Mean = 1.14-m, U10 = 16.41-m/s

##### ii. - Validation

A. - 44005 - negative bias

B. - 44007 - low at only peak on the 7th

C. - 44011 - negative bias

D. - 44013 - low on peak on the 18th

#### (d) Level 3C

##### i. - Map

A. - Max = 3.72-m, Mean = 1.11-m, U10 = 13.41-m/s

##### ii. - Validation



- A. - 44009 - slight low at peak on 19th
  - B. - 44012 - similar to 44009
  - C. - 44014 - good fit, slight phase issue
  - D. - 44056 - big phase issue
- (e) Level 3S1
  - i. - Map
    - A. - Max = 2.97-m, Mean = 1.16-m, U10 = 11.64-m/s
  - ii. - Validation
    - A. - 41002 - slight under-estimation at peak
    - B. - 41008 - good fit
    - C. - 41009 - good fit
    - D. - 41010 - good fit
- (f) Level 3S2
  - i. - Map
    - A. - Max = 2.62-m, Mean = 1.51-m, U10 = 12.26-m/s
  - ii. - Validation
    - A. - 41009 - good fit

## 0.6 1991-06

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 8.49-m, Mean = 2.65-m, U10 = 21.54-m/s
      - B. - 1 storm track making landfall in Florida
    - ii. - Validation
      - A. - Low wave month with the same general trends. Under-estimation of most peak wave events, with greater negative bias at the northern buoy sites.

- (b) Level 2
  - i. - Map
    - A. - Max = 5.49-m, Mean = 2.17-m, U10 = 22.16-m/s
    - B. - 1 track making landfall in Florida
  - ii. - Validation
    - A. - Similar to level1
- (c) Level 3N
  - i. - Map
    - A. - Max = 4.04-m, Mean = 1.32-m, U10 = 16.76-m/s
  - ii. - Validation
    - A. - 44005 - negative bias
    - B. - 44007 - negative bias
    - C. - 44011 - negative bias
    - D. - 44013 - low at peak on 5th
- (d) Level 3C
  - i. - Map
    - A. - Max = 4.30-m, Mean = 1.37-m, U10 = 15.80-m/s
  - ii. - Validation
    - A. - 44009 - negative bias
    - B. - 44012 - good fit
    - C. - 44014 - good fit
    - D. - 44056 - low at peak on 24th
- (e) Level 3S1
  - i. - Map
    - A. - Max = 4.28-m, Mean = 1.37-m, U10 = 16.20-m/s
    - B. - 1 storm track coming off of Florida
  - ii. - Validation
    - A. - 41002 - over-estimation of peak on the 7th by 1-m and under-estimation of peak on the 26th
    - B. - 41008 - a little high on the 8th but good fit
    - C. - 41009 - not enough data
    - D. - 41010 - missed second peak in storm on the 8th

- (f) Level 3S2
  - i. - Map
    - A. - Max = 3.29-m, Mean = 1.21-m, U10 = 15.12-m/s
    - B. - 1 storm track making landfall in Florida
  - ii. - Validation
    - A. - 41009 - not enough data, out during storm.

## 0.7 1991-07

- 1. Problems
  - (a) No issues running
  - (b) Archived
- 2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 6.54-m, Mean = 2.24-m, U10 = 23.34-m/s
      - B. - Same storm track as last month. Coming off of Florida.
    - ii. - Validation
      - A. - Low wave energy month. Pretty good fit at most buoy locations, but some under-estimation at peaks.
  - (b) Level 2
    - i. - Map
      - A. - Max = 4.31-m, Mean = 1.65-m, U10 = 22.58-m/s
      - B. - 1 storm track coming off of Florida
    - ii. - Validation
      - A. - Similar to level 1
  - (c) Level 3N
    - i. - Map
      - A. - Max = 2.09-m, Mean = 0.94-m, U10 = 15.81-m/s
    - ii. - Validation
      - A. - 44005 - negative bias

- B. - 44007 - good fit
  - C. - 44013 - good fit
- (d) Level 3C
  - i. - Map
    - A. - Max = 3.15-m, Mean = 1.06-m, U10 = 18.35-m/s
  - ii. - Validation
    - A. - 44009 - good fit
    - B. - 44012 - good fit
    - C. - 44014 - negative bias
    - D. - 44056 - low waves, but a little low at only peak
- (e) Level 3S1
  - i. - Map
    - A. - Max = 2.36-m, Mean = 1.05-m, U10 = 13.01-m/s
  - ii. - Validation
    - A. - 41002 - negative bias
    - B. - 41008 - low waves but good fit
    - C. - 41009 - low waves but positive bias
    - D. - 41010 - slightly positive bias
- (f) Level 3S2
  - i. - Map
    - A. - Max = 2.12-m, Mean = 1.27-m, U10 = 10.02-m/s
  - ii. - Validation
    - A. - 41009 - low waves but positively bias

## 0.8 1991-08

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1

- i. - Map
    - A. - Max = 12.42-m, Mean = 2.58-m, U10 = 32.22-m/s
    - B. - At least one track going up the US coastline, across the Cape.
  - ii. - Validation
    - A. - One large wave height event on the 19th with peak wave heights greater than 6-m. The model results seem to match the measured wave heights for southern buoy locations very well during this event. The northern buoy locations under-estimate peak.
- (b) Level 2
- i. - Map
    - A. - Max = 13.39-m, Mean = 1.45-m, U10 = 41.32-m/s
    - B. - One storm track going up the coast. Travels across Cape Cod.
  - ii. - Validation
    - A. - Similar to level 1
- (c) Level 3N
- i. - Map
    - A. - Max = 12.05-m, Mean = 1.12-m, U10 = 38.58-m/s
    - B. - One event making landfall in Mass.
  - ii. - Validation
    - A. - 44005 - buoy goes out at peak of the storm but results are negatively bias
    - B. - 44007 - low at all peaks
    - C. - 44013 - good fit
- (d) Level 3C
- i. - Map
    - A. - Max = 13.06-m, Mean = 1.06-m, U10 = 42.56-m/s
    - B. - one track off the OBX coast.
  - ii. - Validation
    - A. - 44009 - over-estimation of peak
    - B. - 44012 - similar to 44009

- C. - 44014 - buoy was out during storm
  - D. - 44056 - good fit
- (e) Level 3S1
  - i. - Map
    - A. - Max = 9.06-m, Mean = 1.06-m, U10 = 35.56-m/s
    - B. - One track up coast
  - ii. - Validation
    - A. - 41002 - under-estimation of peak
    - B. - 41008 - did not get storm, but over-estimation of waves at that time period
    - C. - 41009 - phase issues at peak
    - D. - 41010 - good fit
- (f) Level 3S2
  - i. - Map
    - A. - Max = 5.51-m, Mean = 1.02-m, U10 = 23.80-m/s
    - B. - one track off shore
  - ii. - Validation
    - A. - 41009 - phase issues during storm

## 0.9 1991-09

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 9.94-m, Mean = 2.89-m, U10 = 26.08-m/s
      - B. - 3 storm tracks all offshore
    - ii. - Validation

- A. - Low wave height month with all wave heights under 4-m.  
The model does a pretty good job. Some under-estimation of peaks at the northern buoy locations.
- (b) Level 2
  - i. - Map
    - A. - Max = 10.47-m, Mean = 1.82-m, U10 = 35.57-m/s
    - B. - One storm track making a circle offshore
  - ii. - Validation
    - A. - Similar to level 1
- (c) Level 3N
  - i. - Map
    - A. - Max = 3.12-m, Mean = 1.34-m, U10 = 15.03-m/s
  - ii. - Validation
    - A. - 44007 - Lots of peaks and model under-estimates them all
    - B. - 44011 - negative bias
    - C. - 44013 - really low waves, ok result
- (d) Level 3C
  - i. - Map
    - A. - Max = 3.75-m, Mean = 1.59-m, U10 = 15.72-m/s
  - ii. - Validation
    - A. - 44009 - good fit
    - B. - 44012 - good fit
    - C. - 44014 - slight under-estimation of peaks
    - D. - 44056 - some phase issues
- (e) Level 3S1
  - i. - Map
    - A. - Max = 4.22-m, Mean = 1.58-m, U10 = 15.84-m/s
  - ii. - Validation
    - A. - 41002 - slight under-estimation of peaks
    - B. - 41008 - good fit
    - C. - 41009 - good fit

- D. - 41010 - good fit
- (f) Level 3S2
  - i. - Map
    - A. - Max = 4.03-m, Mean = 1.33-m, U10 = 13.77-m/s
  - ii. - Validation
    - A. - 41009 - good fit

## 0.10 1991-10

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 18.37-m, Mean = 4.02-m, U10 = 31.56-m/s
      - B. - lots of storm tracks with a bunch off the coast of US
    - ii. - Validation
      - A. - very big peak on the 30th with maximums greater than 9-m. The model actually over-estimates the peak at 44011 but overall the model does a good job with the storm peak.
  - (b) Level 2
    - i. - Map
      - A. - Max = 18.84-m, Mean = 2.74-m, U10 = 32.56-m/s
      - B. - 3 storms off US coastline
    - ii. - Validation
      - A. - Similar to level 1
  - (c) Level 3N
    - i. - Map
      - A. - Max = 18.84-m, Mean = 2.47-m, U10 = 30.07-m/s
    - ii. - Validation



- A. - 44007 - Under-estimates peak on 31st by 2-m.
  - B. - 44011 - Over-estimated peak on 30th, better than level 1
  - C. - 44013 - Similar to 44007
- (d) Level 3C
  - i. - Map
    - A. - Max = 9.13-m, Mean = 2.46-m, U10 = 19.34-m/s
  - ii. - Validation
    - A. - 44009 - Over-estimated peak on 31st
    - B. - 44012 - Similar to 44009
    - C. - 44014 - Good fit
    - D. - 44056 - Good fit overall
- (e) Level 3S1
  - i. - Map
    - A. - Max = 7.92-m, Mean = 2.47-m, U10 = 18.07-m/s
    - B. - One track in grid
  - ii. - Validation
    - A. - 41002 - Good fit overall
    - B. - 41008 - Over-estimation of event on 31st
    - C. - 41009 - good fit
    - D. - 41010 - Over-estimation of peak
- (f) Level 3S2
  - i. - Map
    - A. - Max = 6.96-m, Mean = 2.32-m, U10 = 22.86-m/s
    - B. - One track through Bahamas
  - ii. - Validation
    - A. - 41009 - Good fit

## 0.11 1991-11

### 1. Problems

- (a) No issues running

(b) Archived

## 2. Results

(a) Level 1

i. - Map

A. - Max = 10.90-m, Mean = 4.54-m, U10 = 26.66-m/s

B. - At least one track off US coastline, making a loop in Northeast.

ii. - Validation

A. - Lots of wave height fluctuation through the month, but model results look very good. The model is matching the measured peaks very well.

(b) Level 2

i. - Map

A. - Max = 10.39-m, Mean = 2.67-m, U10 = 33.42-m/s

B. - One track making a loop off Northeast.

ii. - Validation

A. - Similar to level 1

(c) Level 3N

i. - Map

A. - Max = 8.05-m, Mean = 2.12-m, U10 = 25.30-m/s

ii. - Validation

A. - 44007 - good fit, some slight under-estimation of peak

B. - 44011 - small negative bias

C. - 44013 - under-estimated peak on the 12th.

(d) Level 3C

i. - Map

A. - Max = 6.73-m, Mean = 1.79-m, U10 = 21.79-m/s

ii. - Validation

A. - 44009 - good fit

B. - 44012 - good fit

C. - 44014 - good fit

- D. - 44056 - Under-estimation of peak on the 10th
- (e) Level 3S1
  - i. - Map
    - A. - Max = 5.27-m, Mean = 1.98-m, U10 = 20.17-m/s
  - ii. - Validation
    - A. - 41002 - under-estimation of peak on the 10th
    - B. - 41008 - phase issue at peak on the 10th
    - C. - 41009 - Under-estimation of peak
    - D. - 41010 - good fit overall
- (f) Level 3S2
  - i. - Map
    - A. - Max = 6.35-m, Mean = 2.21-m, U10 = 15.23-m/s
  - ii. - Validation
    - A. - 41009 - good fit except of under-estimation f peak on the 10th

## 0.12 1991-12

1. Problems
  - (a) No issues running
  - (b) Archived
2. Results
  - (a) Level 1
    - i. - Map
      - A. - Max = 14.31-m, Mean = 4.78-m, U10 = 37.58-m/s
    - ii. - Validation
      - A. - Active winter month with the usual trend. Northern buoy locations are under-estimating peaks, and southern buoy locations are over-estimating peaks.
  - (b) Level 2
    - i. - Map

- A. - Max = 7.40-m, Mean = 3.38-m, U10 = 23.20-m/s
  - ii. - Validation
    - A. - Similar to level 1
- (c) Level 3N
  - i. - Map
    - A. - Max = 5.33-m, Mean = 2.50-m, U10 = 22.92-m/s
  - ii. - Validation
    - A. - 44007 - under-estimation of each peak
    - B. - 44011 - negative bias
    - C. - 44013 - under-estimated peak on 31st
- (d) Level 3C
  - i. - Map
    - A. - Max = 4.66-m, Mean = 1.95-m, U10 = 19.06-m/s
  - ii. - Validation
    - A. - 44009 - good fit
    - B. - 44012 - good fit
    - C. - 44014 - under-estimated peaks
    - D. - 44056 - not enough data
- (e) Level 3S1
  - i. - Map
    - A. - Max = 5.08-m, Mean = 1.87-m, U10 = 18.56-m/s
  - ii. - Validation
    - A. - 41002 - under-estimation of peak
    - B. - 41008 - over-estimation of peak on 20th
    - C. - 41009 - similar to 41008
    - D. - 41010 - similar to 41008
- (f) Level 3S2
  - i. - Map
    - A. - Max = 5.53-m, Mean = 2.08-m, U10 = 16.44-m/s
  - ii. - Validation
    - A. - 41009 - over-estimation of peak on the 20th.

## 0.13 1991-stats

### 0.13.1 Level 1

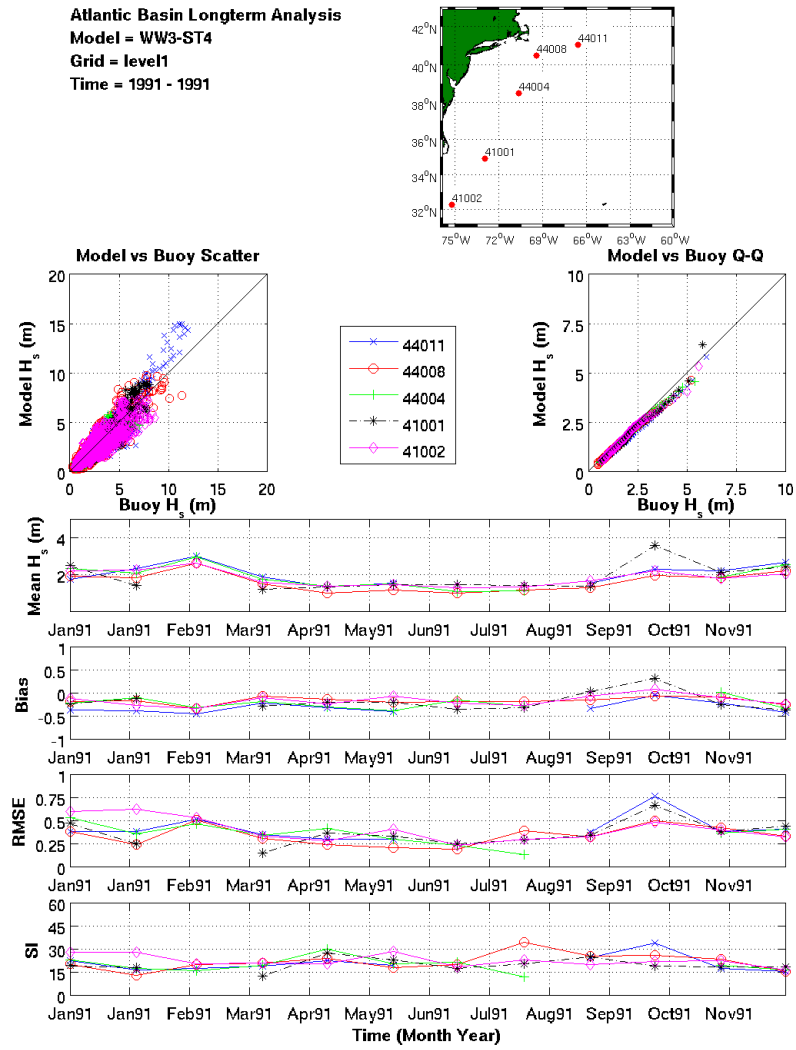


Figure 1: Comp 2 for Level 1

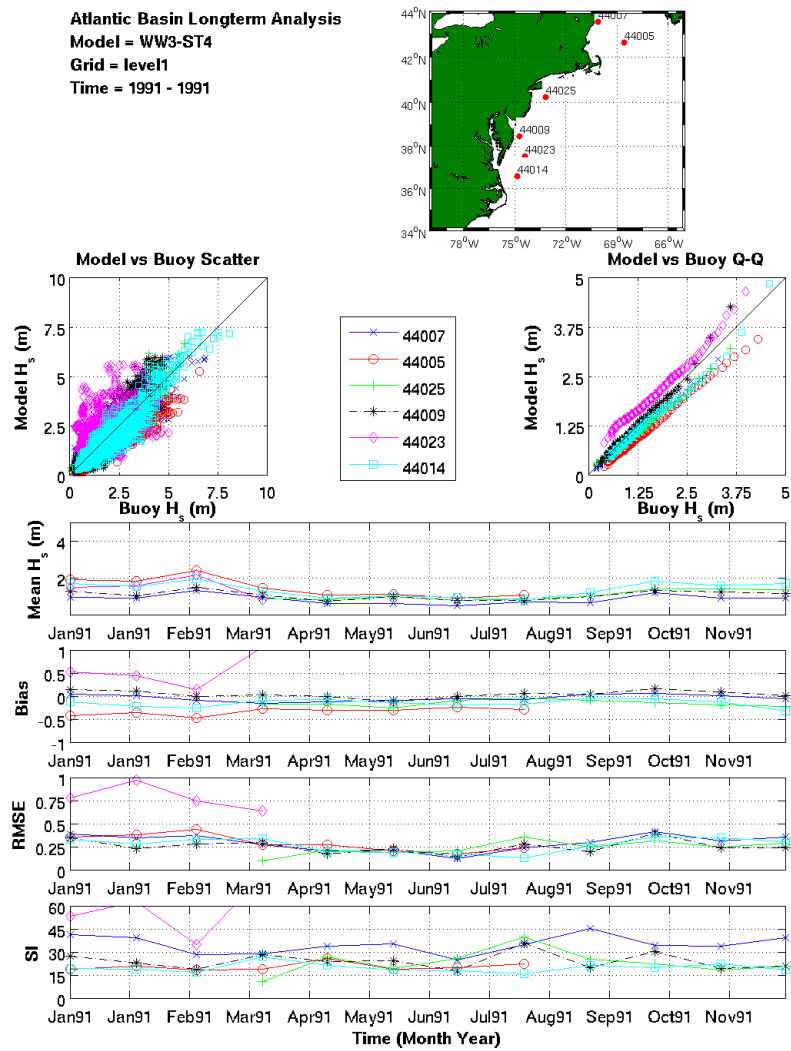


Figure 2: Comp 3 for Level 1

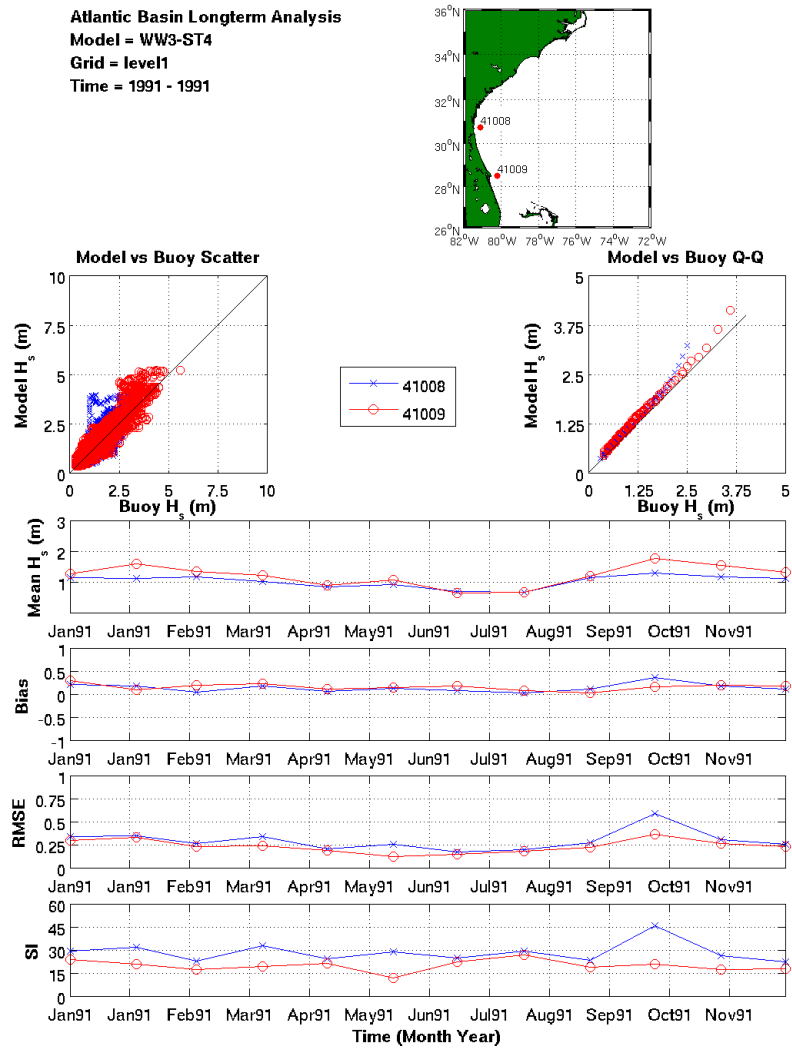


Figure 3: Comp 4 for Level 1

## 0.13.2 Level 2

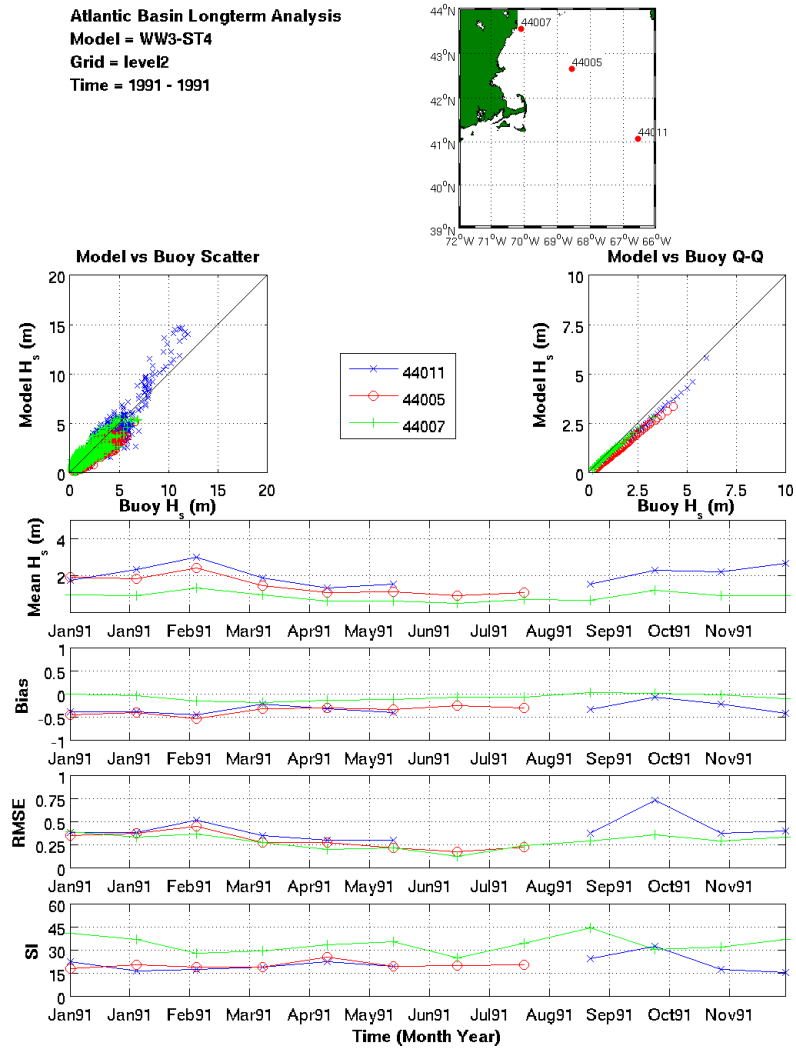


Figure 4: Comp 2 for Level 2



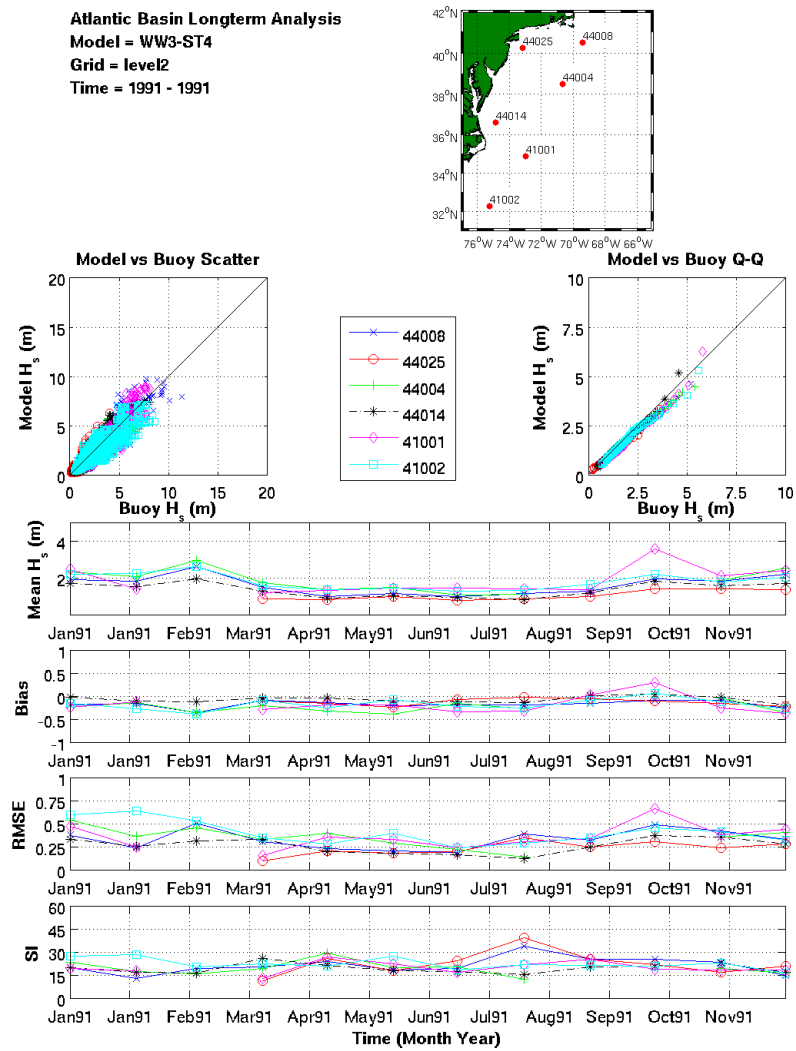


Figure 5: Comp 3 for Level 2

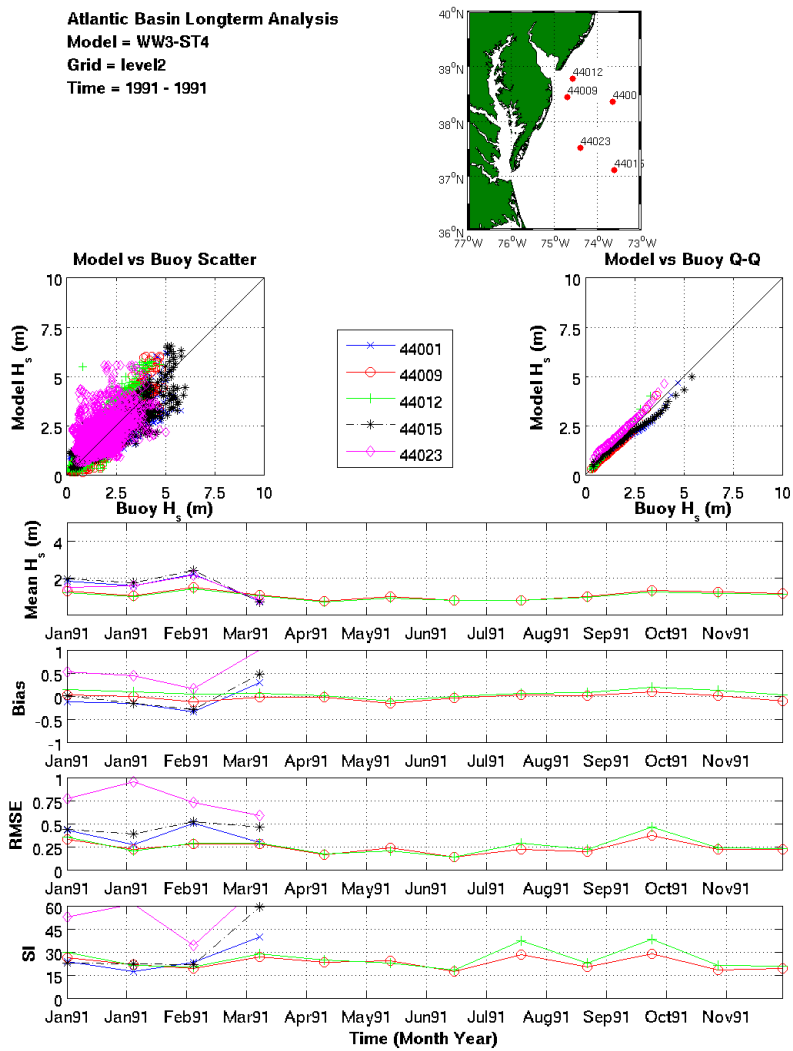


Figure 6: Comp 4 for Level 2

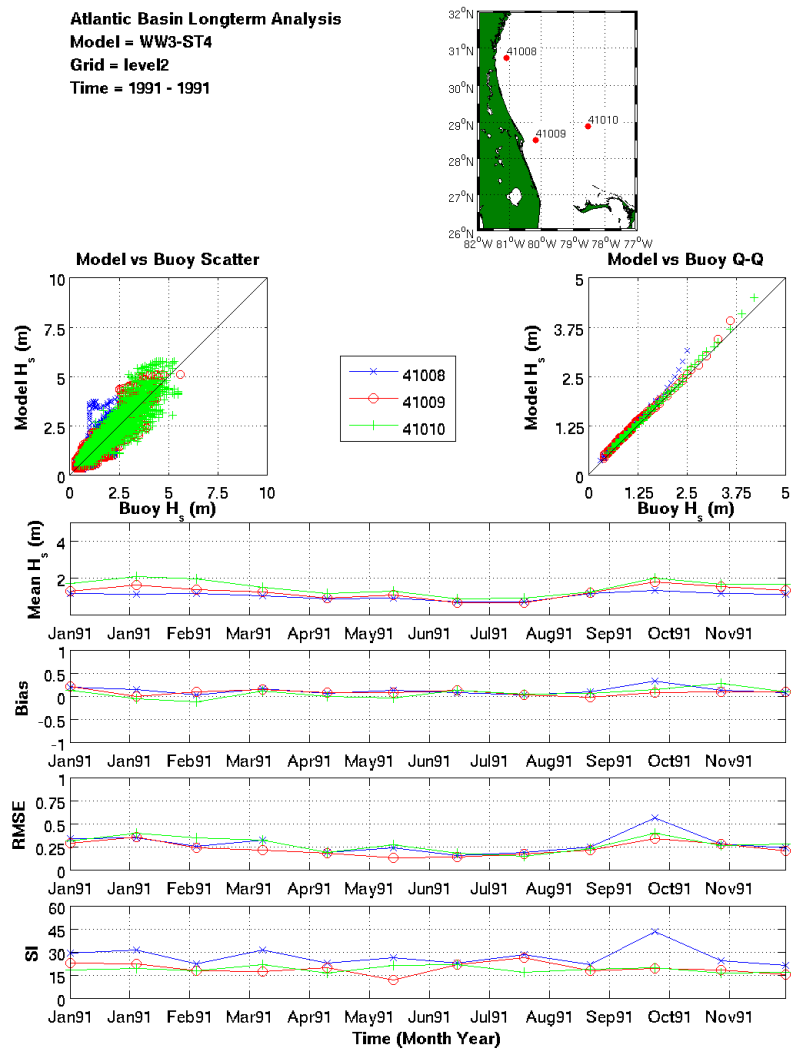


Figure 7: Comp 5 for Level 2

### 0.13.3 Level 3N

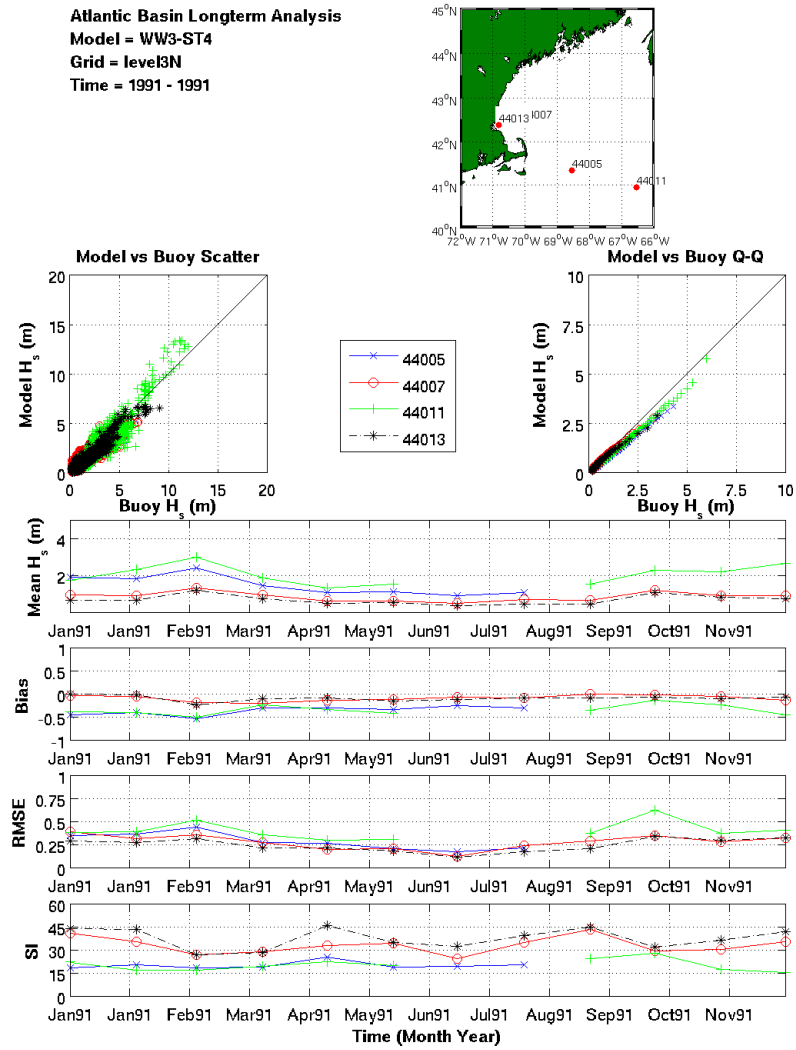


Figure 8: Comp 1 for Level 3N

### 0.13.4 Level 3C

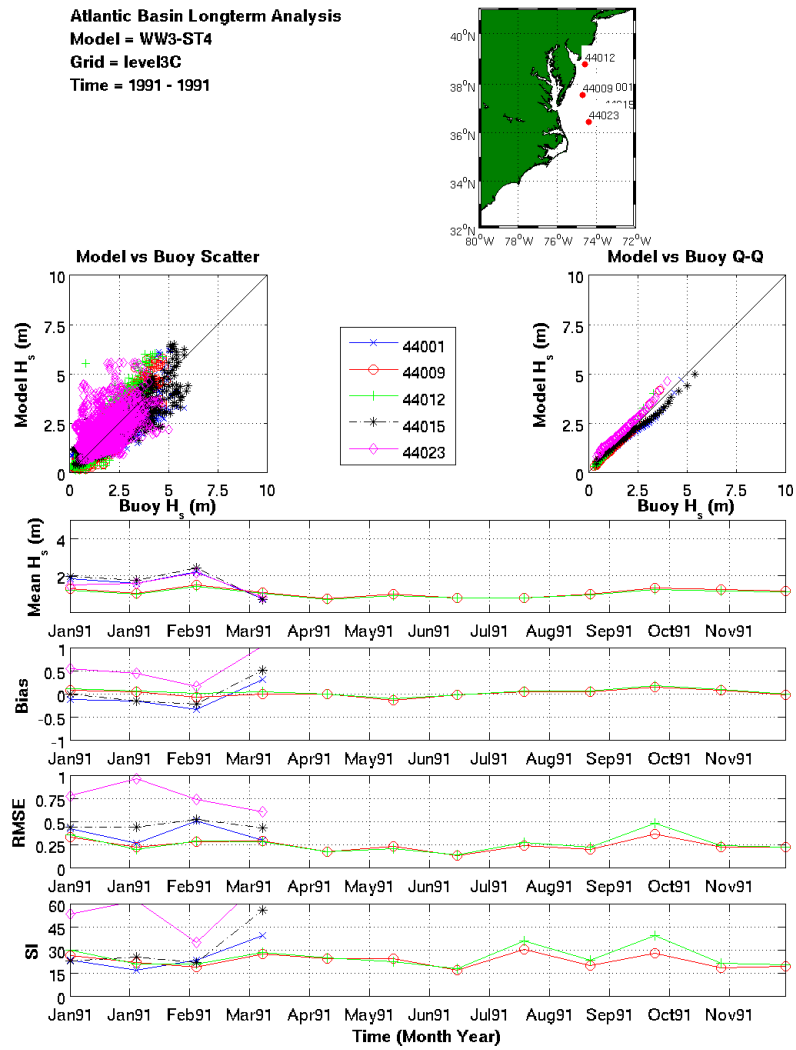


Figure 9: Comp 1 for Level 3C

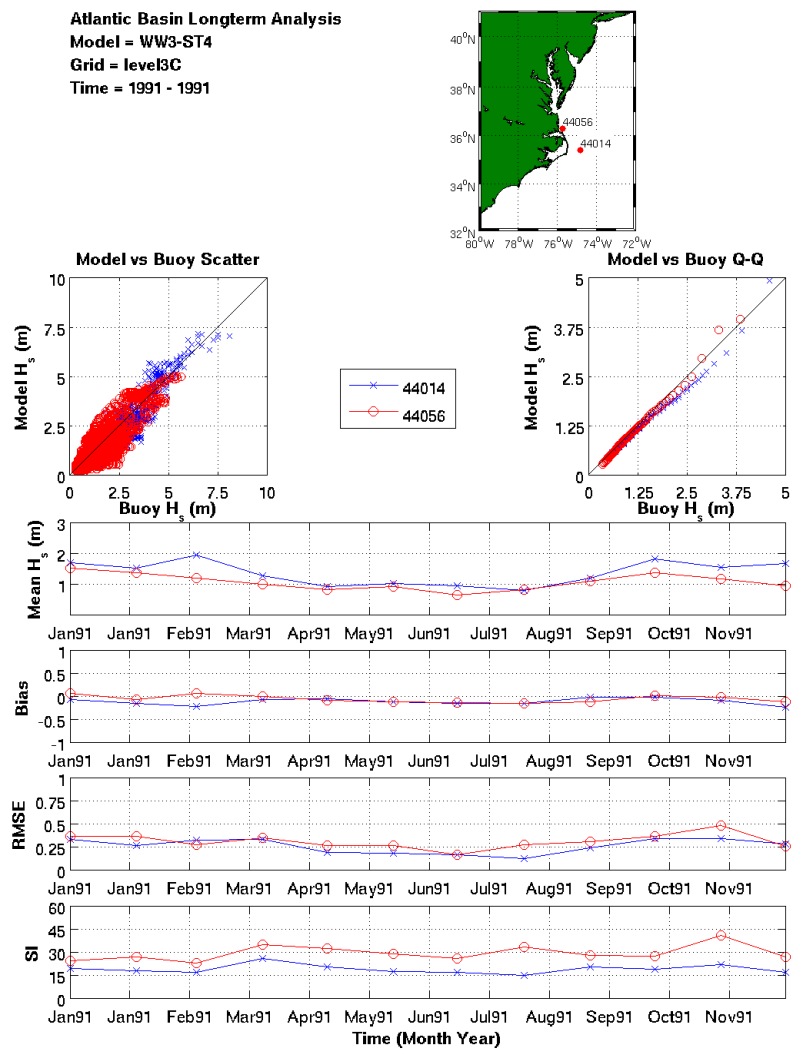


Figure 10: Comp 2 for Level 3C

### 0.13.5 Level 3S1

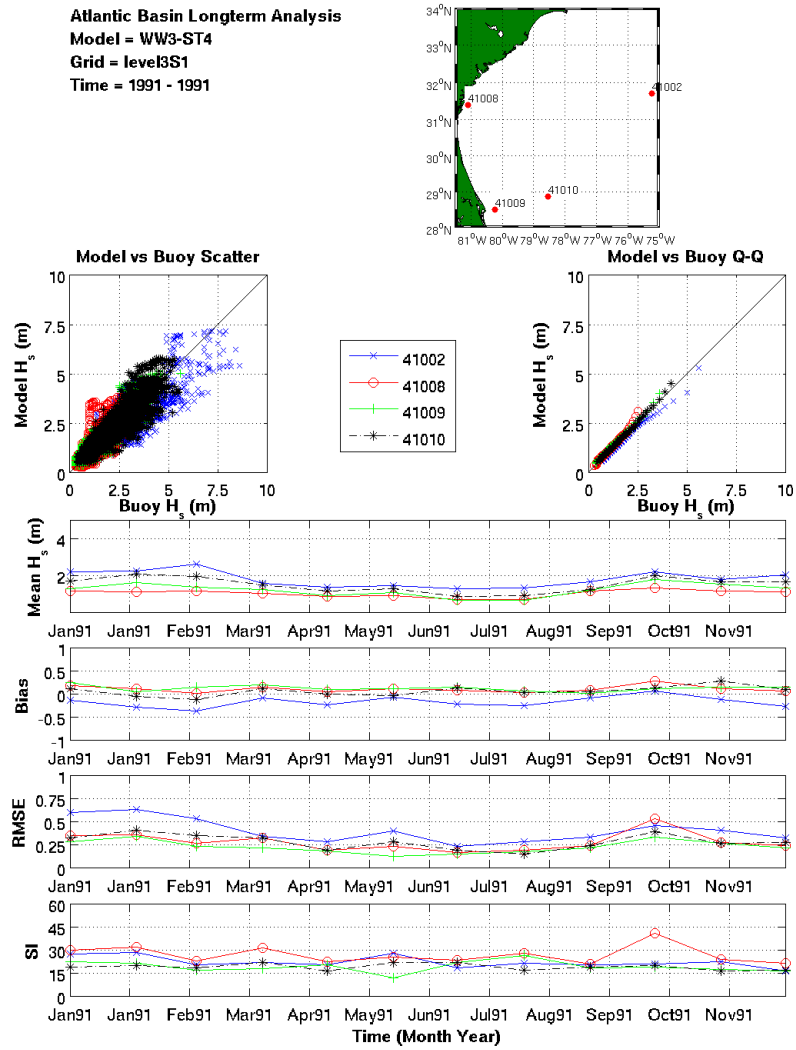


Figure 11: Comp 1 for Level 3S1

### 0.13.6 Level 3S2

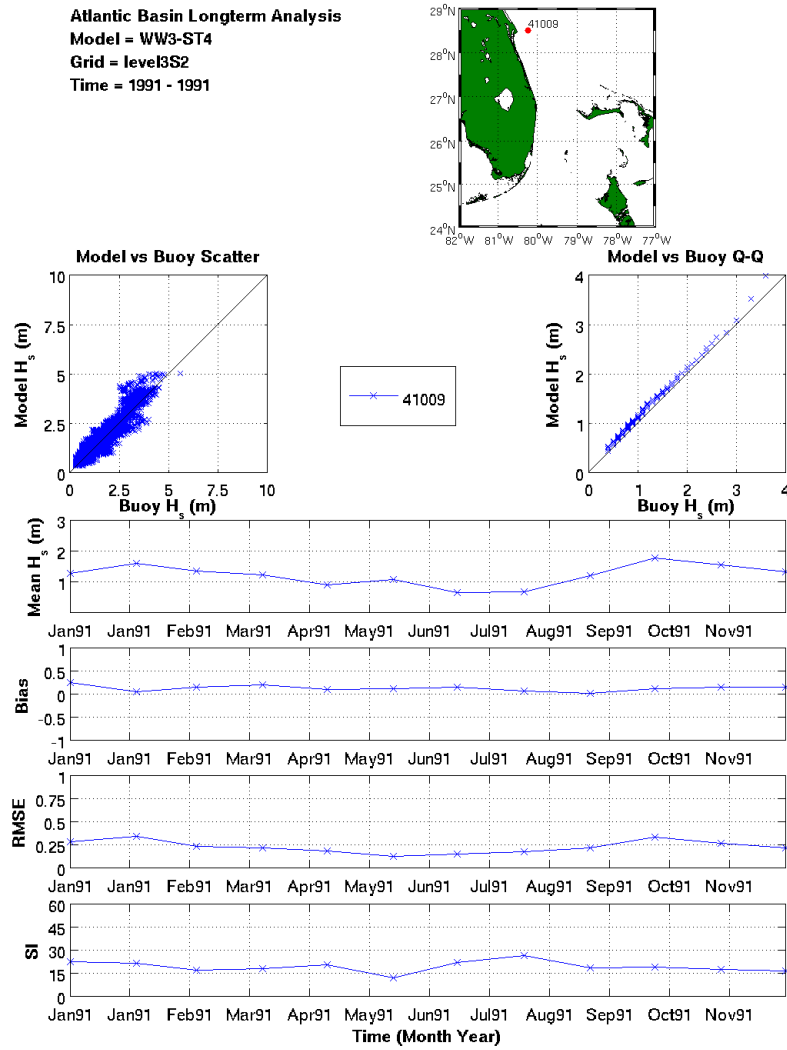


Figure 12: Comp 1 for Level 3S2