



# Metocean Data Report - Six Months

## **Douglas Shoal Remediation Project**

Great Barrier Reef Marine Park Authority

8 November 2019

12 Creek Street  
Brisbane. QLD. 4000

301001-02112-EN-REP-0006

**Advisian**  
Worley Group

[advisian.com](http://advisian.com)



**Australian Government**

**Great Barrier Reef  
Marine Park Authority**

© Commonwealth of Australia 2019

Published by the Great Barrier Reef Marine Park Authority

ISBN 9780648589259

This document is licensed by the Commonwealth of Australia for use under a Creative Commons By Attribution 4.0 International licence with the exception of the Coat of Arms of the Commonwealth of Australia, the logo of the Great Barrier Reef Marine Park Authority, any other material protected by a trademark, content supplied by third parties and any photographs. For licence conditions see: <http://creativecommons.org/licenses/by/4.0>



Aboriginal and Torres Strait Islander readers are advised this publication may contain names and images of deceased persons.

#### **Disclaimer**

This report has been prepared on behalf of and for the exclusive use of Great Barrier Reef Marine Park Authority, and is subject to and issued in accordance with the agreement between Great Barrier Reef Marine Park Authority and Advisian. Advisian accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

While all efforts have been made to verify facts, the Great Barrier Reef Marine Park Authority takes no responsibility for the accuracy of information supplied in this publication.

**A catalogue record for this publication is available from the National Library of Australia**

#### **This publication should be cited as:**

Advisian 2019, *Douglas Shoal remediation project: Metocean data report (January to June 2019)*, Prepared by Advisian Pty Ltd for the Great Barrier Reef Marine Park Authority, Townsville.

Comments and questions regarding this document are welcome and should be addressed to:



**Australian Government**  
Great Barrier Reef  
Marine Park Authority

Great Barrier Reef Marine Park Authority  
2–68 Flinders Street  
(PO Box 1379)  
Townsville QLD 4810, Australia

Phone: (07) 4750 0700  
Fax: (07) 4772 6093  
Email: [info@gbmpa.gov.au](mailto:info@gbmpa.gov.au)  
[www.gbmpa.gov.au](http://www.gbmpa.gov.au)

## Table of contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Study datum.....	1
1.2	Units and conventions .....	2
<b>2</b>	<b>Deployment information.....</b>	<b>3</b>
2.1	Deployment frames.....	3
2.2	Deployment and retrieval method.....	3
2.3	Deployment location .....	4
2.4	Deployment configuration .....	5
<b>3</b>	<b>Results and summary .....</b>	<b>8</b>
3.1	Quality assurance and control .....	8
3.1.1	Compass calibration .....	8
3.1.2	Data interrogation.....	8
3.2	Current and water levels .....	8
3.3	Waves.....	9
<b>4</b>	<b>Lessons learned.....</b>	<b>10</b>
<b>5</b>	<b>References .....</b>	<b>11</b>

## Table list

Table 1-1 ADCP deployment periods.....	1
Table 2-1 Deployment locations for ADCP1 and ADCP2.....	4
Table 2-2 ADCP1 deployment configuration information .....	6
Table 2-3 ADCP2 deployment configuration information .....	6
Table 4-1 Fieldwork lessons learned .....	10

## Figure list

Figure 1-1 Deployed ADCP at ADCP2 .....	1
Figure 2-1 ADCP frame and acoustic release .....	3

## Appendix list

- Appendix A** Current and Wave Monitoring Locations
- Appendix B** ADCP1: Current and Water Level Time Series Plots
- Appendix C** ADCP1: Current Rose, Velocity Scatter and Joint Frequency Table Plots
- Appendix D** ADCP2: Current and Water Level Time Series Plots
- Appendix E** ADCP2: Current Rose, Velocity Scatter and Joint Frequency Table Plots
- Appendix F** ADCP1: Wave Time Series Plots
- Appendix G** ADCP1: Wave Rose, Histogram and Joint Frequency Table Plots
- Appendix H** ADCP2: Wave Time Series Plots
- Appendix I** ADCP2: Wave Rose, Histogram and Joint Frequency Table Plots

# 1 Introduction

This document provides a factual report of the wave and current data collected at Douglas Shoal by using Acoustic Doppler Current Profilers (ADCPs) for the Great Barrier Reef Marine Park Authority (GBRMPA) Douglas Shoal Remediation Project. The data have been collected at two locations which are named ADCP Site 1 (ADCP1) and ADCP Site 2 (ADCP2). Please refer to Appendix A for current and wave monitoring locations (ADCP1 and ADCP2). Figure 1-1 below shows one of the deployed ADCP units at site ADCP2. This report covers three deployment periods as presented in Table 1-1 whereby two ADCP instruments were deployed per period. Deployment period 1 collected wave data and current data at ADCP1 and only current data at ADCP2. Deployments 2 and 3 collected both wave and current data at both deployment locations. More detail on the ADCP component of the Douglas Shoal Remediation Project can be found in *Sampling and Analysis Plan – Douglas Shoal Remediation Project* (Advisian 2019)

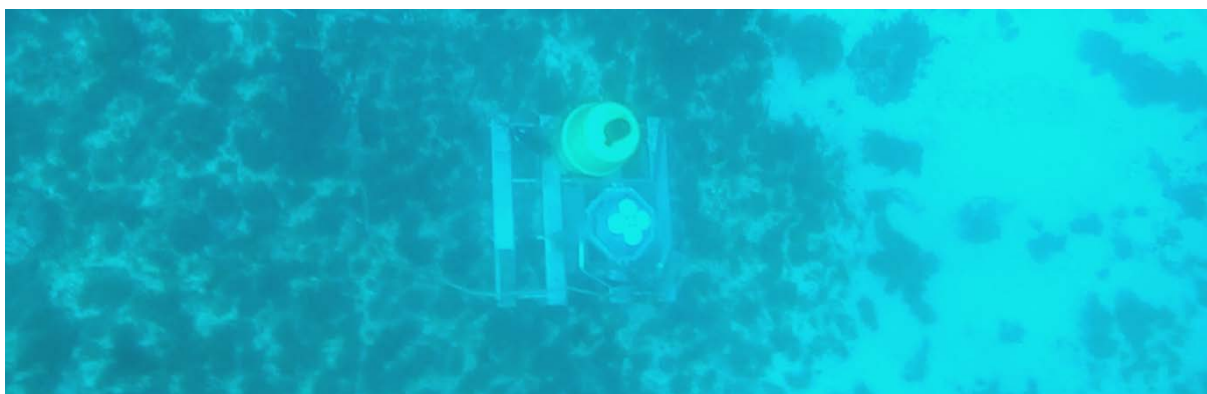


Figure 1-1 Deployed ADCP at ADCP2

Table 1-1 ADCP deployment periods

Deployment Period	Deployment Date	Recovery Date
1	17/01/2019	14/03/2019
2	16/03/2019	13/06/2019
3	14/06/2019	25/08/2019

## 1.1 Study datum

Geographical positions are provided in geographic (Latitude/Longitude) coordinates unless stated otherwise. Exact seabed elevation relative to a specified datum is not provided. Reported water depths are as measured by each instrument.

## **1.2 Units and conventions**

All units are in standard SI units unless otherwise stated, with all bearings and directions provided in degrees True North

## 2 Deployment information

### 2.1 Deployment frames

The ADCP's are deployed in a custom-built frame. The ADCP frame is fitted with an Acoustic Release Pop-Up-Buoy (PUB) for subsequent recovery. A picture of the ADCP frame with the fitted acoustic release on deck is shown in Figure 2-1.



*Figure 2-1 ADCP frame and acoustic release*

During deployment, a digital tilting sensor (accelerometer), owned and developed by Advisian, was used to ensure the frame was in an upright position within the acceptable range required (normally within 8 degrees of the vertical).

### 2.2 Deployment and retrieval method

The deployment of the ADCPs and weighted frames was undertaken using a lifting crane and the 'endless rope method'. The frames are first lowered to the water using the crane, a rope is slipped through 2 D shackles placed on the top of the frame and secured to the vessel on two separate

bollards, taking the weight of the frame. The crane hook is lowered until all the weight is taken up by the rope and the crane hook is then removed. To lower the frame, one end of the rope remains attached to the vessel (bollard) and the other end is released from the other bollard and gently let-out to control the decent of the frame. All efforts are made to ensure the ADCP settles on a flat area of seafloor devoid of corals. Once the frame hits the seabed the rope is disconnected from the bollard end and pulled up from the opposite end through the D shackles. The ADCP is anchored to the seafloor using a plough anchor attached to the ADCP via chain up to 10m in length. The anchor is lowered to the seafloor using the same endless rope method ensuring the line between the ADCP and anchor is taut as possible. Deployment takes approximately 30mins per ADCP unit if all operations run smoothly.

To retrieve the ADCPs, the vessel holds position 100m from the GPS location of the ADCP and frame unit. The acoustic release mechanism on the frame is triggered remotely from the vessel by sending a 'release' signal from the acoustic buoy control box on board the vessel via a transducer hanging over the side of the vessel. The buoy is released to the surface and is attached via a cable to the frame on the seafloor. The cable has a lifting capacity of 1000kg which is more than sufficient to support a fully laden ADCP frame and any additional weights on the frame plus anchor and chain.

Depending upon the weather and at the skipper discretion, the vessel may either:

- Approach the buoy, attach the buoy to a crane hook, maintain position and retrieve the frame, ADCP and anchor
- Anchor in proximity to the ADCP Buoy, drift back onto the buoy and use a boat hook to capture the buoy or deploy a tender and crew to retrieve the buoy and return the buoy to the main vessel for connection to the crane hook.

Depending upon the method used and weather retrieval takes between 1 and 2 hours.

## 2.3 Deployment location

Details regarding the as-deployed location and depth range during each deployment period are provided in Table 2-1. All deployments at the ADCP1 and ADCP2 were within approximately 10m of target location.

Table 2-1 Deployment locations for ADCP1 and ADCP2

Deployment Period	Location	Latitude (WGS 84)	Longitude (WGS 84)	Accuracy	Approximate depth range (m)
1	ADCP 1	23° 06.017' S	151° 39.588' E	within 10m	13-15
1	ADCP 2	23° 05.726' S	151° 39.117' E	within 10m	11-14
2	ADCP 1	23° 06.030' S	151° 39.597' E	within 10m	13-15
2	ADCP 2	23° 05.730' S	151° 39.132' E	within 10m	12-15



Deployment Period	Location	Latitude (WGS 84)	Longitude (WGS 84)	Accuracy	Approximate depth range (m)
3	ADCP 1	23° 06.030' S	151° 39.602' E	within 10m	12-15
3	ADCP 2	23° 05.734' S	151° 39.140' E	within 10m	13-16

## 2.4 Deployment configuration

The ADCPs were configured to measure current during all three deployments at both ADCP1 and ADCP2 locations. The ADCPs were configured to measure wave parameters during all three deployments at ADCP1 and for deployment periods two and three at location ADCP2. Table 2-2 and Table 2-3 below provide configuration information for ADCP deployments at ADCP1 and ADCP2 respectively.

Table 2-2 ADCP1 deployment configuration information

Parameter	Mobilisation Trip (Period 1)	Service Trip 1 (Period 2)	Service Trip 2 (Period 3)
Instrument	Workhorse Sentinel	Workhorse Sentinel	Workhorse Sentinel
Frequency	614400	614400	614400
Water Profile	YES	YES	Yes
Bottom Track	NO	NO	NO
High Res. Modes	NO	NO	NO
High Rate Pinging	NO	NO	NO
Shallow Bottom Mode	NO	NO	NO
Wave Gauge	YES	YES	YES
Lowered ADCP	NO	NO	NO
Ice Track	NO	NO	NO
Surface Track	NO	NO	NO
Beam angle	20	20	20
Temperature	27.00	26.00	24.00
Deployment hours	2400.00	2400.00	2160.00
Battery packs	1	1	1
Automatic TP	YES	YES	Yes
Memory size [MB]	448	448	448
Saved Screen	2	3	3
First cell range	1.60 m	1.60 m	1.60 m
Last cell range	25.60 m	25.60 m	25.60 m
Max range	33.75 m	34.37 m	35.57 m
Standard deviation	1.93 cm/s	1.93 cm/s	1.93 cm/s
Ensemble size	1134 bytes	1134 bytes	1134 bytes
Storage required	117.68 MB	117.68 MB	105.91 MB
Power usage	429.95 Wh	429.98 Wh	387.04 Wh
Battery usage	1.0	1.0	0.9
Samples / Wv Burst	600	600	600
Min NonDir Wave Per	2.20 s	2.20 s	2.20 s
Min Dir Wave Period	3.48 s	3.48 s	3.48 s
Bytes / Wave Burst	46880	46880	46880
Profile Interval	15 min	15 min	15 min
No. Cells	49	49	49
Max Depth	20 m	20 m	20 m
Cell Size	0.5 m	0.5 m	0.5 m
Wave Interval	60 min	60 min	60 min
Wave sampling rate	5 min	5 min	5 min

Table 2-3 ADCP2 deployment configuration information

Parameter	Mobilisation Trip (Period 1)	Service Trip 1 (Period 2)	Service Trip 2 (Period 3)
Instrument	Workhorse Sentinel	Workhorse Sentinel	Workhorse Sentinel

Parameter	Mobilisation Trip (Period 1)	Service Trip 1 (Period 2)	Service Trip 2 (Period 3)
Frequency	614400	614400	614400
Water Profile	YES	YES	YES
Bottom Track	NO	NO	NO
High Res. Modes	NO	NO	NO
High Rate Pinging	NO	NO	NO
Shallow Bottom Mode	NO	NO	NO
Wave Gauge	NO	YES	YES
Lowered ADCP	NO	NO	NO
Ice Track	NO	NO	NO
Surface Track	NO	NO	NO
Beam angle	20	20	20
Temperature	27.00	26.00	24.00
Deployment hours	2400.00	2400.00	2160.00
Battery packs	1	1	1
Automatic TP	YES	YES	YES
Memory size [MB]	256	448	448
Saved Screen	3	3	3
First cell range	1.60 m	1.60 m	1.60 m
Last cell range	20.60 m	25.60 m	25.60 m
Max range	33.75 m	34.37 m	35.57 m
Standard deviation	1.93 cm/s	1.93 cm/s	1.93 cm/s
Ensemble size	934 bytes	1134 bytes	1134 bytes
Storage required	8.55 MB	117.68 MB	105.91 MB
Power usage	100.24 Wh	429.98 Wh	387.04 Wh
Battery usage	0.2	1.0	0.9
Samples / Wv Burst	N/A	600	600
Min NonDir Wave Per	N/A	2.20 s	2.20 s
Min Dir Wave Period	N/A	3.48 s	3.48 s
Bytes / Wave Burst	N/A	46880	46880
Profile Interval	15 min	15 min	15 min
No. Cells	49	49	49
Max Depth	0.5 m	20 m	20 m
Cell Size	20 m	0.5 m	0.5 m

## 3 Results and summary

### 3.1 Quality assurance and control

#### 3.1.1 Compass calibration

A compass calibration was performed for both ADCP units prior to the first deployment for period one. The same ADCP units were used for the following deployments and did not require compass calibration again for deployments two and three. The ADCP internal compass is factory calibrated prior to purchase or re-calibrated during any servicing events. Once the ADCP is attached to the frame the influence of the metal frame and any other attachments need to be accounted for which influence the internal compass, prior to deployment.

The re-calibration of the ADCP is carried out on land prior to initial deployment by lifting the frame of the ground (1-2m) with the ADCP unit attached into the air using a crane. The ADCP is switched on and placed into the calibration mode then the frame is manually spun slowly and steadily around in a clockwise direction making sure there are no tilting motions. The directional data collected by the ADCP are then compared to the original directional data prior to the ADCP unit being attached to the frame and the data adjusted accordingly.

The process is then repeated, and an error is calculated between the adjusted initial results and the new results. As per the manufacturer's recommendations, if the overall error is less than 2 degrees, the unit is ready for deployment. If the error is >2 degrees, the procedure should be repeated.

#### 3.1.2 Data interrogation

Advisian's standard method of Quality Assurance / Quality Control (QA/QC) involves a first pass analysis of the raw hydrodynamic and wave information retrieved from the unit. This process involves:

- Confirming the pitch and roll on the unit is within the "accurate range" of within 8 degrees to the vertical (with values preferably less than 5)
- Ensuring wave period, and associated wave parameters, calculated from the spectral binary files, is within acceptable ranges and removing all parameters over the corresponding time if not.

The data presented in the appendices has undergone this standard QA/QC check. Data screening and visual inspection ensure that records determined to be erroneous have been removed from the datasets provided. The data was not adjusted for Magnetic declination.

For the purpose of this report and data presentation, the full velocity profile for current measurements has been included in the dataset (from ADCP unit to the surface); however, a small portion of this profile could be affected by 'side-lobe interference' (approximately 10% of the profile closest to the surface).

### 3.2 Current and water levels

A summary of the hydrodynamic components captured by the ADCP unit that has been deployed at ADCP1 are presented in Appendix B and Appendix C. A summary of the hydrodynamic components captured by the ADCP unit that has been deployed at ADCP2 are presented in Appendix D and Appendix E. These summaries include the following:

- Current and water level time series plots
- Current speed rose plots
- Current velocity scatter (current speed against direction)
- Current joint frequency tables of current speed compared to current direction
- U and V velocity component scatter plots.

### **3.3 Waves**

A summary of the wave parameters captured by the ADCP unit that has been deployed at ADCP1 are presented in Appendix F and Appendix G. A summary of the wave parameters captured by the ADCP unit that has been deployed at ADCP2 are presented in Appendix H and Appendix I. These summaries include the following:

- Wave parameter time series plots
- Significant wave height rose plots
- Peak period rose plots
- Current joint frequency tables of current speed compared to current direction.

## 4 Lessons learned

The fieldwork provided the opportunity to gain valuable knowledge regarding conditions at Douglas Shoal that are likely to be relevant to future activity for the remediation project. Involving the deployments and retrieval of instruments. A summary of these is provided in Table 4-1 as 'lessons learned'.

Table 4-1 Fieldwork lessons learned

Challenge	Issue	Solution
Open nature of Douglas Shoal	Activities at the Shoal are impacted upon by wind, waves and currents during most of the year, causing delays in mobilisations and can make deployment/retrieval of ADCP's difficult.	Service visits are scheduled during calm periods and during the neap tide period if possible.  The slack period of the tide is utilised for retrieval and deployment
Anchoring on Douglas Shoal	Anchoring can be difficult during certain conditions due to very loose substrate and large areas of smooth rock which did not provide adequate anchoring points.	Smaller (lighter) vessels used during the retrieval of the ADCP and frame.  Utilise the slack period of the tidal cycle to limit current impacts on anchoring
Simultaneous operations nearby	Anchor line from another work vessel dragged over the ADCP frame and turned over the frame	Use divers/snorkellers to right the frame  Trigger the remote buoy on the ADCP, retrieve and reset the buoy then redeploy the unit  Ensure no other boating activities involving anchoring of vessels occur nearby during the deployment of the ADCPS  Ensure the ADCP on the seafloor is well clear of the vessel anchor line
Abundant fauna	Interactions with fauna	Limit vessel speeds in sensitive locations. Ensure protocols for interactions with fauna are communicated and adhered too. For example, maintain look out and slow speeds when on the Shoal and when approaching or leaving the Shoal.

## 5 References

Advisian (2019). Sampling and Analysis Plan – Douglas Shoal Remediation Project. Report prepared by Advisian for the Great Barrier Reef Marine Park Authority, Version 3, 17 May 2019.







**Appendix A**  
**Current and Wave Monitoring Locations**



# Douglas Shoal Remediation Planning

## Metocean Data Report – Six Months

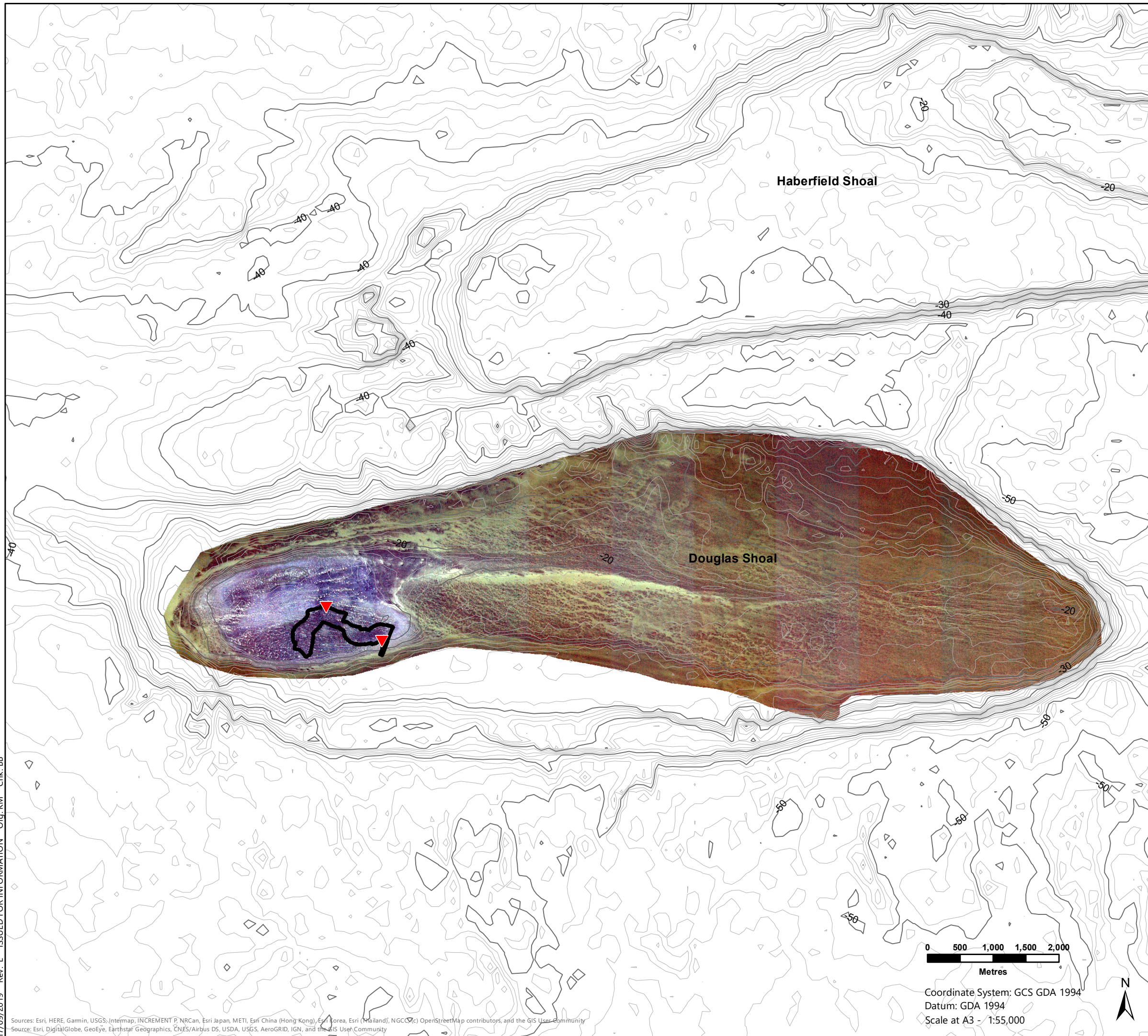
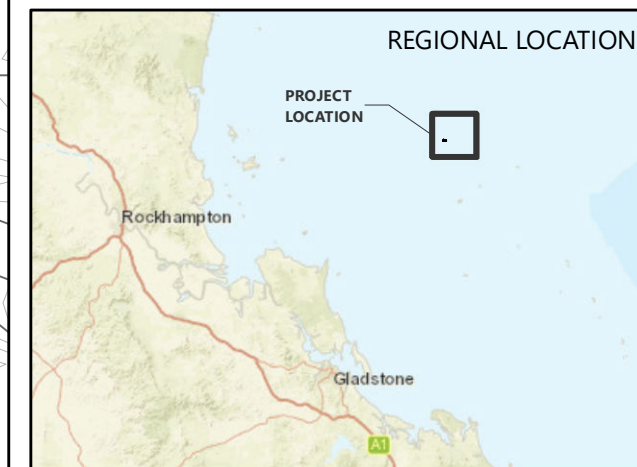
**Figure 1-2**  
**Current and wave data capture**

-  Current and wave monitoring locations (approximate)
-  Grounding footprint
- Contour (eAtlas Bathymetry)**
-  5m Contour
-  1m Contour

Source Information:  
Contour (eAtlas Bathymetry), Grounding footprint  
Cardno 2017  
2018 Imagery  
EOMAP GmbH & Co. KG (© DigitalGlobe Inc)


While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.

© Advisian Pty Ltd  
© Commonwealth of Australia 2018

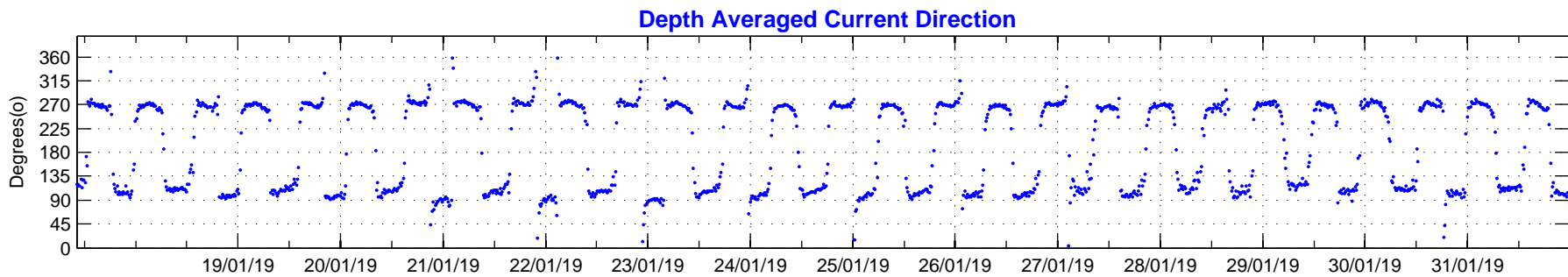
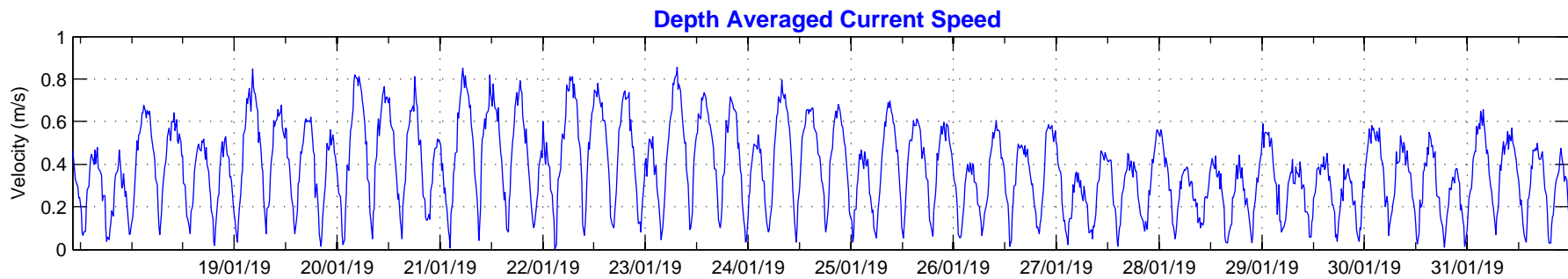
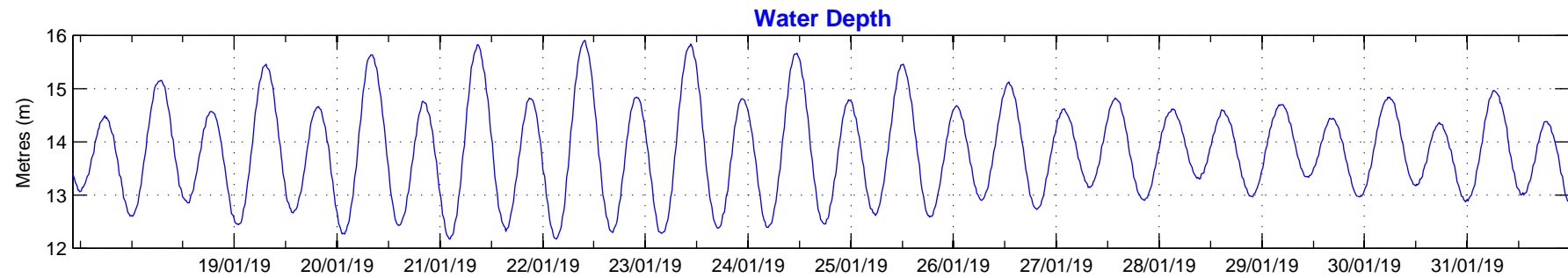


G:\30100\102112 PROJ - Douglas Shoal Remediation Proj\10.0 Engineering\10 GM-Geomatics\Output\301001-02112-00-GM-SKT-0048-E (Site Assess Sonar Swy).mxd  
17/09/2019 Rev: E ISSUED FOR INFORMATION Org: KM Chk: BB

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Malland), NGCC, OpenStreetMap contributors, and the GIS User Community  
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



**Appendix B**  
**ADCP1: Current and Water Level Time Series**  
**Plots**



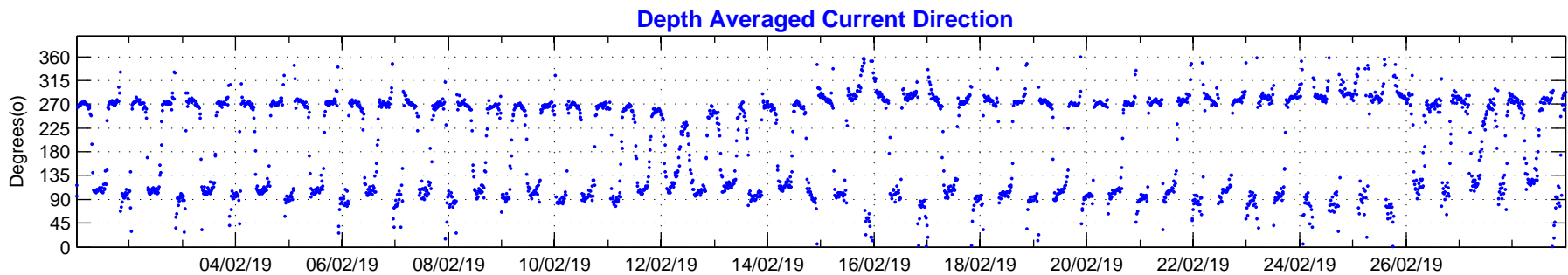
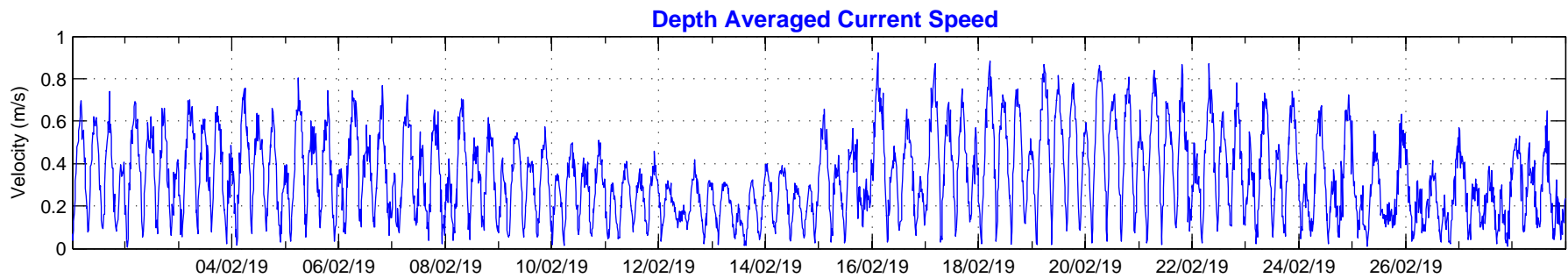
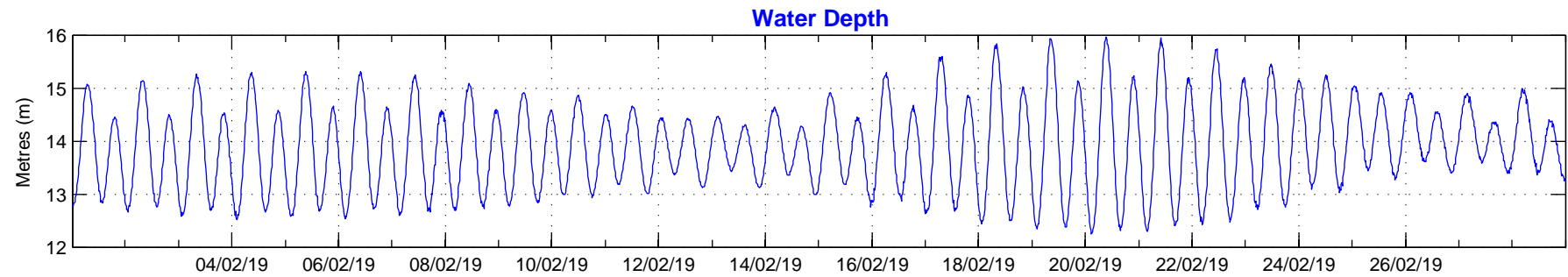
**Wave Summary January 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: January 2019 (17-Jan-2019 to 31-Jan-2019)  
 Data source: ADCP1 Period 1  
 Data summary: January 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



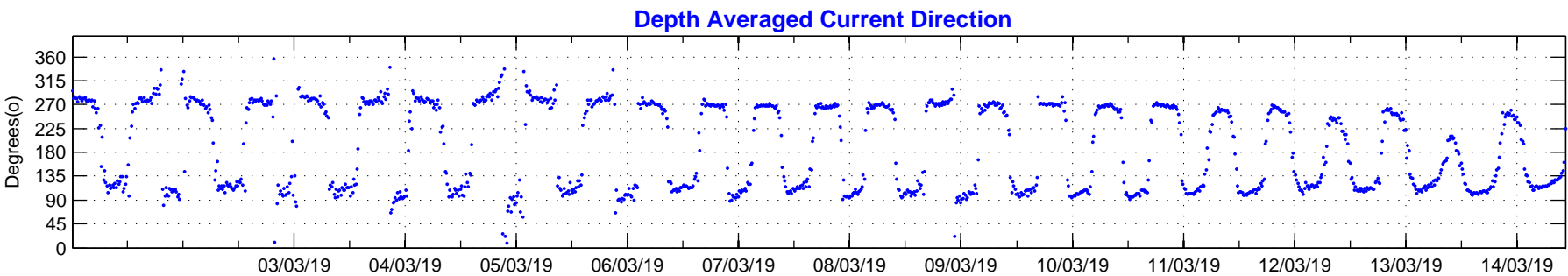
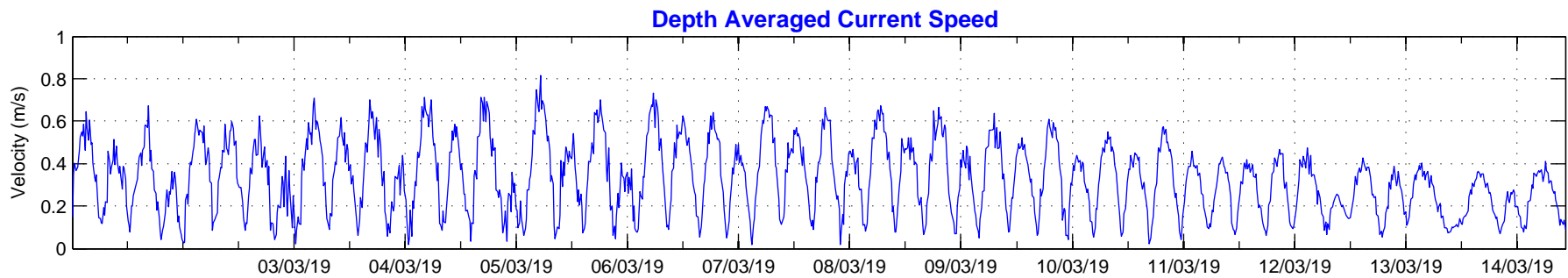
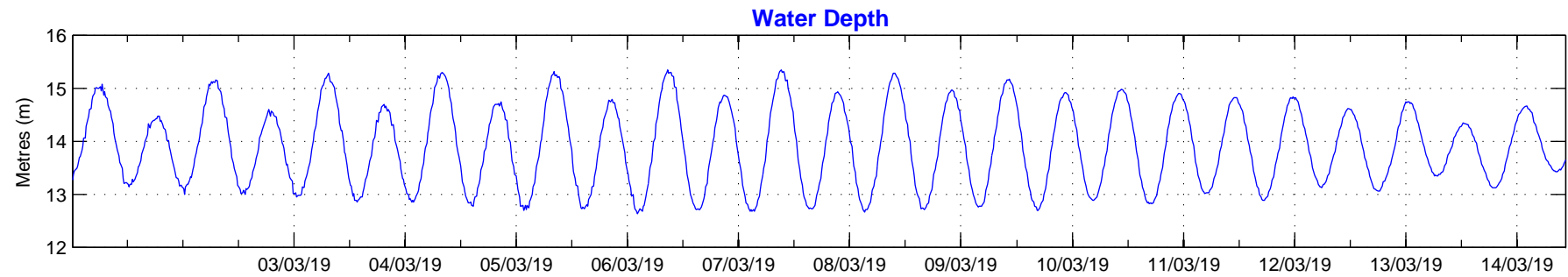
**Wave Summary February 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: February 2019 (01-Feb-2019 to 28-Feb-2019)  
 Data source: ADCP1 Period 1  
 Data summary: February 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



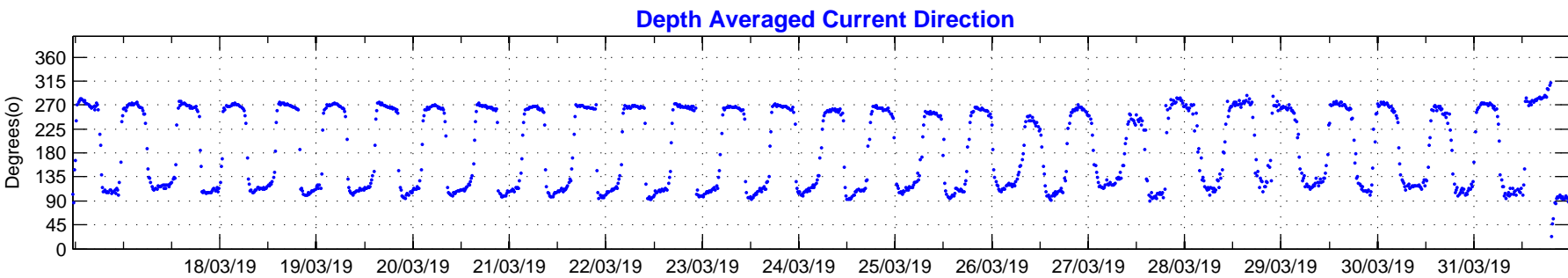
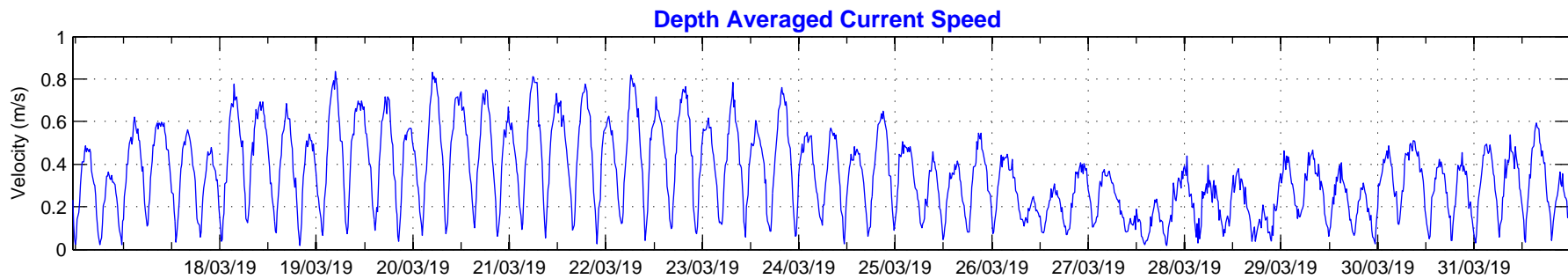
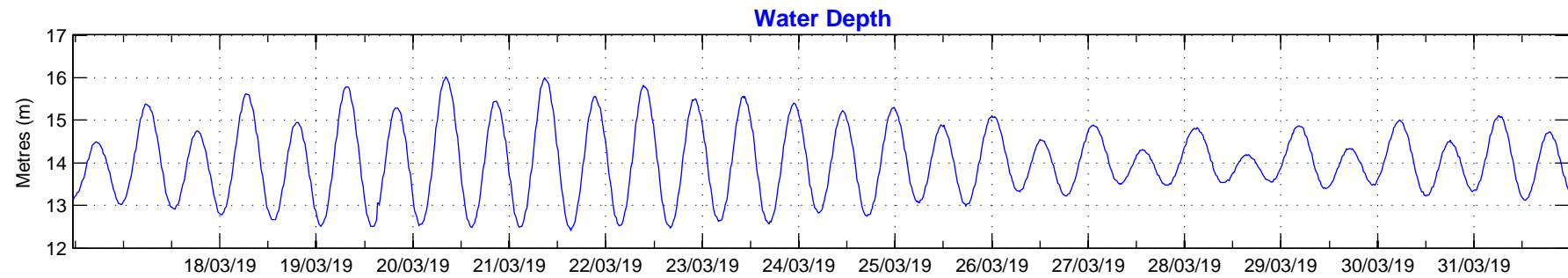
**Wave Summary March 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: March 2019 (01-Mar-2019 to 14-Mar-2019)  
 Data source: ADCP1 Period 1  
 Data summary: March 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



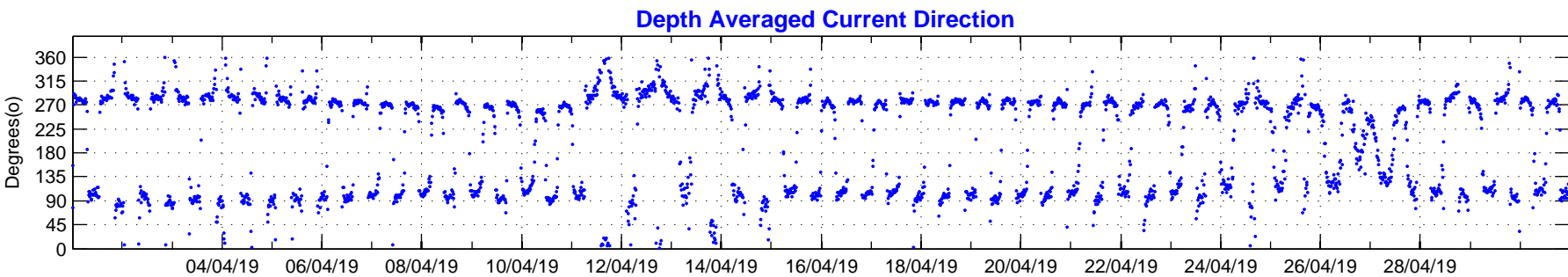
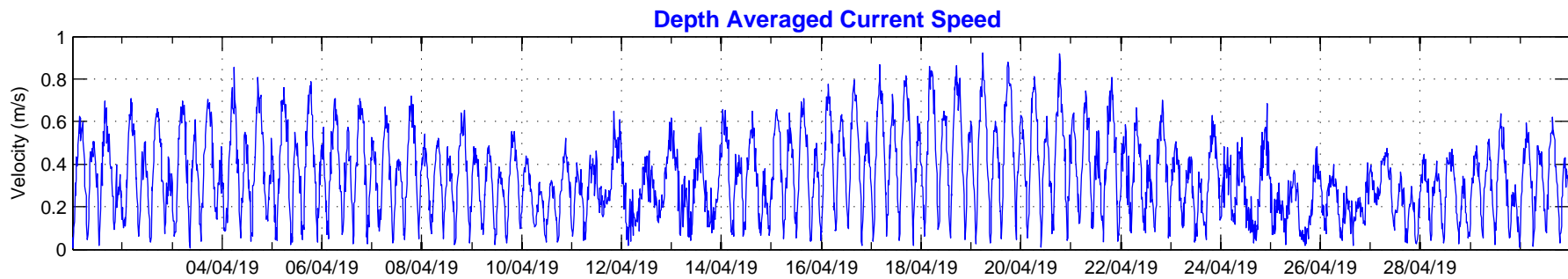
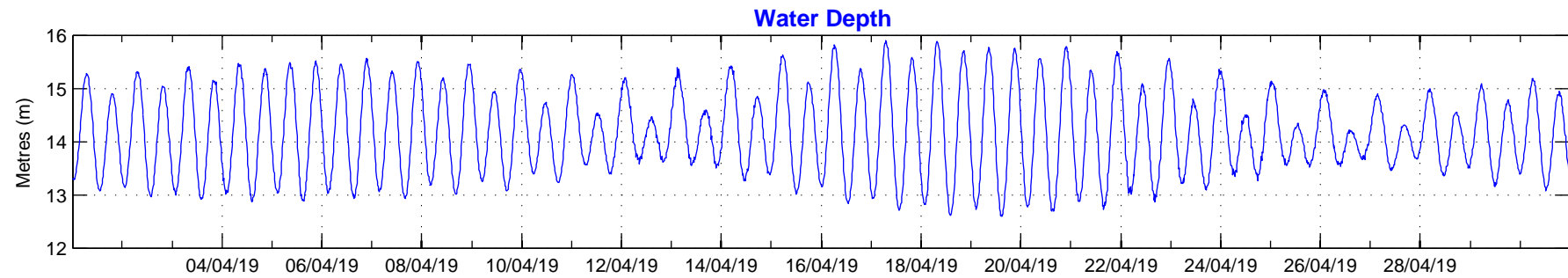
**Wave Summary March 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: March 2019 (16-Mar-2019 to 31-Mar-2019)  
 Data source: ADCP1 Period 2  
 Data summary: March 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



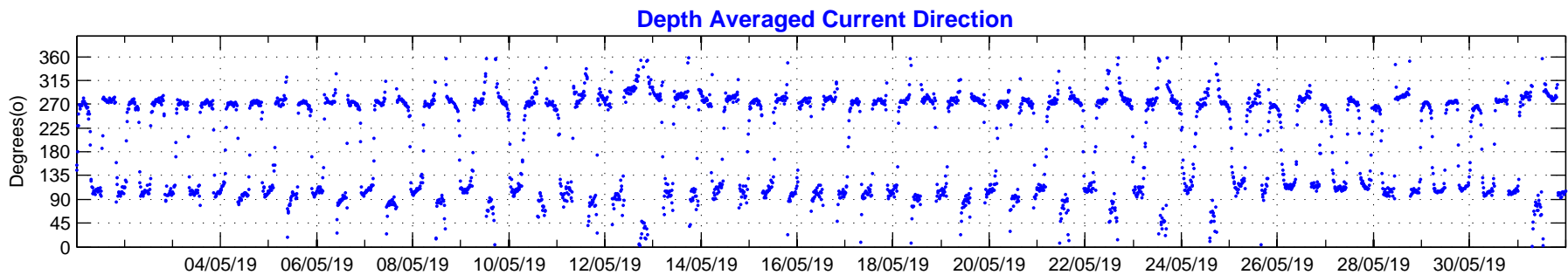
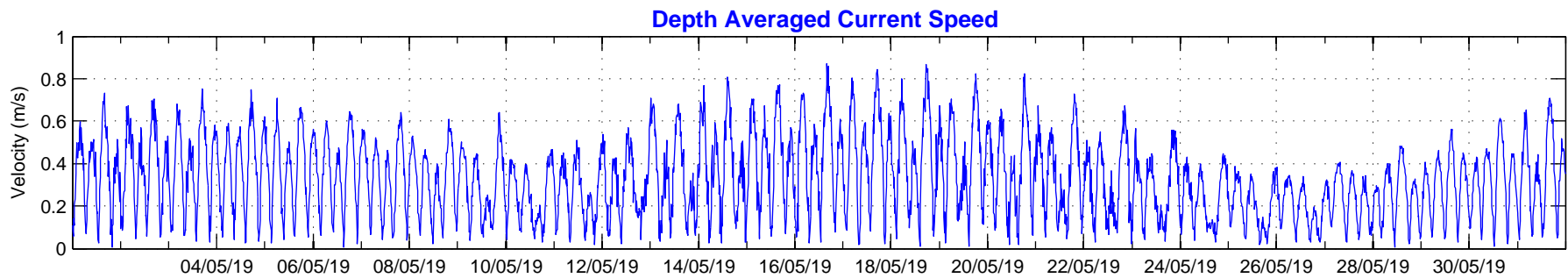
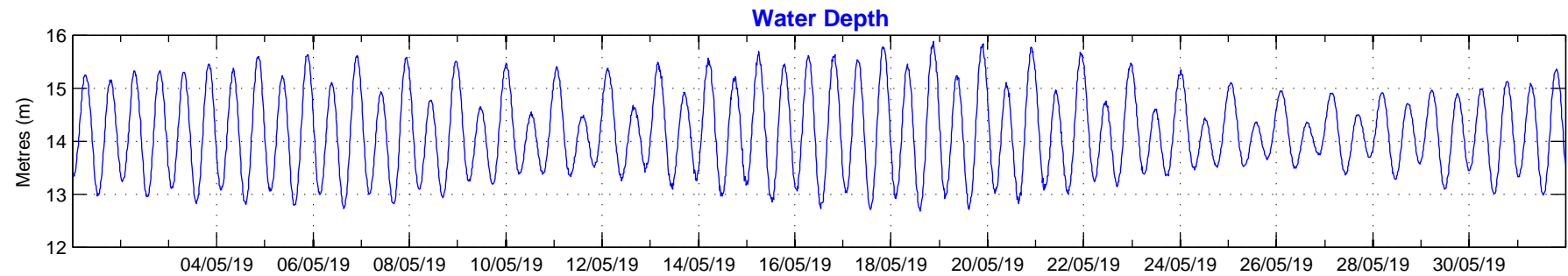
**Wave Summary April 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: April 2019 (01-Apr-2019 to 30-Apr-2019)  
 Data source: ADCP1 Period 2  
 Data summary: April 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



**Wave Summary May 2019**

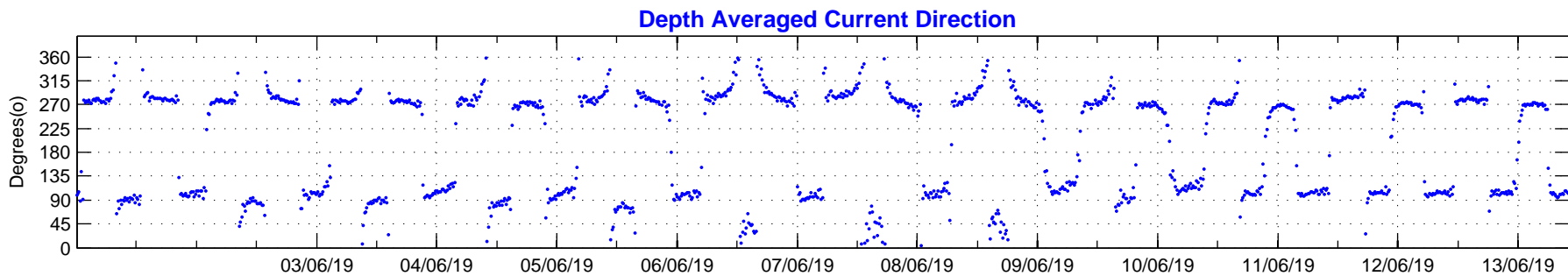
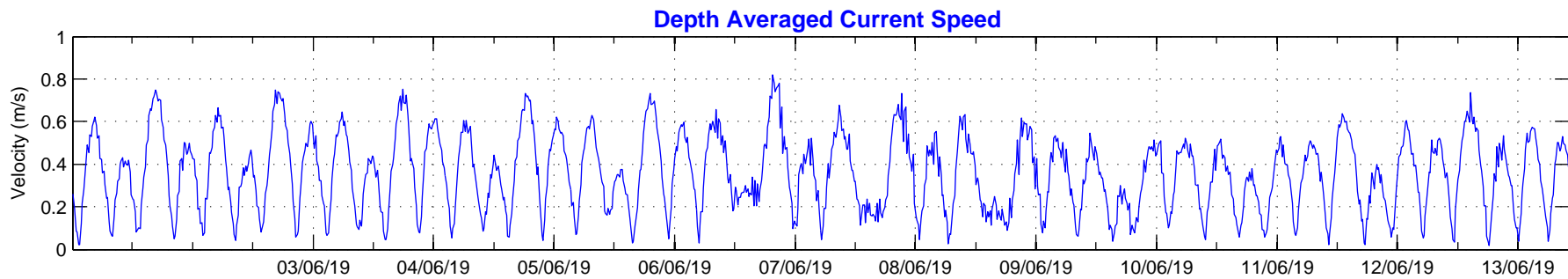
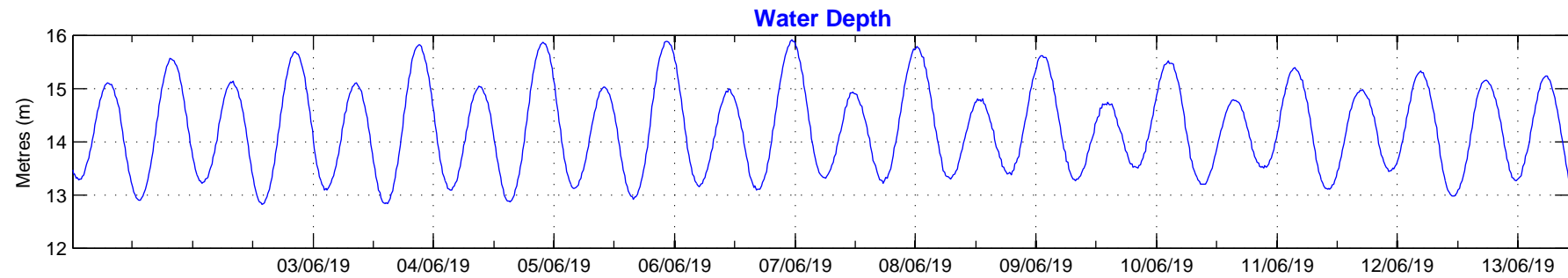
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: May 2019 (01-May-2019 to 31-May-2019)  
 Data source: ADCP1 Period 2  
 Data summary: May 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s





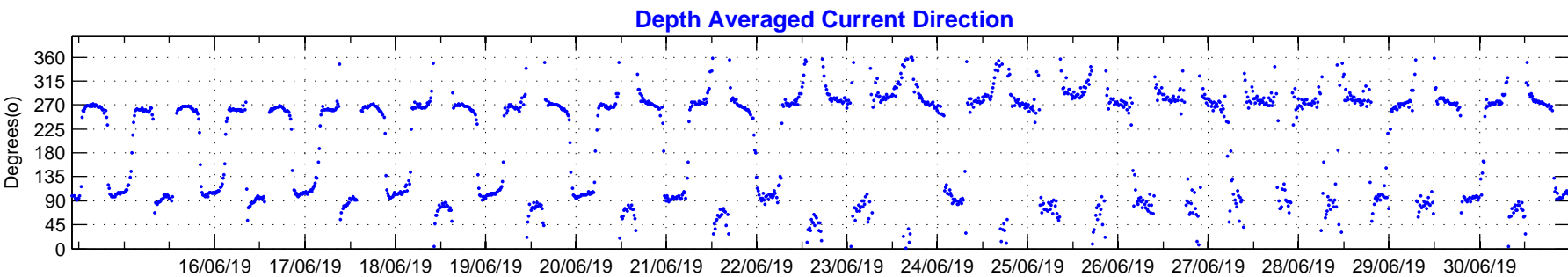
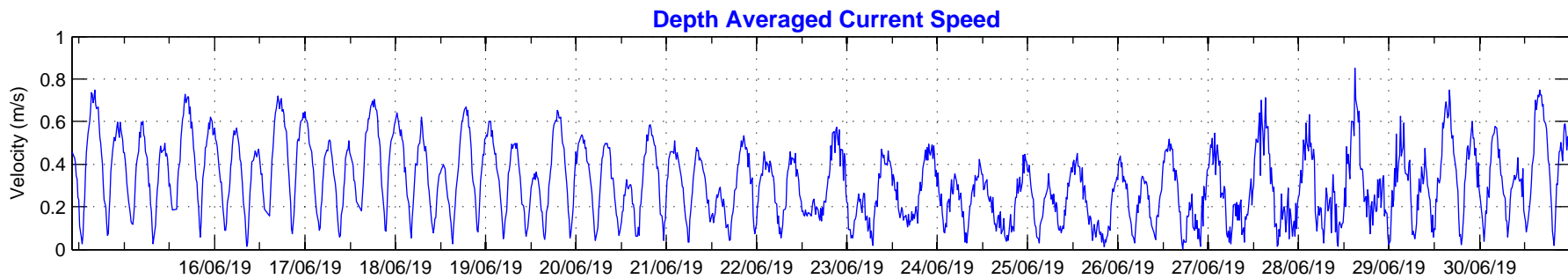
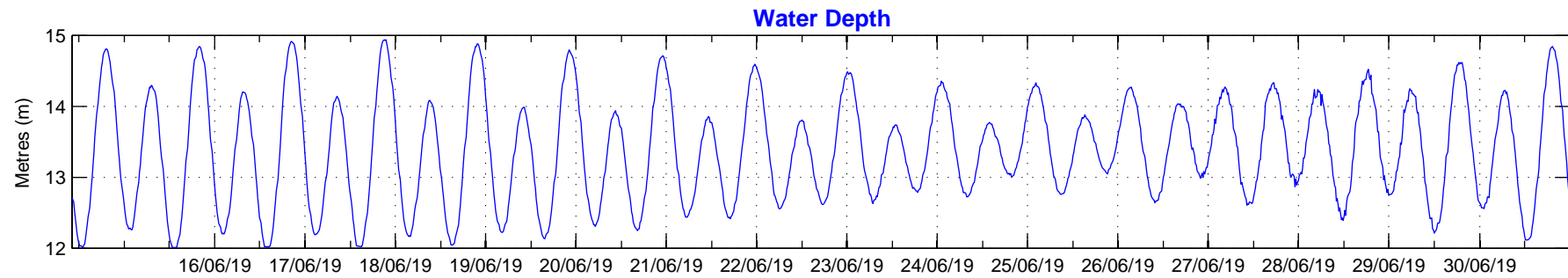
**Wave Summary June 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: June 2019 (01-Jun-2019 to 13-Jun-2019)  
 Data source: ADCP1 Period 2  
 Data summary: June 2019

**Key Data Statistics:**

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



**Wave Summary June 2019**

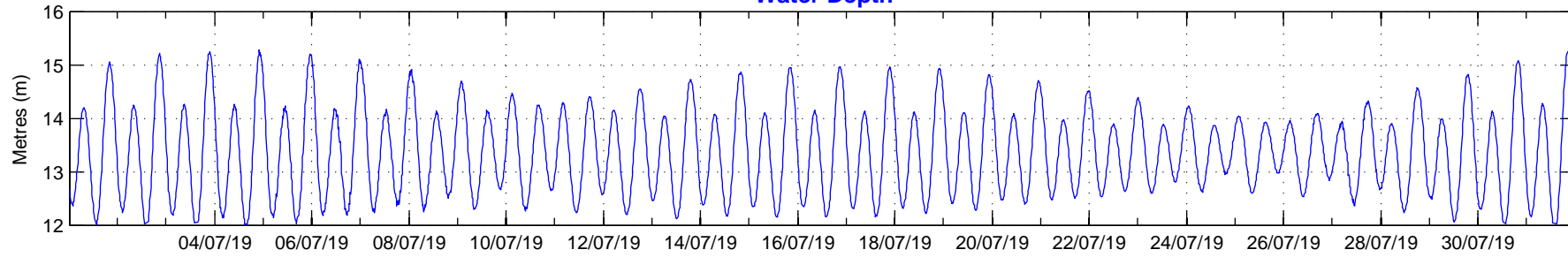
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
 Data period: June 2019 (14-Jun-2019 to 30-Jun-2019)  
 Data source: ADCP1 Period 3  
 Data summary: June 2019

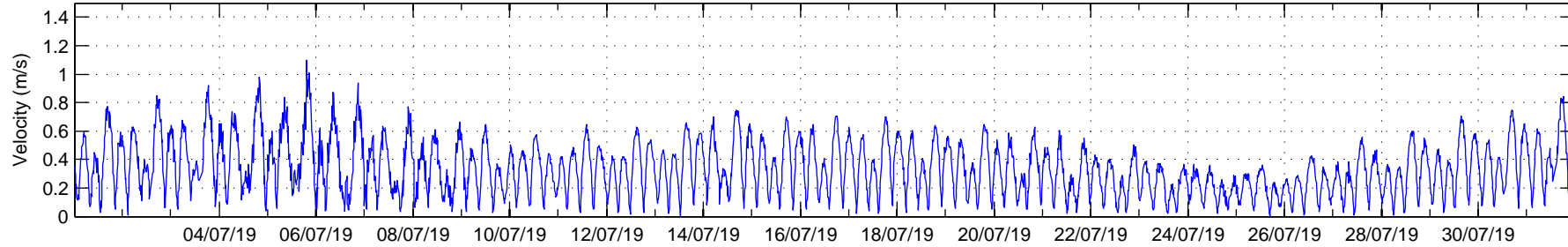
**Key Data Statistics:**

Max Curr Spd: 1.10 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s

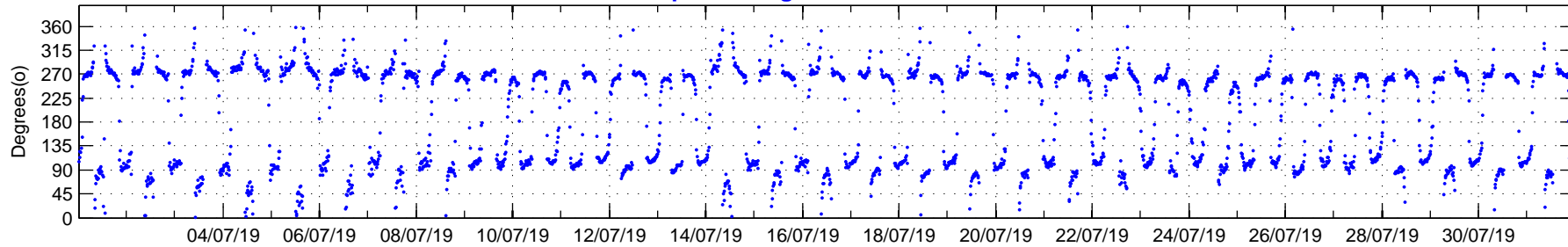
Water Depth



Depth Averaged Current Speed



Depth Averaged Current Direction



Wave Summary July 2019

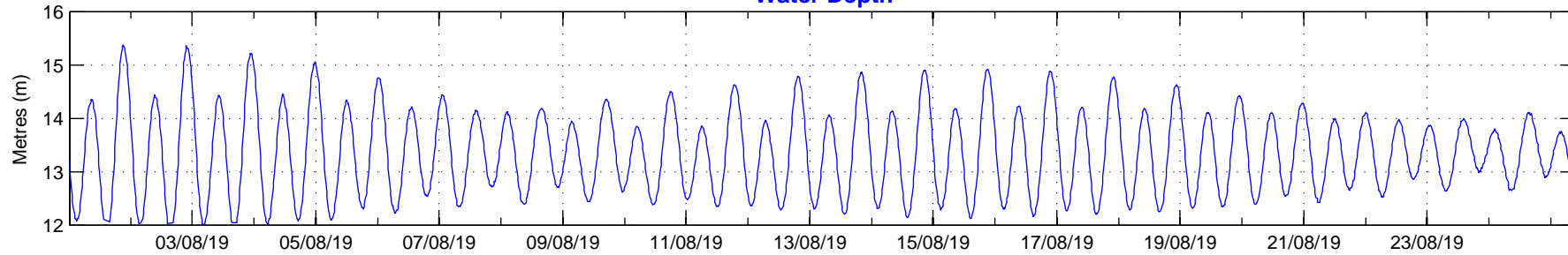
Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
Data period: July 2019 (01-Jul-2019 to 31-Jul-2019)  
Data source: ADCP1 Period 3  
Data summary: July 2019

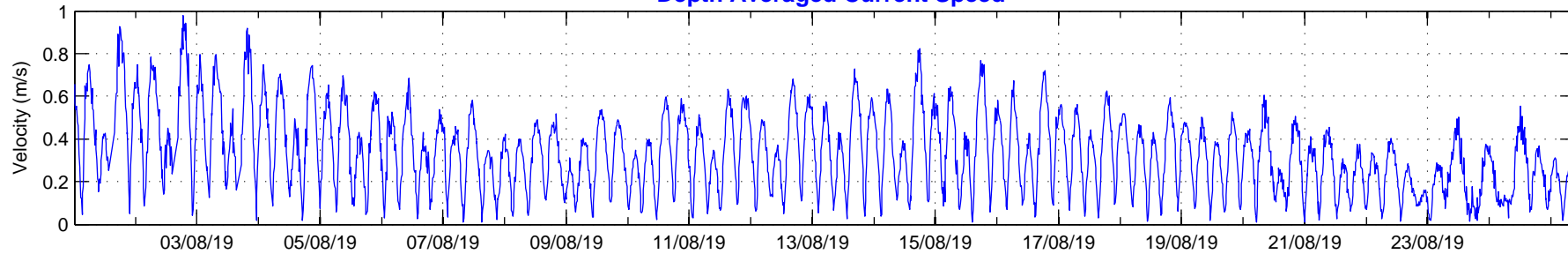
Key Data Statistics:

Max Curr Spd: 1.10 m/s  
Mean Curr Spd: 0.33 m/s  
StdDev. Curr Spd: 0.18 m/s

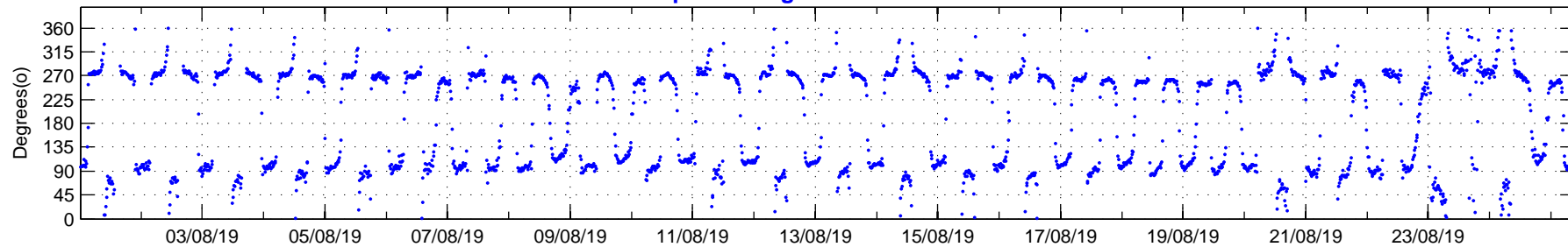
### Water Depth



### Depth Averaged Current Speed



### Depth Averaged Current Direction




### Wave Summary August 2019

#### Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
Data period: August 2019 (01-Aug-2019 to 25-Aug-2019)  
Data source: ADCP1 Period 3  
Data summary: August 2019

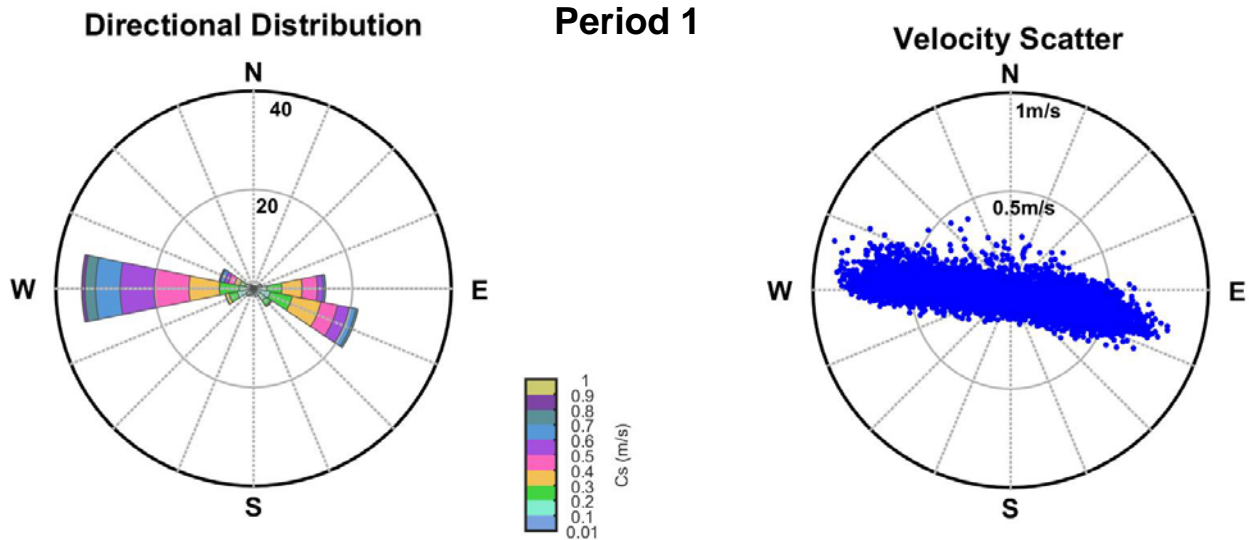
#### Key Data Statistics:

Max Curr Spd: 1.10 m/s  
Mean Curr Spd: 0.33 m/s  
StdDev. Curr Spd: 0.18 m/s



**Appendix C**  
**ADCP1: Current Rose, Velocity Scatter and**  
**Joint Frequency Table Plots**

## Current Speed for ADCP1 Location



JFT (%) of Current Speed against Direction for the entire period 17-Jan-2019 to 14-Mar-2019

N=5378	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	100.00
0.01-0.1	0.26	0.28	0.22	0.41	0.58	0.63	0.87	0.93	0.87	0.89	0.73	1.08	0.65	0.33	0.45	0.39	9.58	99.93
0.1-0.2	0.11	0.07	0.37	0.67	2.12	2.83	2.12	0.86	0.30	0.56	1.13	2.31	2.27	1.38	0.33	0.28	17.70	90.35
0.2-0.3	0.06	0.07	0.09	0.52	3.03	4.50	1.23	-	-	-	0.07	1.67	4.00	1.12	0.13	0.07	16.57	72.65
0.3-0.4	-	-	0.02	0.15	4.07	5.91	0.26	-	-	-	-	0.71	6.14	1.10	0.11	-	18.46	56.08
0.4-0.5	-	-	-	-	3.11	3.42	0.04	-	-	-	-	0.09	7.07	1.26	0.02	0.02	15.02	37.62
0.5-0.6	-	-	-	-	1.19	2.44	-	-	-	-	-	0.02	6.86	0.82	0.02	-	11.34	22.59
0.6-0.7	-	-	-	-	0.43	1.36	-	-	-	-	-	-	4.98	0.82	-	-	7.59	11.25
0.7-0.8	-	-	-	-	0.07	0.45	-	-	-	-	-	-	2.14	0.22	-	-	2.88	3.66
0.8-0.9	-	-	-	-	-	0.04	-	-	-	-	-	-	0.67	0.06	-	-	0.76	0.78
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-	0.02	0.02
>1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subTot.	0.43	0.43	0.71	1.75	14.60	21.57	4.52	1.79	1.17	1.45	1.93	5.88	34.77	7.12	1.06	0.76		
Total **	0.43	0.43	0.71	1.75	14.60	21.57	4.52	1.79	1.18	1.46	1.94	5.88	34.78	7.13	1.06	0.77		
Cumul.	0.43	0.86	1.58	3.33	17.93	39.50	44.03	45.82	46.99	48.45	50.39	56.27	91.04	98.17	99.23	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

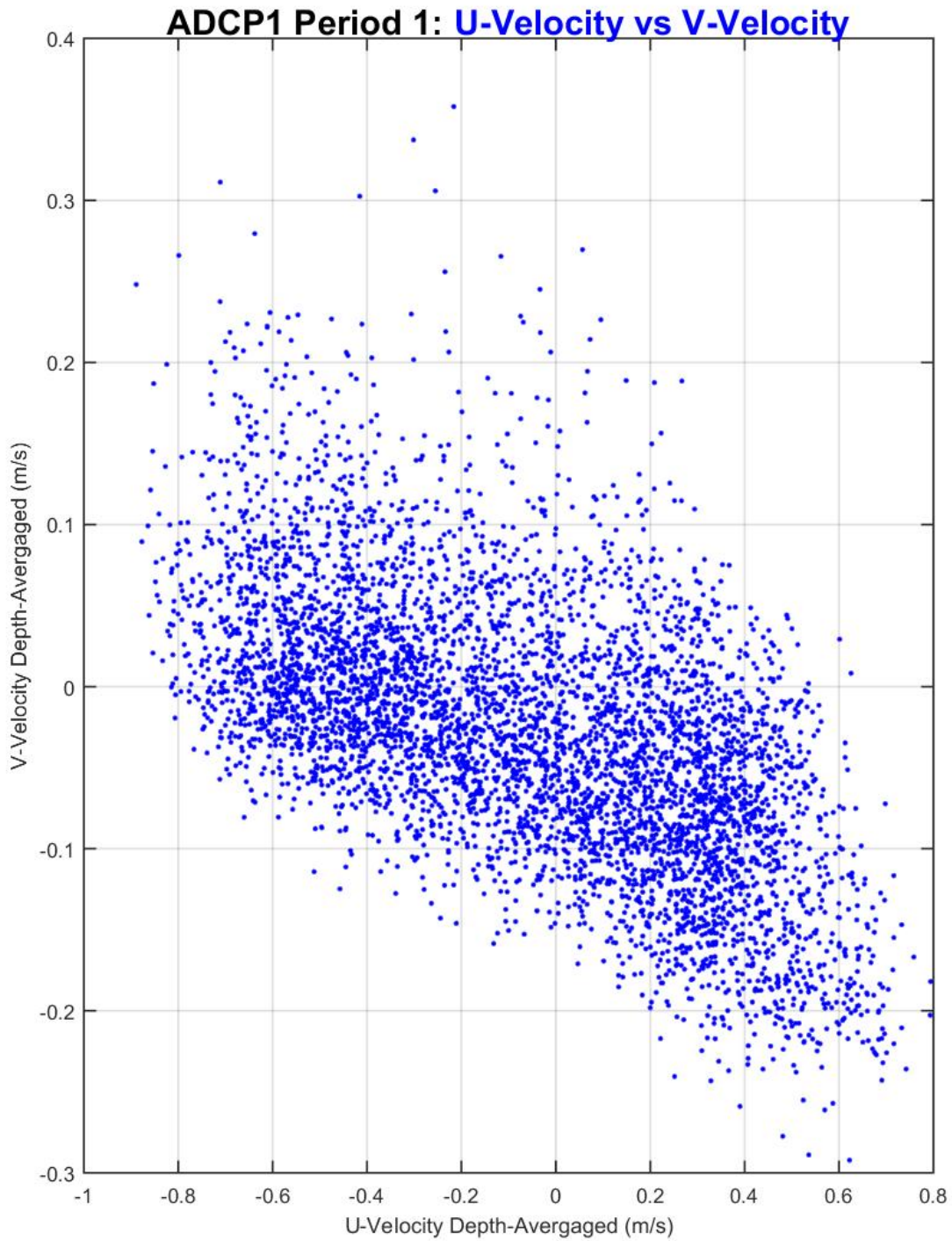
\*\* includes the calm winds which are evenly distributed amongst the directional bins

### Data Information:

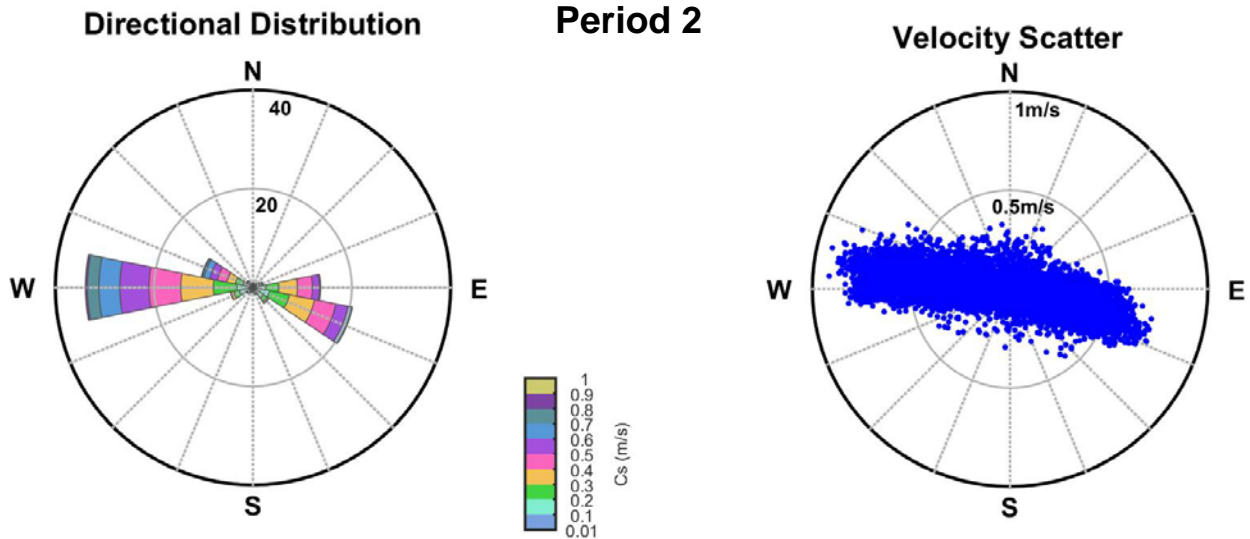
Project: 301001-02112  
 Location: ADCP1 [151° 39.588' E , 23° 06.017' S ]  
 Data period: All data (17-Jan-2019 to 14-Mar-2019)  
 Data source: ADCP1 Period 1  
 Data summary: Complete  
 Number of Records: 5378  
 Missing data (%): 0.00  
 Calm (% < 0.01m/s): 0.07

### Key Data Statistics:

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s



## Current Speed for ADCP1 Location



**JFT (%) of Current Speed against Direction for the entire period 16-Mar-2019 to 13-Jun-2019**

N=8524	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	100.00
0.01-0.1	0.41	0.32	0.27	0.60	0.56	0.84	0.86	0.87	0.60	0.80	0.81	0.88	0.70	0.56	0.42	0.32	9.82	99.91
0.1-0.2	0.29	0.33	0.54	0.83	2.05	2.60	1.74	0.47	0.40	0.26	0.63	1.95	2.53	1.51	0.57	0.28	17.00	90.09
0.2-0.3	0.25	0.09	0.21	0.52	2.59	4.07	0.88	0.08	0.07	0.05	0.09	1.15	4.77	1.55	0.45	0.19	17.01	73.09
0.3-0.4	0.01	0.02	-	0.19	3.79	5.19	0.35	0.01	-	-	0.02	0.56	6.60	1.76	0.22	0.01	18.75	56.08
0.4-0.5	-	-	-	-	3.05	4.40	0.09	-	-	-	-	0.09	6.42	1.96	0.02	-	16.04	37.33
0.5-0.6	-	-	-	-	1.43	2.51	-	-	-	-	-	0.02	5.91	1.55	-	-	11.43	21.29
0.6-0.7	-	-	-	-	0.22	0.81	-	-	-	-	-	-	4.21	1.23	-	-	6.48	9.87
0.7-0.8	-	-	-	-	-	0.11	-	-	-	-	-	-	2.35	0.40	-	-	2.85	3.39
0.8-0.9	-	-	-	-	-	-	-	-	-	-	-	-	0.40	0.12	-	-	0.52	0.54
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	0.02	0.02
>1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subTot.	0.96	0.76	1.02	2.14	13.70	20.53	3.92	1.43	1.07	1.10	1.56	4.66	33.92	10.65	1.69	0.80		
Total **	0.97	0.77	1.03	2.14	13.71	20.54	3.92	1.44	1.07	1.11	1.57	4.66	33.92	10.66	1.70	0.80		
Cumul.	0.97	1.74	2.76	4.90	18.61	39.15	43.07	44.51	45.58	46.69	48.26	52.92	86.84	97.50	99.20	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

\*\* includes the calm winds which are evenly distributed amongst the directional bins

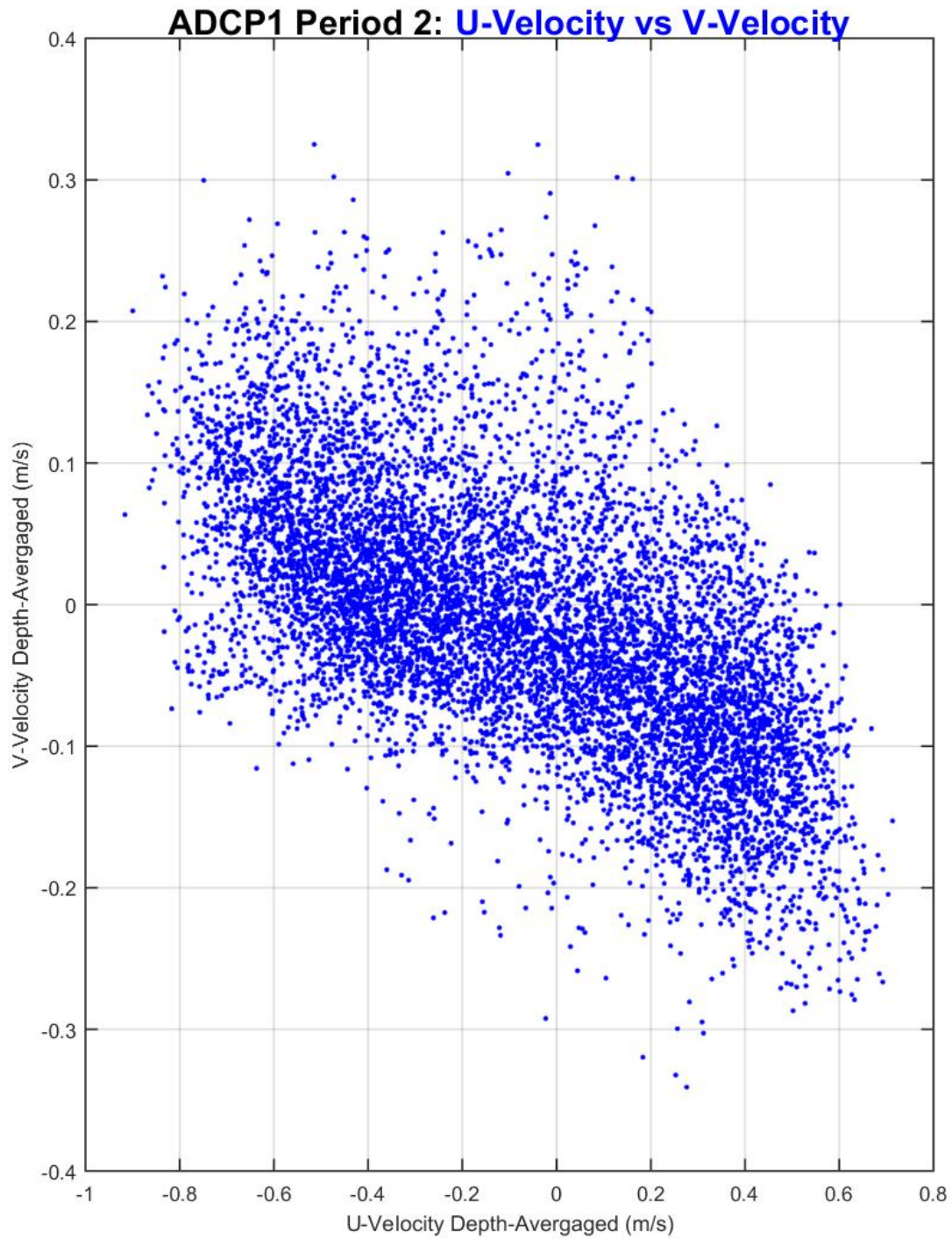
### Data Information:

Project: 301001-02112  
 Location: ADCP1 [151° 39.597' E , 23° 06.030' S]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP1 Period 2  
 Data summary: Complete  
 Number of Records: 8524  
 Missing data (%): 0.00  
 Calm (% < 0.01m/s): 0.09

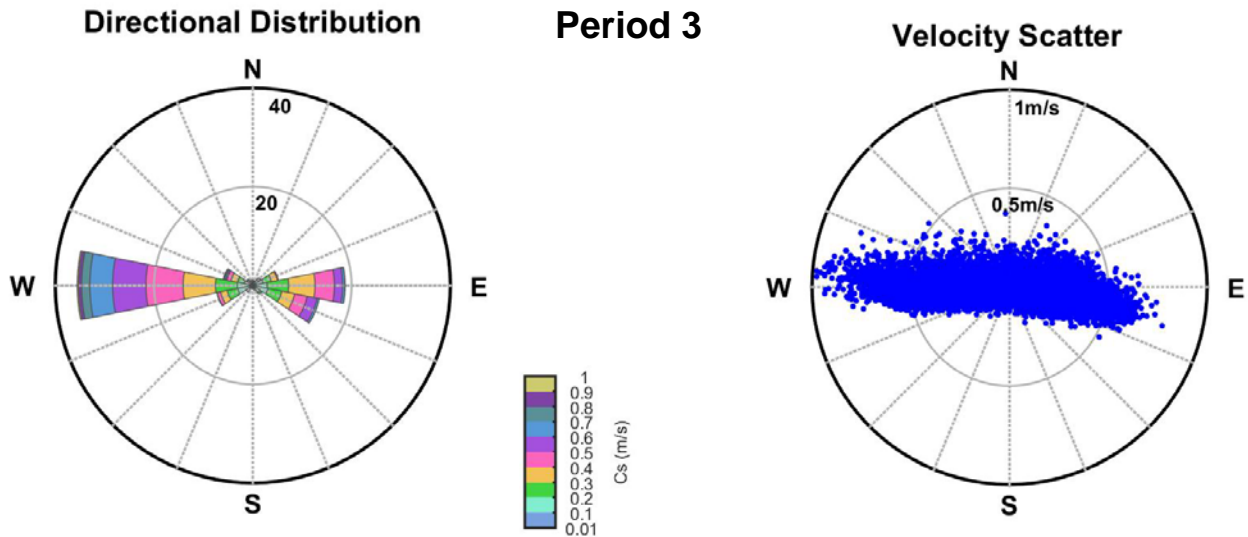
### Key Data Statistics:

Max Curr Spd: 0.92 m/s  
 Mean Curr Spd: 0.34 m/s  
 StdDev. Curr Spd: 0.19 m/s





## Current Speed for ADCP1 Location



JFT (%) of Current Speed against Direction for the entire period 14-Jun-2019 to 25-Aug-2019

N=6844	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	100.00
0.01-0.1	0.41	0.31	0.50	0.64	0.61	0.91	0.70	0.63	0.70	0.50	0.88	0.86	0.73	0.72	0.39	0.48	9.96	99.88
0.1-0.2	0.60	0.48	0.92	1.45	2.29	2.18	1.11	0.38	0.10	0.29	0.77	2.22	2.40	1.08	0.60	0.53	17.40	89.92
0.2-0.3	0.09	0.10	0.45	1.74	4.35	2.89	0.37	-	-	-	0.01	2.19	4.44	1.36	0.35	0.09	18.44	72.52
0.3-0.4	0.01	0.04	0.09	1.23	5.33	2.66	-	-	-	-	-	1.37	6.55	1.34	0.15	0.01	18.79	54.08
0.4-0.5	-	-	-	0.25	3.92	2.57	-	-	-	-	-	0.69	7.52	0.83	0.03	-	15.81	35.29
0.5-0.6	-	-	-	-	1.68	2.06	-	-	-	-	-	0.10	6.74	0.32	0.01	-	10.91	19.48
0.6-0.7	-	-	-	-	0.47	0.42	-	-	-	-	-	-	4.60	0.28	-	-	5.77	8.56
0.7-0.8	-	-	-	-	0.04	0.03	-	-	-	-	-	-	1.68	0.12	-	-	1.87	2.79
0.8-0.9	-	-	-	-	-	-	-	-	-	-	-	-	0.60	0.04	-	-	0.64	0.92
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	0.25	-	-	-	0.25	0.28
>1	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	-	-	0.03	0.03
subTot.	1.11	0.94	1.96	5.30	18.70	13.72	2.18	1.01	0.80	0.79	1.67	7.44	35.53	6.09	1.53	1.11		
Total **	1.12	0.94	1.97	5.31	18.71	13.73	2.18	1.02	0.81	0.80	1.67	7.44	35.54	6.10	1.54	1.12		
Cumul.	1.12	2.06	4.03	9.34	28.05	41.77	43.96	44.97	45.78	46.58	48.25	55.70	91.24	97.34	98.88	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

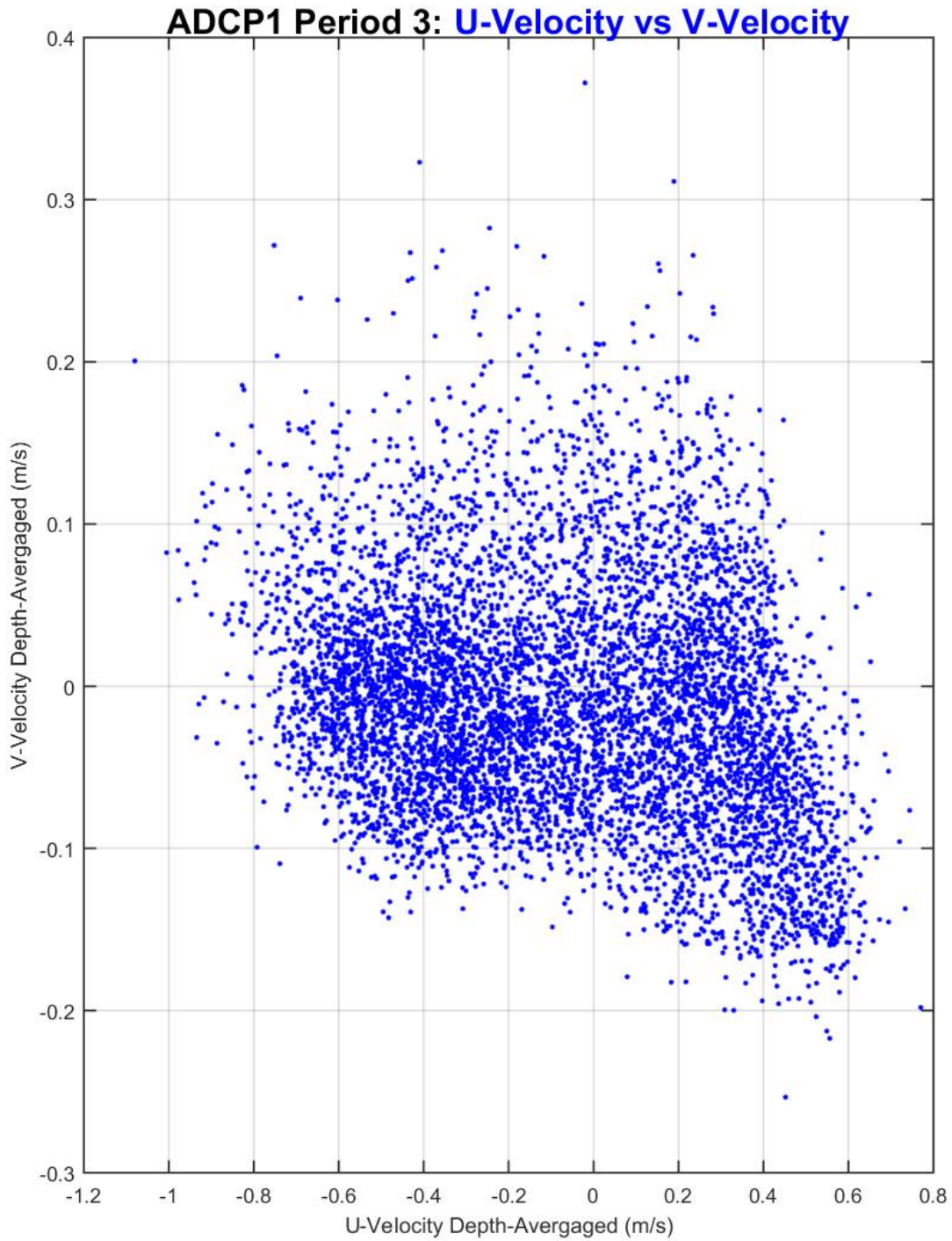
\*\* includes the calm winds which are evenly distributed amongst the directional bins


### Data Information:

Project: 301001-02112  
 Location: ADCP1 [151° 39.602' E , 23° 06.030' S]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP1 Period 3  
 Data summary: Complete  
 Number of Records: 6844  
 Missing data (%): 0.00  
 Calm (% < 0.01m/s): 0.12

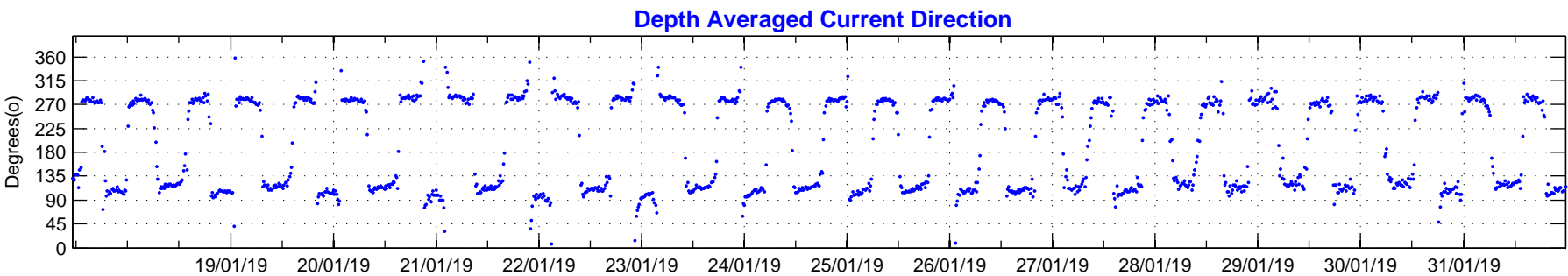
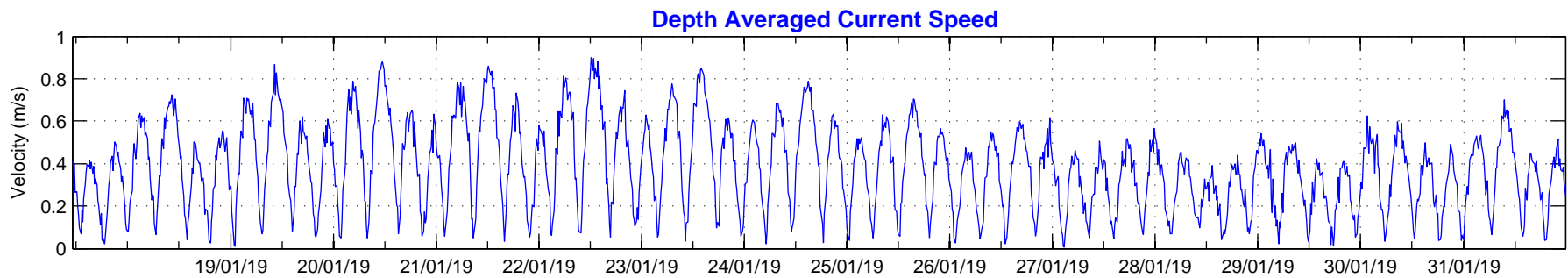
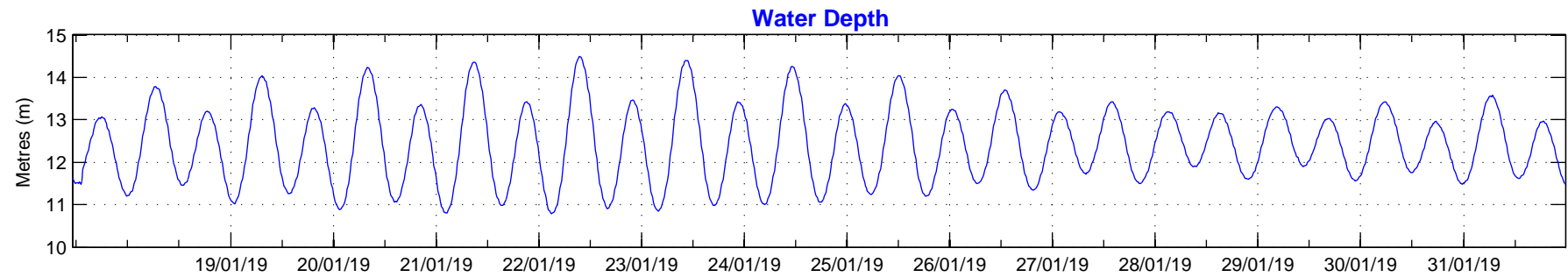
### Key Data Statistics:

Max Curr Spd: 1.10 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s





**Appendix D**  
**ADCP2: Current and Water Level Time Series**  
**Plots**



**Wave Summary January 2019**

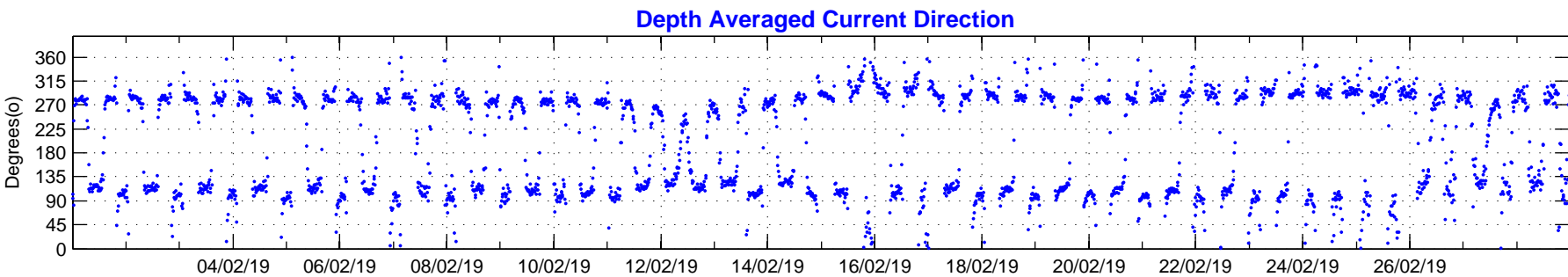
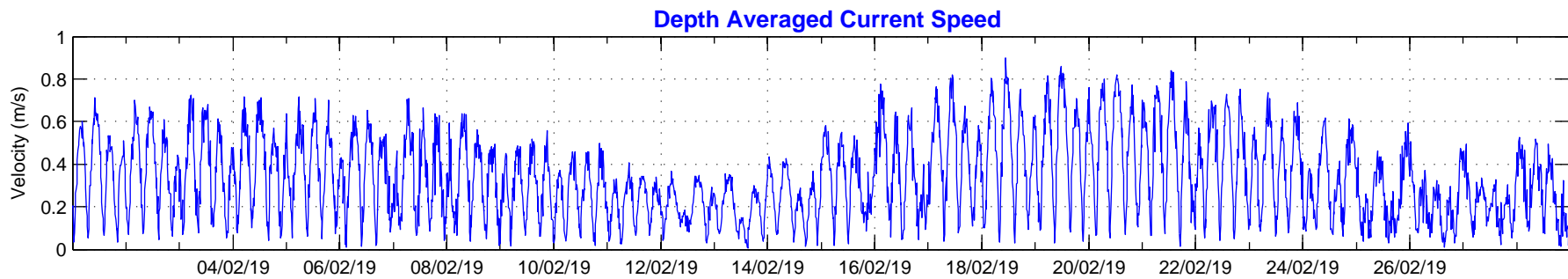
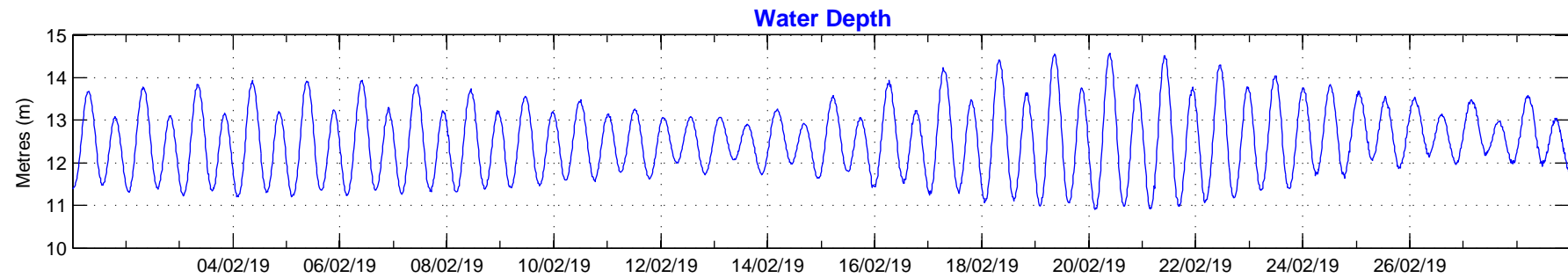
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period1 [151° 39.117 , 23° 05.726S]  
 Data period: January 2019 (17-Jan-2019 to 31-Jan-2019)  
 Data source: AWAC  
 Data summary: January 2019

**Key Data Statistics:**

Max Curr Spd: 0.90 m/s  
 Mean Curr Spd: 0.35 m/s  
 StdDev. Curr Spd: 0.19 m/s





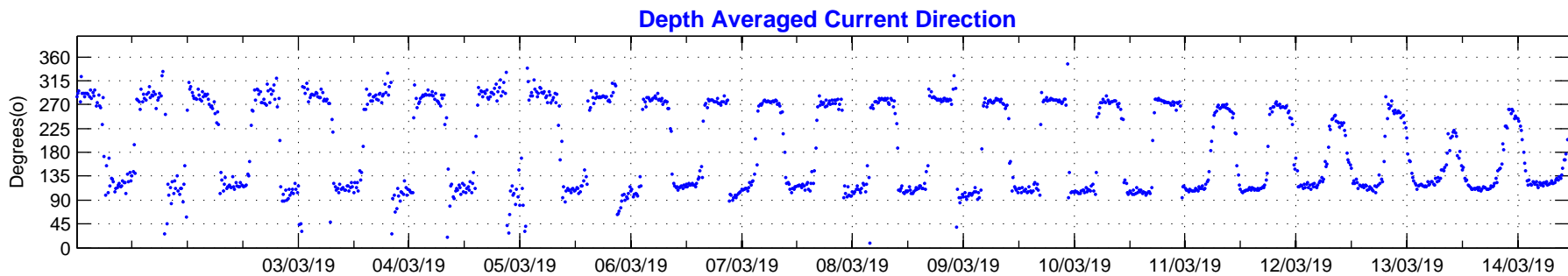
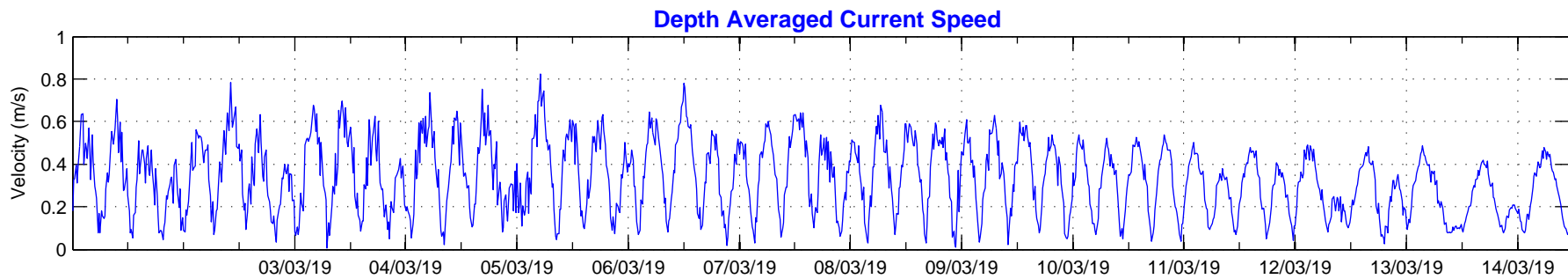
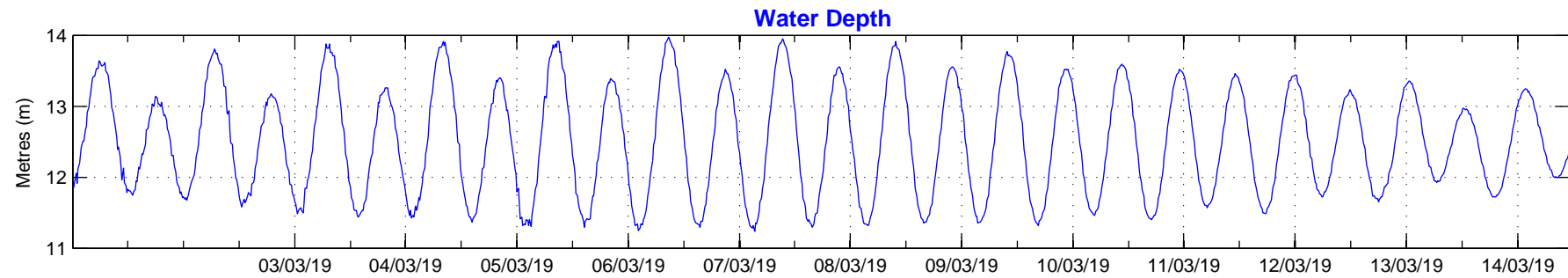
**Wave Summary February 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period1 [151° 39.117 , 23° 05.726S]  
 Data period: February 2019 (01-Feb-2019 to 28-Feb-2019)  
 Data source: AWAC  
 Data summary: February 2019

**Key Data Statistics:**

Max Curr Spd: 0.90 m/s  
 Mean Curr Spd: 0.35 m/s  
 StdDev. Curr Spd: 0.19 m/s



**Wave Summary March 2019**

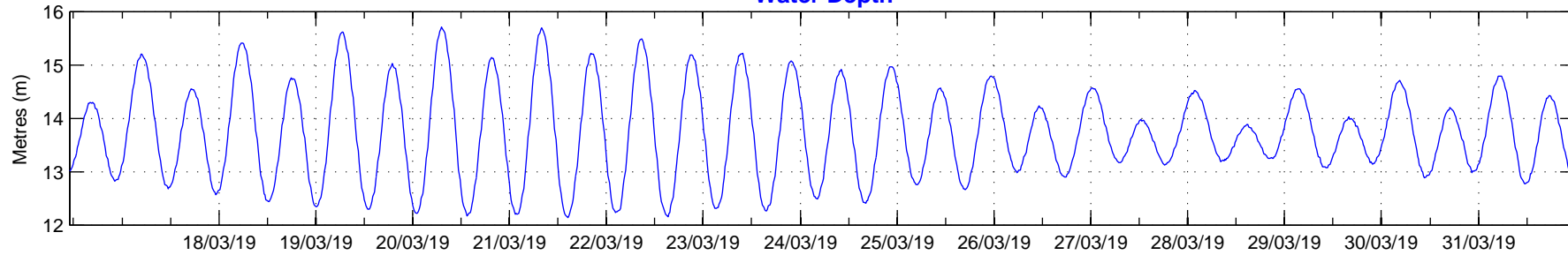
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period1 [151° 39.117 , 23° 05.726S]  
 Data period: March 2019 (01-Mar-2019 to 14-Mar-2019)  
 Data source: AWAC  
 Data summary: March 2019

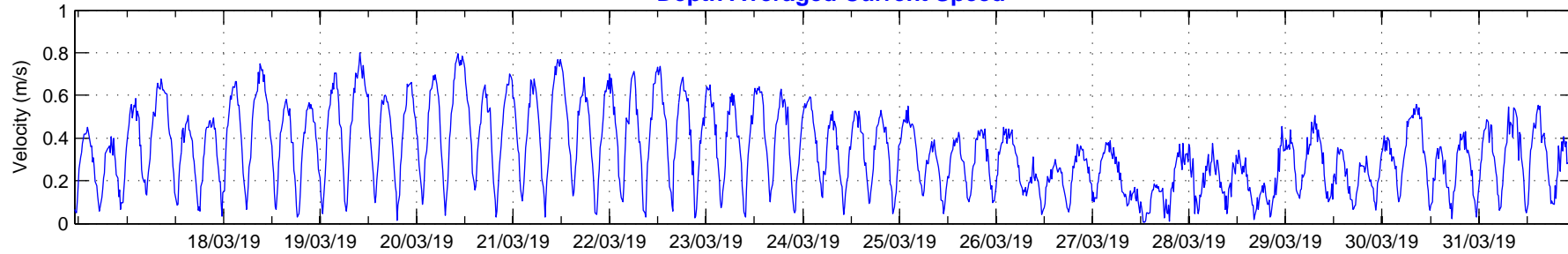
**Key Data Statistics:**

Max Curr Spd: 0.90 m/s  
 Mean Curr Spd: 0.35 m/s  
 StdDev. Curr Spd: 0.19 m/s

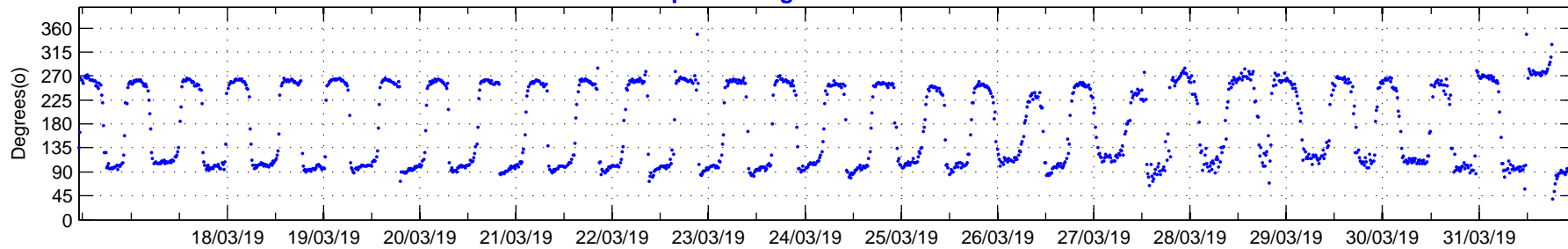
Water Depth



Depth Averaged Current Speed



Depth Averaged Current Direction



Wave Summary March 2019

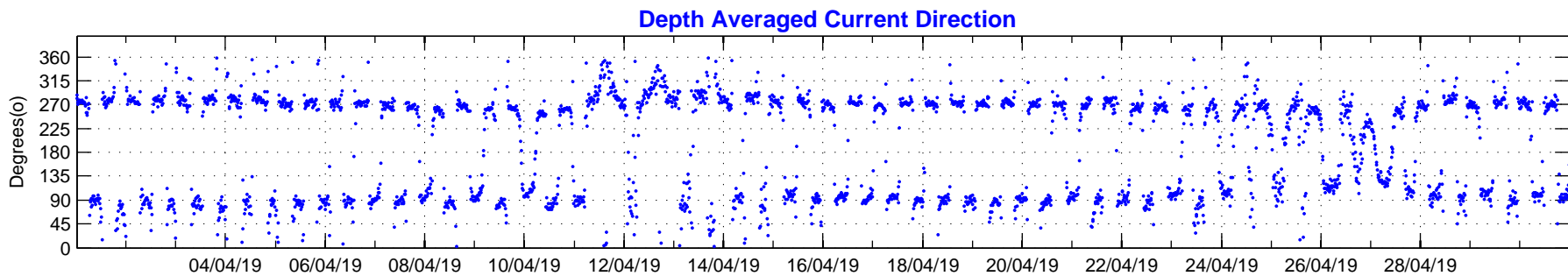
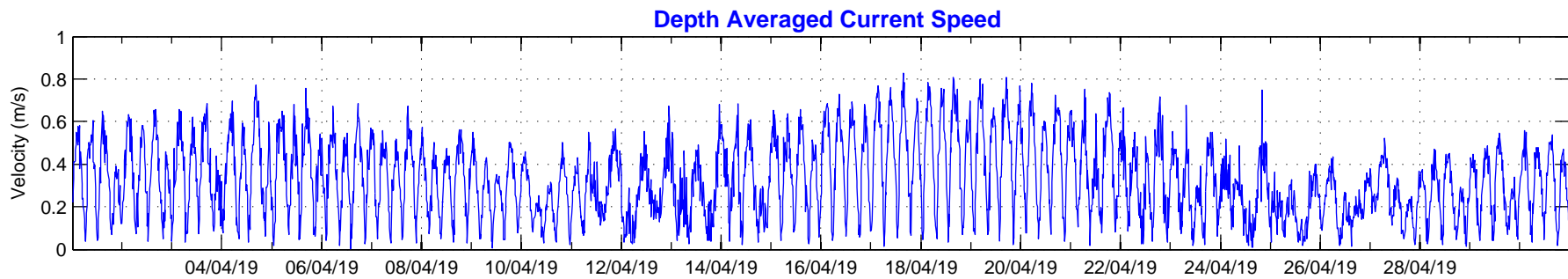
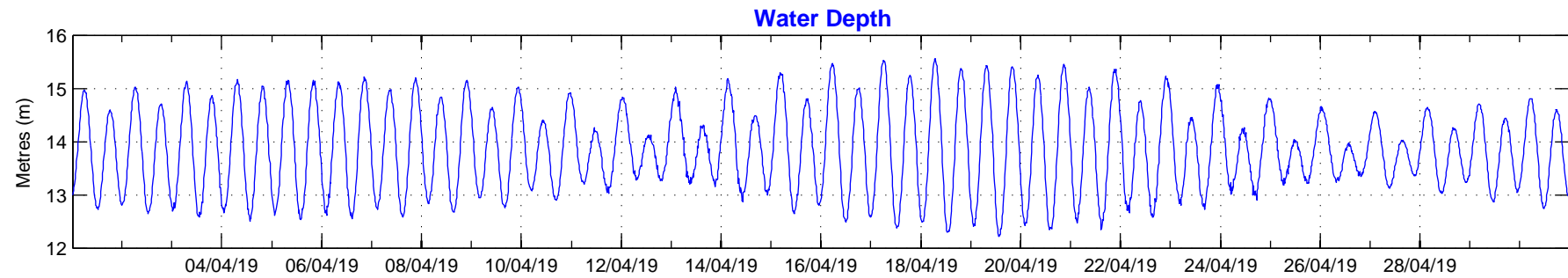
Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
Data period: March 2019 (16-Mar-2019 to 31-Mar-2019)  
Data source: AWAC  
Data summary: March 2019

Key Data Statistics:

Max Curr Spd: 0.83 m/s  
Mean Curr Spd: 0.33 m/s  
StdDev. Curr Spd: 0.18 m/s





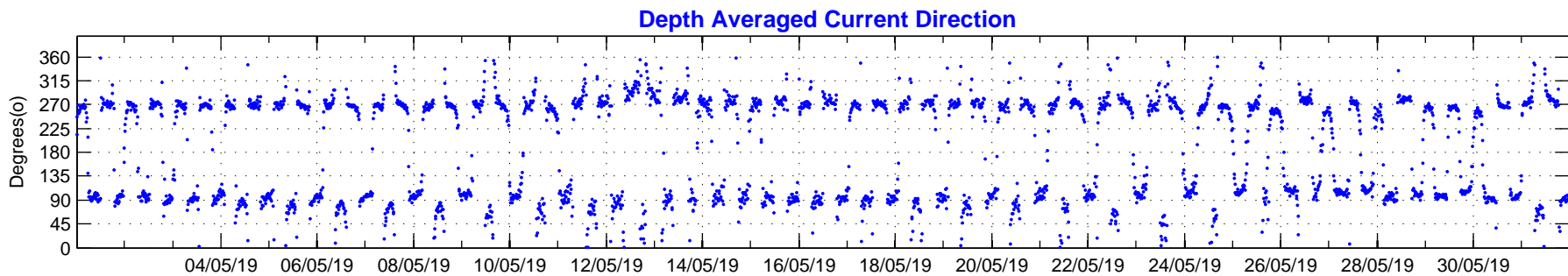
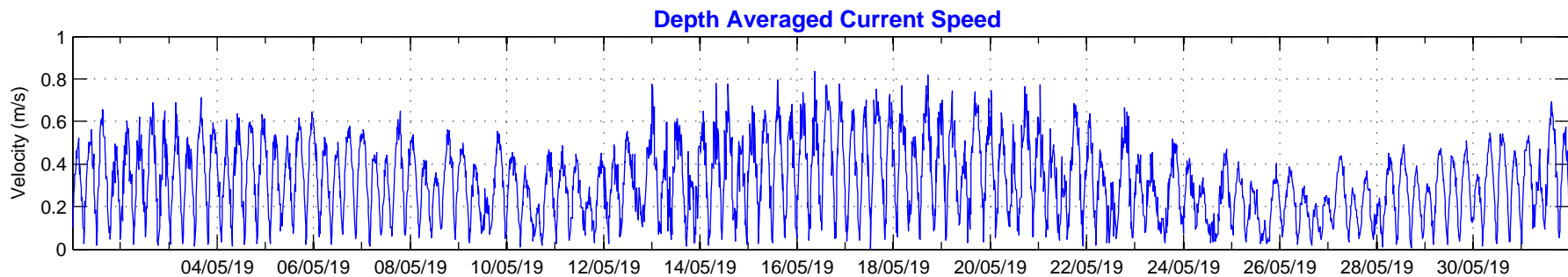
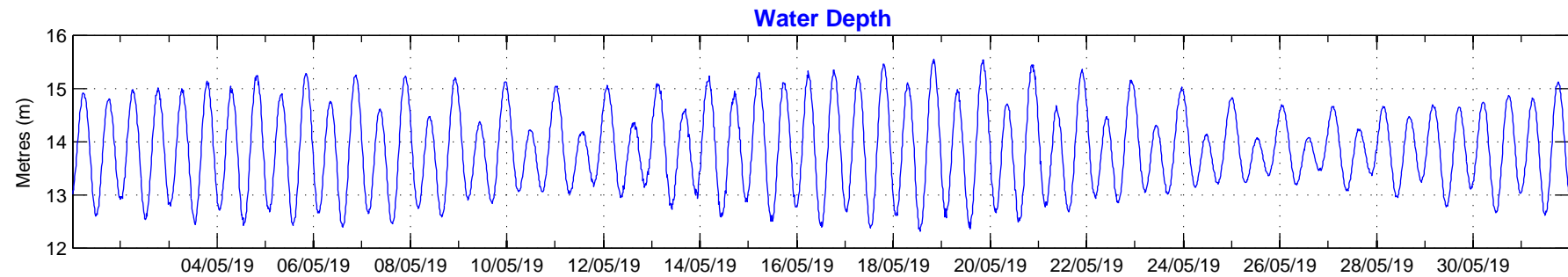
**Wave Summary April 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: April 2019 (01-Apr-2019 to 30-Apr-2019)  
 Data source: AWAC  
 Data summary: April 2019

**Key Data Statistics:**

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



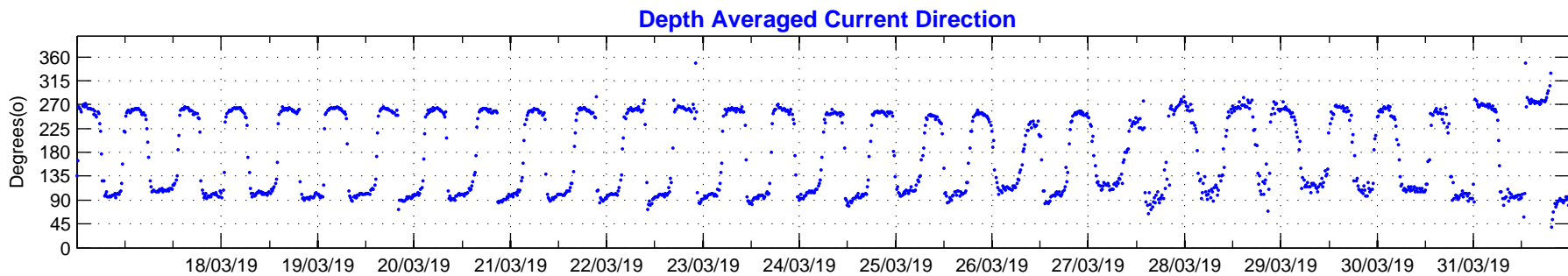
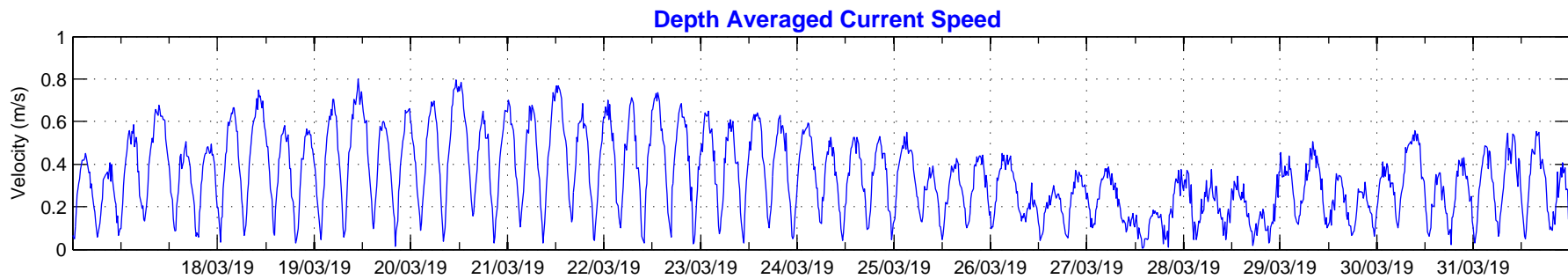
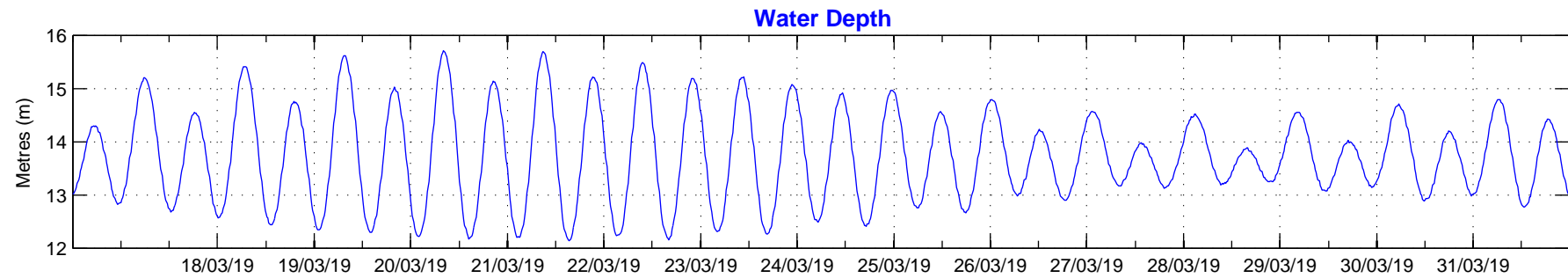
**Wave Summary May 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: May 2019 (01-May-2019 to 31-May-2019)  
 Data source: AWAC  
 Data summary: May 2019

**Key Data Statistics:**

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



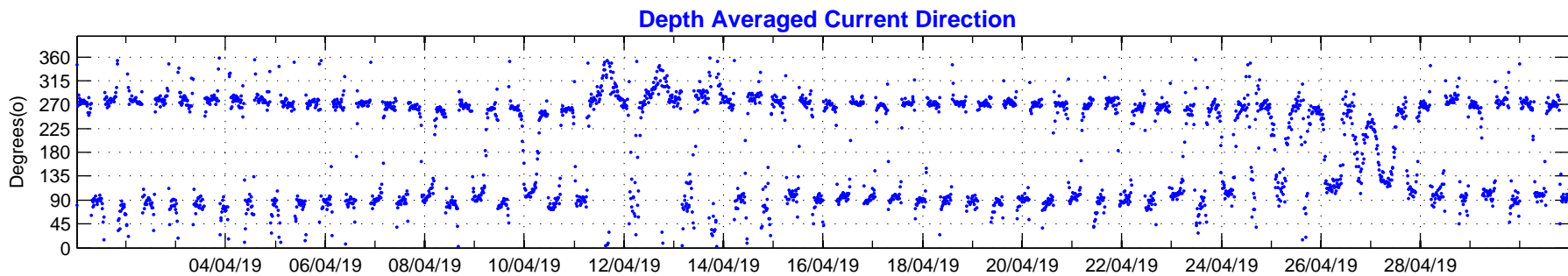
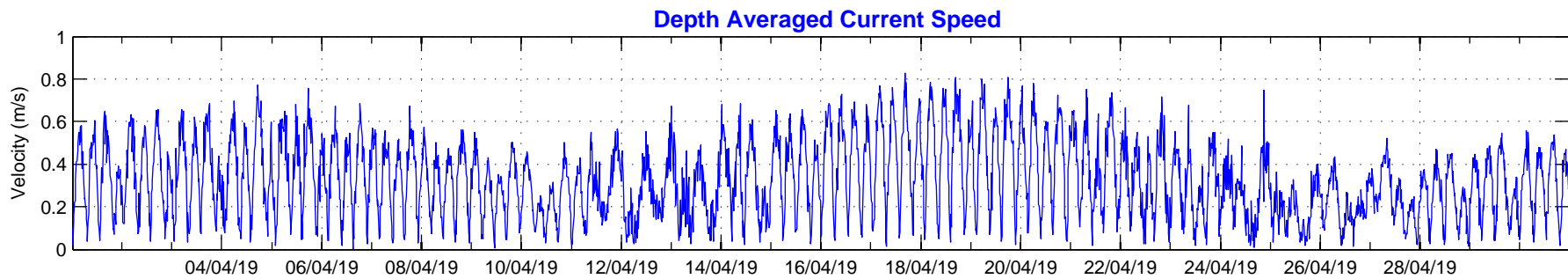
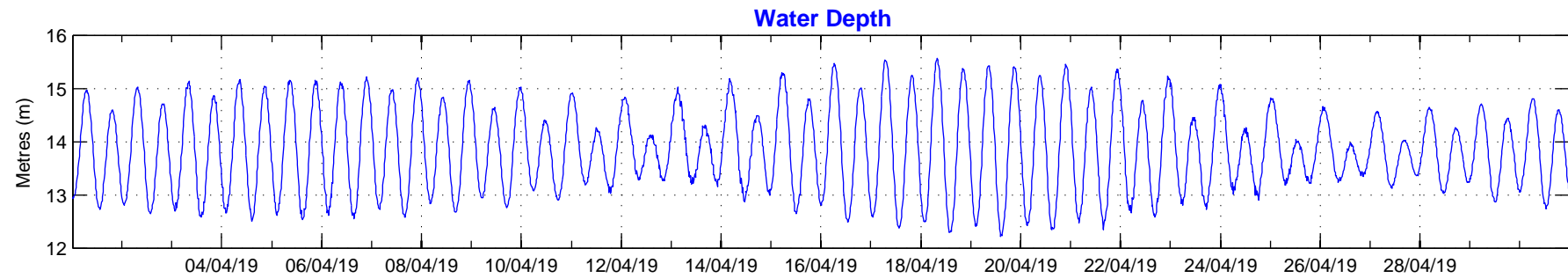
## Wave Summary March 2019

### Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: March 2019 (16-Mar-2019 to 31-Mar-2019)  
 Data source: AWAC  
 Data summary: March 2019

### Key Data Statistics:

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



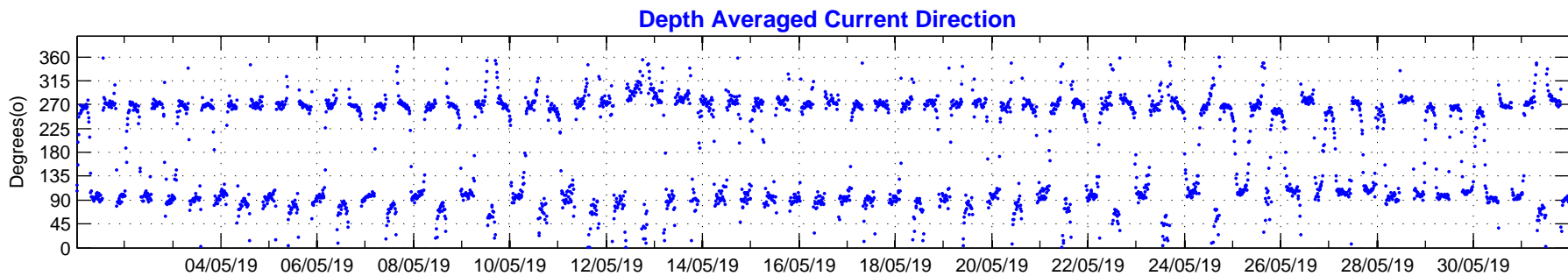
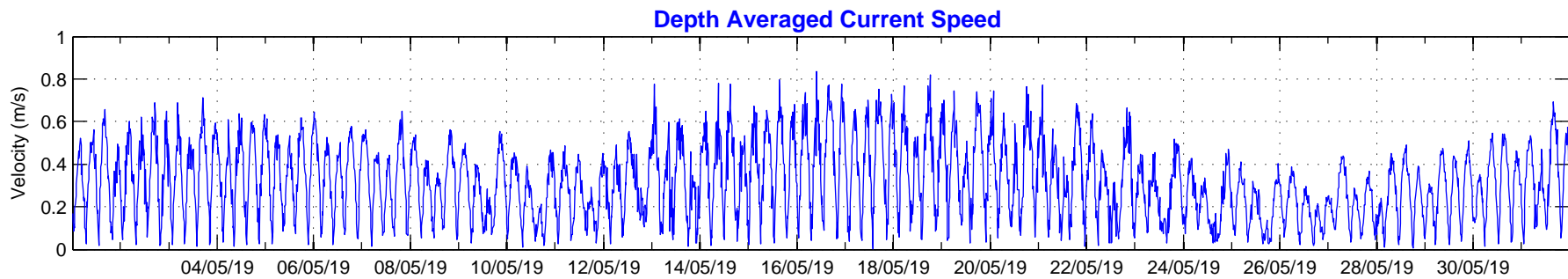
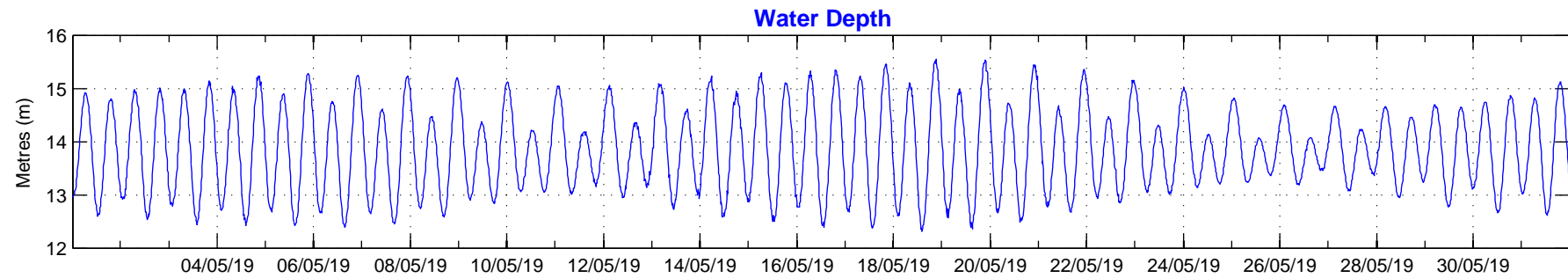
**Wave Summary April 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: April 2019 (01-Apr-2019 to 30-Apr-2019)  
 Data source: AWAC  
 Data summary: April 2019

**Key Data Statistics:**

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



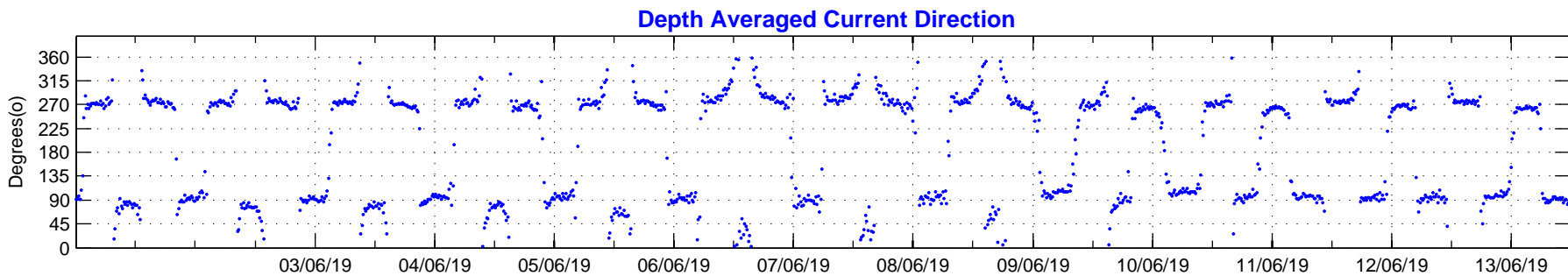
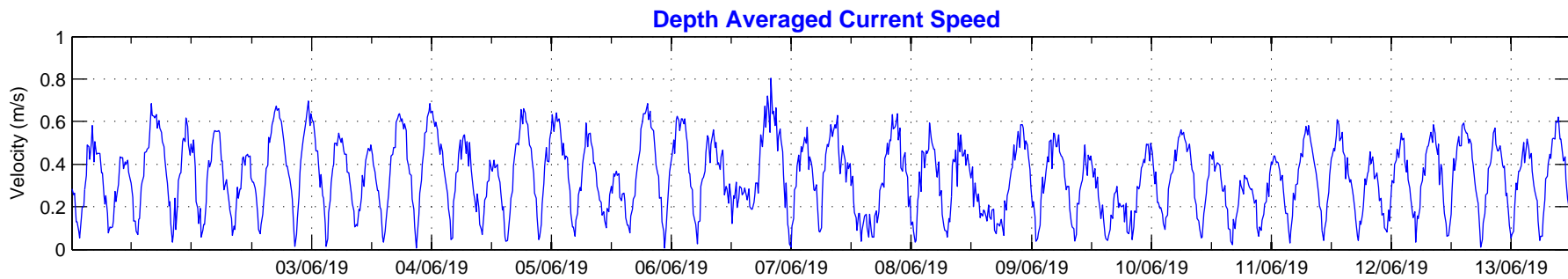
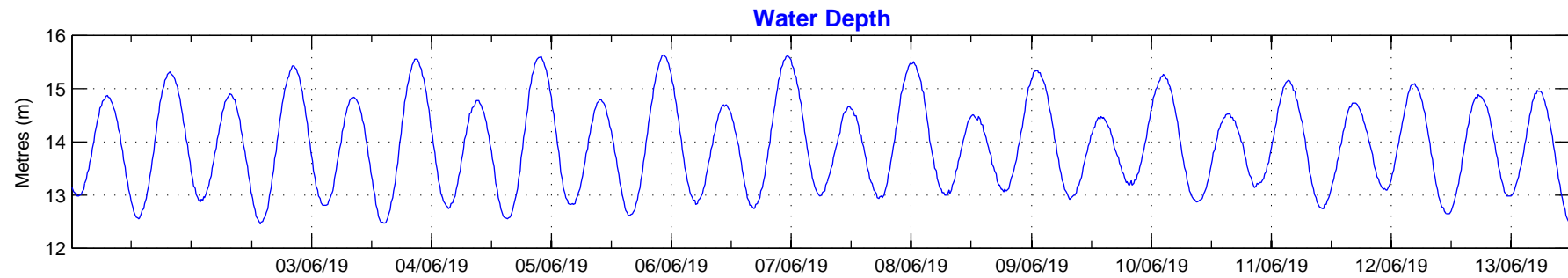
#### Wave Summary May 2019

#### Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: May 2019 (01-May-2019 to 31-May-2019)  
 Data source: AWAC  
 Data summary: May 2019

#### Key Data Statistics:

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



**Wave Summary June 2019**

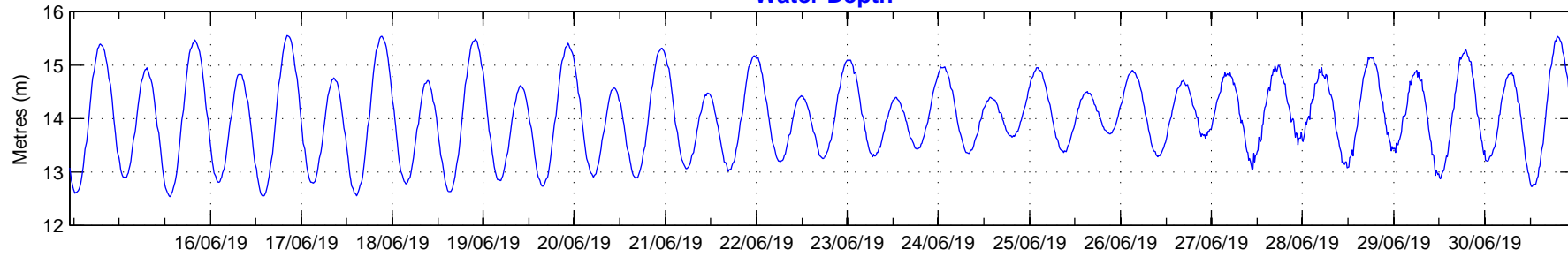
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: June 2019 (01-Jun-2019 to 13-Jun-2019)  
 Data source: AWAC  
 Data summary: June 2019

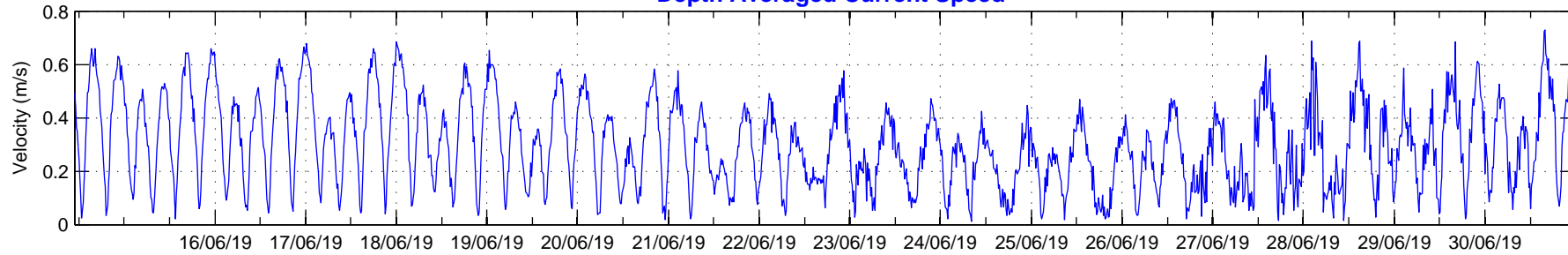
**Key Data Statistics:**

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s

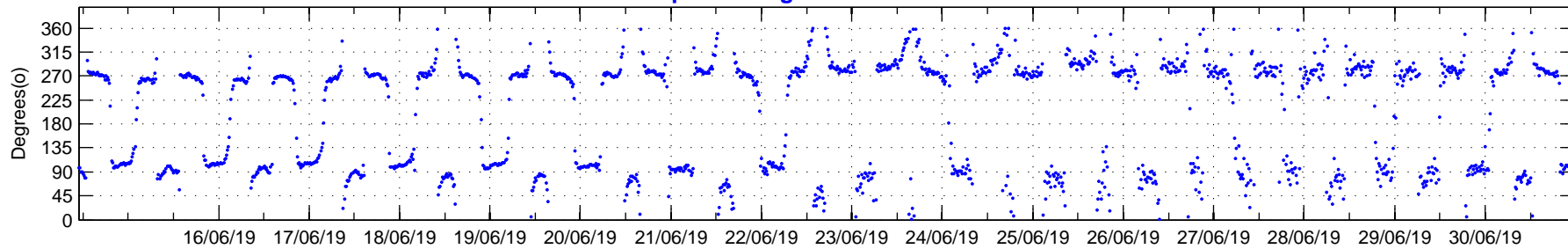
Water Depth



Depth Averaged Current Speed



Depth Averaged Current Direction



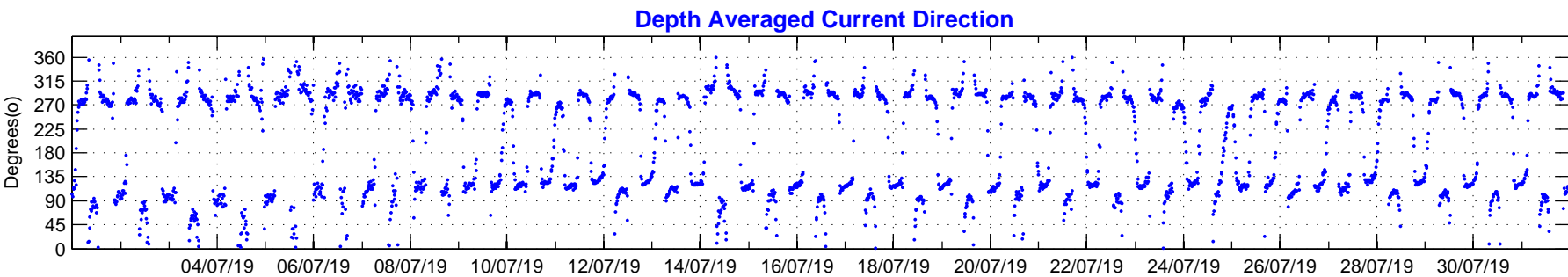
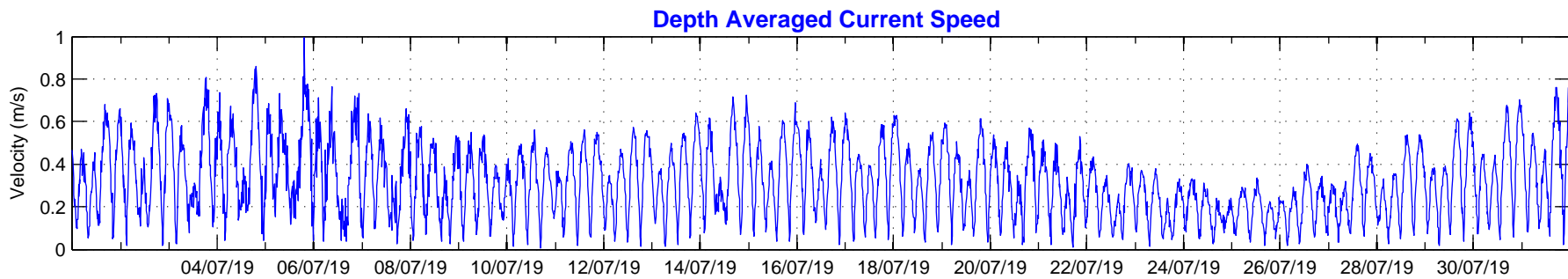
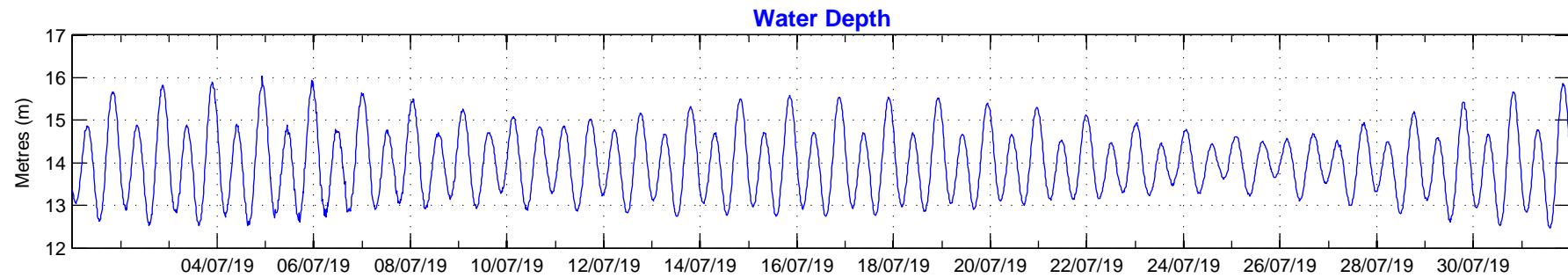
Wave Summary June 2019

Data Information:

Project: 301001-02112 Douglas Shoal Remediation Project  
Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
Data period: June 2019 (14-Jun-2019 to 30-Jun-2019)  
Data source: AWAC  
Data summary: June 2019

Key Data Statistics:

Max Curr Spd: 0.99 m/s  
Mean Curr Spd: 0.31 m/s  
StdDev. Curr Spd: 0.17 m/s



**Wave Summary July 2019**

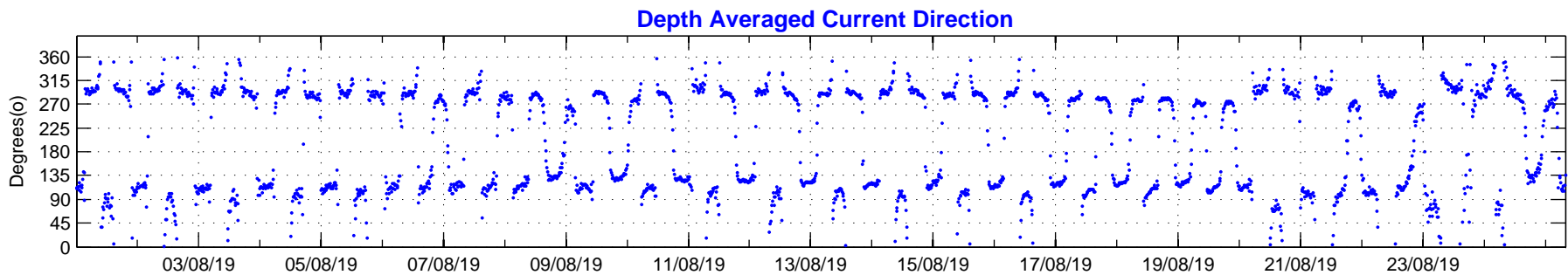
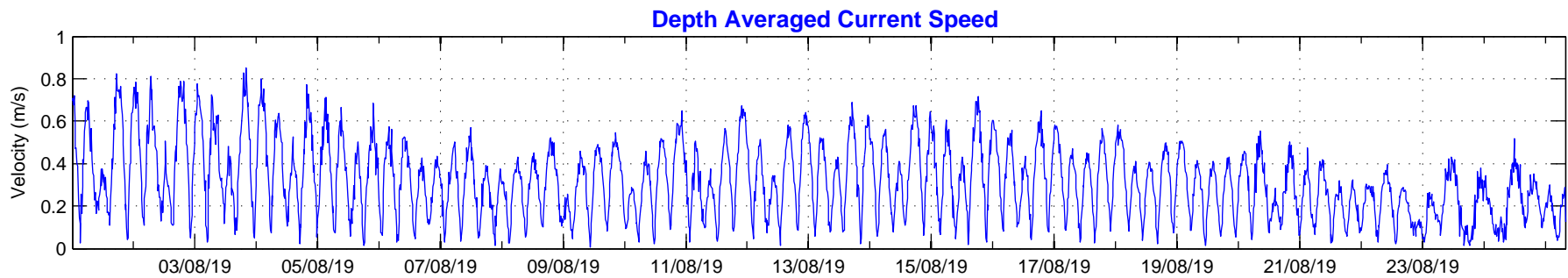
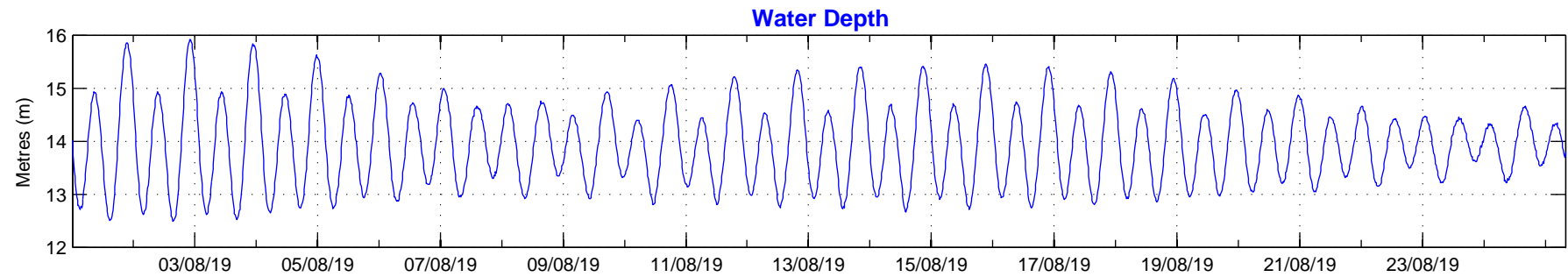
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
 Data period: July 2019 (01-Jul-2019 to 31-Jul-2019)  
 Data source: AWAC  
 Data summary: July 2019

**Key Data Statistics:**

Max Curr Spd: 0.99 m/s  
 Mean Curr Spd: 0.31 m/s  
 StdDev. Curr Spd: 0.17 m/s






**Wave Summary August 2019**

**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
 Data period: August 2019 (01-Aug-2019 to 25-Aug-2019)  
 Data source: AWAC  
 Data summary: August 2019

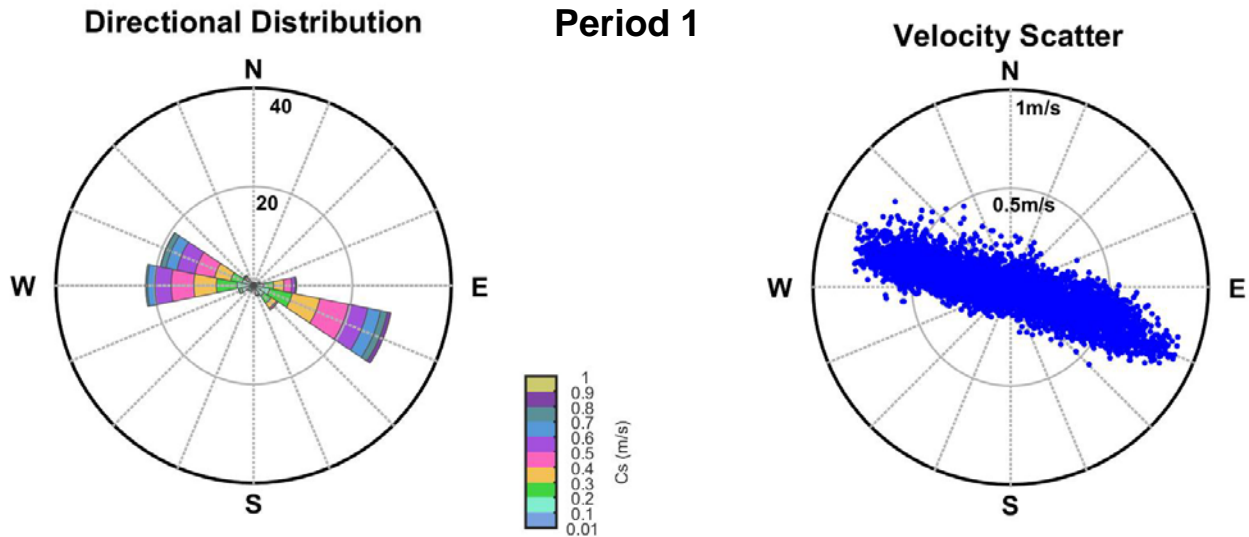
**Key Data Statistics:**

Max Curr Spd: 0.99 m/s  
 Mean Curr Spd: 0.31 m/s  
 StdDev. Curr Spd: 0.17 m/s



**Appendix E**  
**ADCP2: Current Rose, Velocity Scatter and**  
**Joint Frequency Table Plots**

## Current Speed for ADCP2 Location



JFT (%) of Current Speed against Direction for the entire period 17-Jan-2019 to 14-Mar-2019

N=5378	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	100.00
0.01-0.1	0.37	0.20	0.41	0.32	0.60	0.61	0.65	0.97	0.67	0.97	0.69	0.91	0.65	0.63	0.48	0.32	9.45	99.91
0.1-0.2	0.17	0.41	0.30	0.78	1.43	2.70	1.92	1.06	0.24	0.37	0.65	1.56	2.70	1.75	0.84	0.30	17.16	90.46
0.2-0.3	0.13	0.07	0.04	0.22	2.01	4.65	1.77	0.17	-	-	0.07	0.56	4.18	2.34	0.52	0.07	16.81	73.30
0.3-0.4	-	-	-	0.06	2.10	5.71	1.25	-	-	-	-	0.11	4.56	3.29	0.33	0.06	17.46	56.49
0.4-0.5	-	-	-	-	1.56	5.93	0.33	-	-	-	-	-	4.56	4.07	0.20	0.02	16.68	39.03
0.5-0.6	-	-	-	-	0.76	3.96	0.06	-	-	-	-	-	3.31	3.70	0.13	-	11.92	22.35
0.6-0.7	-	-	-	-	0.22	2.66	0.02	-	-	-	-	-	1.49	2.27	-	-	6.66	10.43
0.7-0.8	-	-	-	-	0.04	1.36	-	-	-	-	-	-	0.39	1.10	0.02	-	2.90	3.77
0.8-0.9	-	-	-	-	-	0.78	-	-	-	-	-	-	-	0.09	-	-	0.87	0.87
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subTot.	0.67	0.69	0.74	1.38	8.72	28.36	5.99	2.19	0.91	1.34	1.41	3.14	21.83	19.25	2.53	0.76		
Total **	0.68	0.69	0.75	1.38	8.73	28.36	5.99	2.20	0.92	1.34	1.42	3.15	21.84	19.25	2.53	0.77		
Cumul.	0.68	1.37	2.12	3.50	12.23	40.59	46.58	48.78	49.70	51.04	52.46	55.61	77.45	96.70	99.23	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

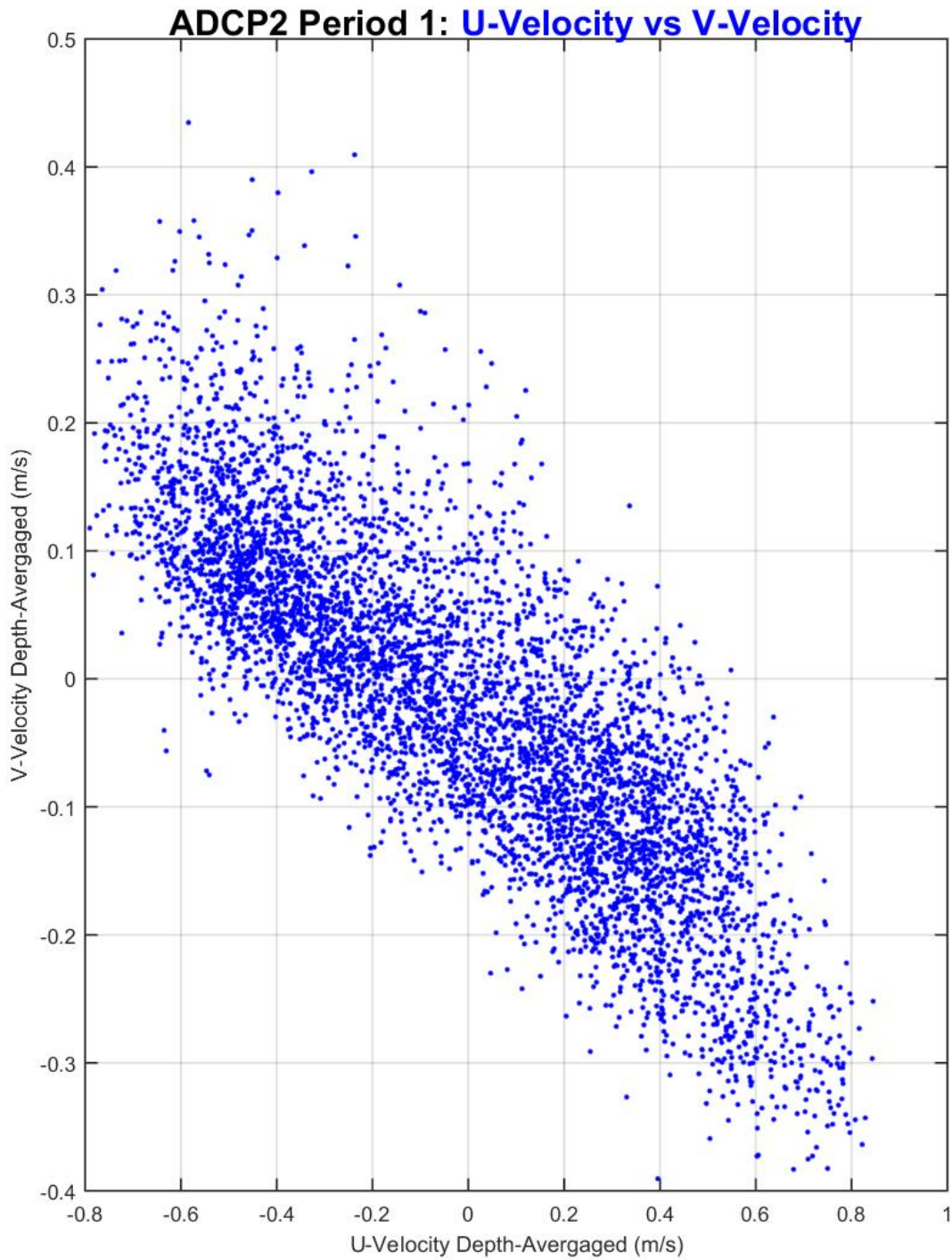
\*\* includes the calm winds which are evenly distributed amongst the directional bins

### Data Information:

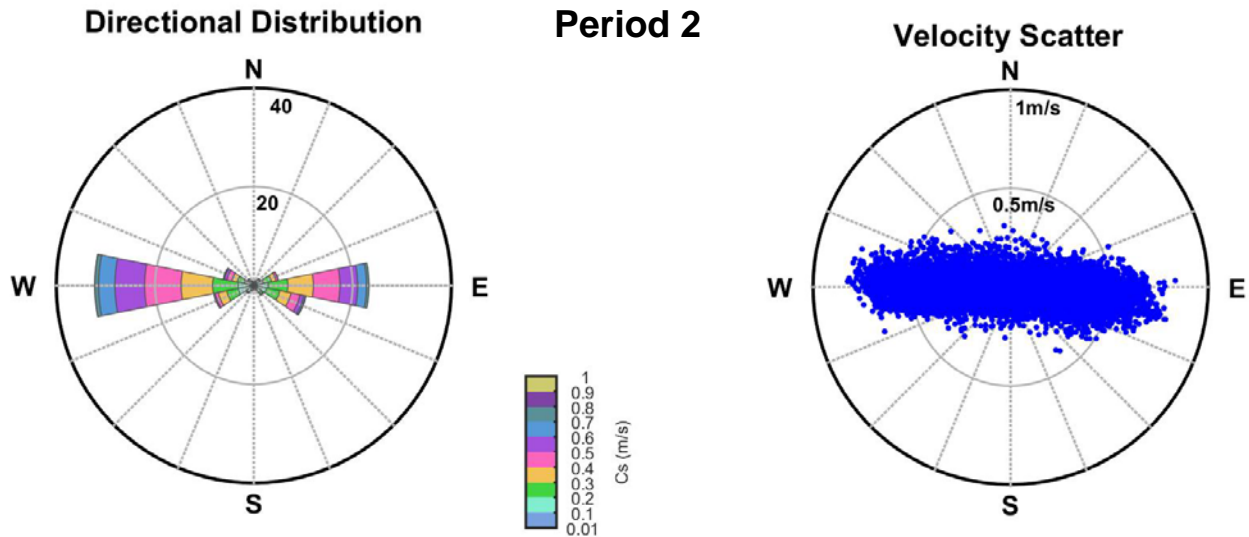
Project: 301001-02112  
 Location: ADCP2 [151° 39.117' E , 23° 05.726' S ]  
 Data period: All data (17-Jan-2019 to 14-Mar-2019)  
 Data source: ADCP2 Period 1  
 Data summary: Complete  
 Number of Records: 5378  
 Missing data (%): 0.00  
 Calm (% < 0.01m/s): 0.09

### Key Data Statistics:

Max Curr Spd: 0.90 m/s  
 Mean Curr Spd: 0.35 m/s  
 StdDev. Curr Spd: 0.19 m/s



## Current Speed for ADCP2 Location



JFT (%) of Current Speed against Direction for the entire period 16-Mar-2019 to 13-Jun-2019

N=8562	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13	100.00
0.01-0.1	0.36	0.62	0.69	0.64	0.69	0.78	0.89	0.57	0.53	0.59	0.68	0.78	0.81	0.56	0.59	0.36	10.15	99.87
0.1-0.2	0.35	0.39	0.76	1.33	2.24	1.88	0.95	0.41	0.39	0.49	1.03	2.41	2.36	1.39	0.60	0.49	17.47	89.72
0.2-0.3	0.06	0.08	0.28	1.66	3.97	2.68	0.39	0.05	0.02	0.07	0.21	2.38	5.16	1.45	0.37	0.14	18.97	72.25
0.3-0.4	0.01	-	0.01	0.95	5.16	2.33	0.14	-	-	-	0.06	1.74	6.38	1.10	0.08	0.01	17.98	53.28
0.4-0.5	-	-	-	0.42	5.37	1.85	0.05	-	-	-	-	0.67	7.38	1.04	0.01	-	16.79	35.31
0.5-0.6	-	-	-	0.08	3.59	0.81	-	-	-	-	-	0.28	6.02	0.56	-	-	11.34	18.51
0.6-0.7	-	-	-	-	1.79	0.33	-	-	-	-	-	0.05	3.30	0.20	-	-	5.66	7.17
0.7-0.8	-	-	-	-	0.50	0.12	-	-	-	-	-	-	0.77	0.04	-	-	1.43	1.51
0.8-0.9	-	-	-	-	0.01	0.01	-	-	-	-	-	-	0.06	-	-	-	0.08	0.08
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subTot.	0.78	1.09	1.74	5.09	23.32	10.79	2.41	1.03	0.94	1.15	1.98	8.31	32.24	6.34	1.65	1.01		
Total **	0.79	1.10	1.75	5.10	23.33	10.80	2.42	1.04	0.94	1.15	1.99	8.32	32.25	6.35	1.66	1.01		
Cumul.	0.79	1.89	3.64	8.74	32.07	42.87	45.29	46.33	47.27	48.42	50.41	58.73	90.98	97.33	98.99	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

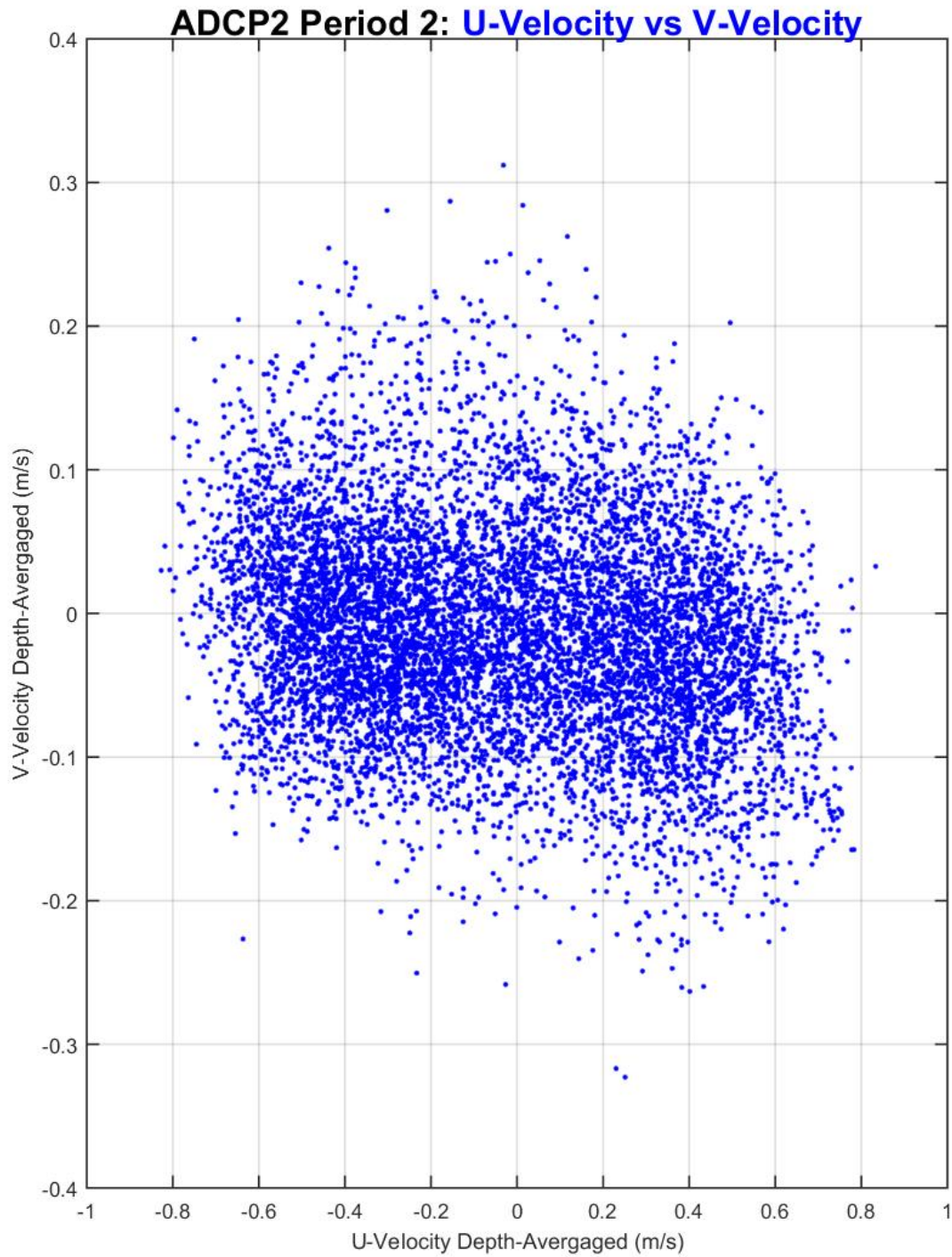
\*\* includes the calm winds which are evenly distributed amongst the directional bins

### Data Information:

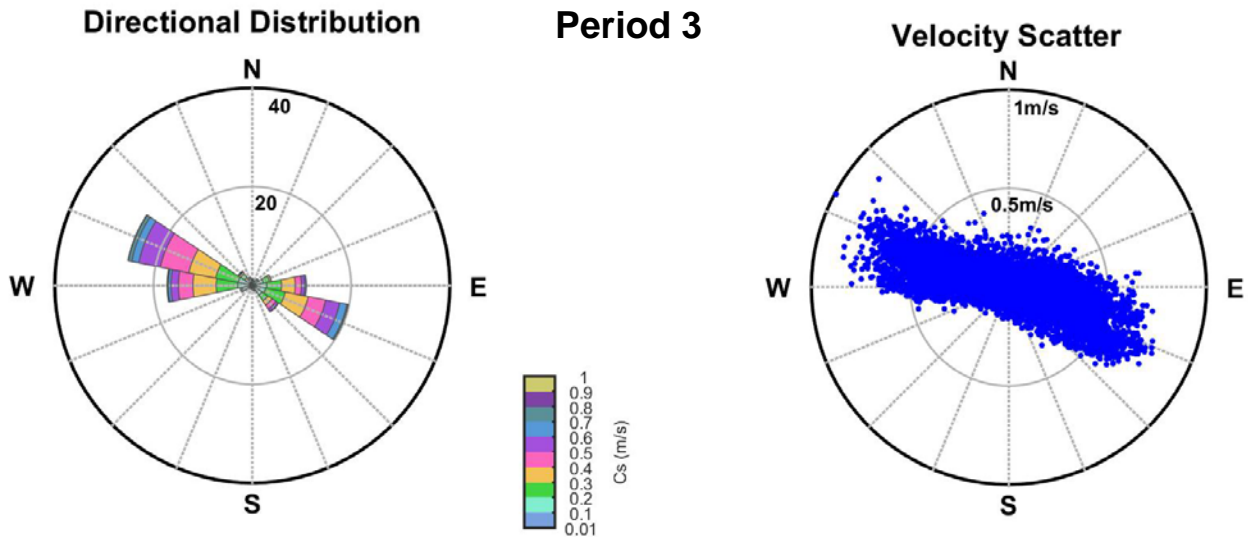
Project: 301001-02112  
 Location: ADCP2 [151° 39.132' E , 23° 05.730' S ]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP2 Period 2  
 Data summary: Complete  
 Number of Records: 8562  
 Missing data (%): 0.20  
 Calm (% < 0.01m/s): 0.13

### Key Data Statistics:

Max Curr Spd: 0.83 m/s  
 Mean Curr Spd: 0.33 m/s  
 StdDev. Curr Spd: 0.18 m/s



## Current Speed for ADCP2 Location



JFT (%) of Current Speed against Direction for the entire period 14-Jun-2019 to 25-Aug-2019

N=6901	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-0.01 (Calm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	100.00
0.01-0.1	0.64	0.43	0.42	0.67	0.84	0.78	0.68	0.39	0.59	0.65	0.57	0.83	0.57	0.67	0.67	0.70	10.09	99.96
0.1-0.2	0.59	0.52	0.85	1.62	2.06	1.97	1.65	0.61	0.36	0.16	0.43	1.28	2.36	2.25	1.19	0.72	18.63	89.87
0.2-0.3	0.10	0.07	0.32	1.25	3.01	4.04	1.46	0.14	-	-	-	0.35	4.39	4.67	1.00	0.28	21.08	71.24
0.3-0.4	-	0.03	0.03	0.38	2.78	4.74	1.00	0.01	-	-	-	0.06	4.71	5.52	0.41	0.07	19.74	50.15
0.4-0.5	-	-	-	0.04	1.25	3.59	0.96	-	-	-	-	0.01	2.94	5.87	0.17	-	14.84	30.42
0.5-0.6	-	-	-	-	0.67	2.90	0.58	-	-	-	-	-	1.51	4.48	0.09	-	10.22	15.58
0.6-0.7	-	-	-	-	0.32	1.51	0.12	-	-	-	-	-	0.57	1.45	0.03	-	3.98	5.36
0.7-0.8	-	-	-	-	0.03	0.29	-	-	-	-	-	-	0.20	0.70	-	-	1.22	1.38
0.8-0.9	-	-	-	-	-	-	-	-	-	-	-	-	0.03	0.10	0.01	-	0.14	0.16
0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	0.01	0.01
>1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subTot.	1.33	1.06	1.62	3.96	10.95	19.82	6.45	1.16	0.96	0.81	1.00	2.52	17.27	25.71	3.56	1.77		
Total **	1.34	1.06	1.63	3.96	10.96	19.83	6.45	1.16	0.96	0.81	1.00	2.52	17.28	25.71	3.57	1.77		
Cumul.	1.34	2.40	4.02	7.98	18.94	38.76	45.22	46.38	47.34	48.15	49.15	51.68	68.95	94.66	98.23	100.00		

\* denotes values less than 0.01%

- denotes no records in bin

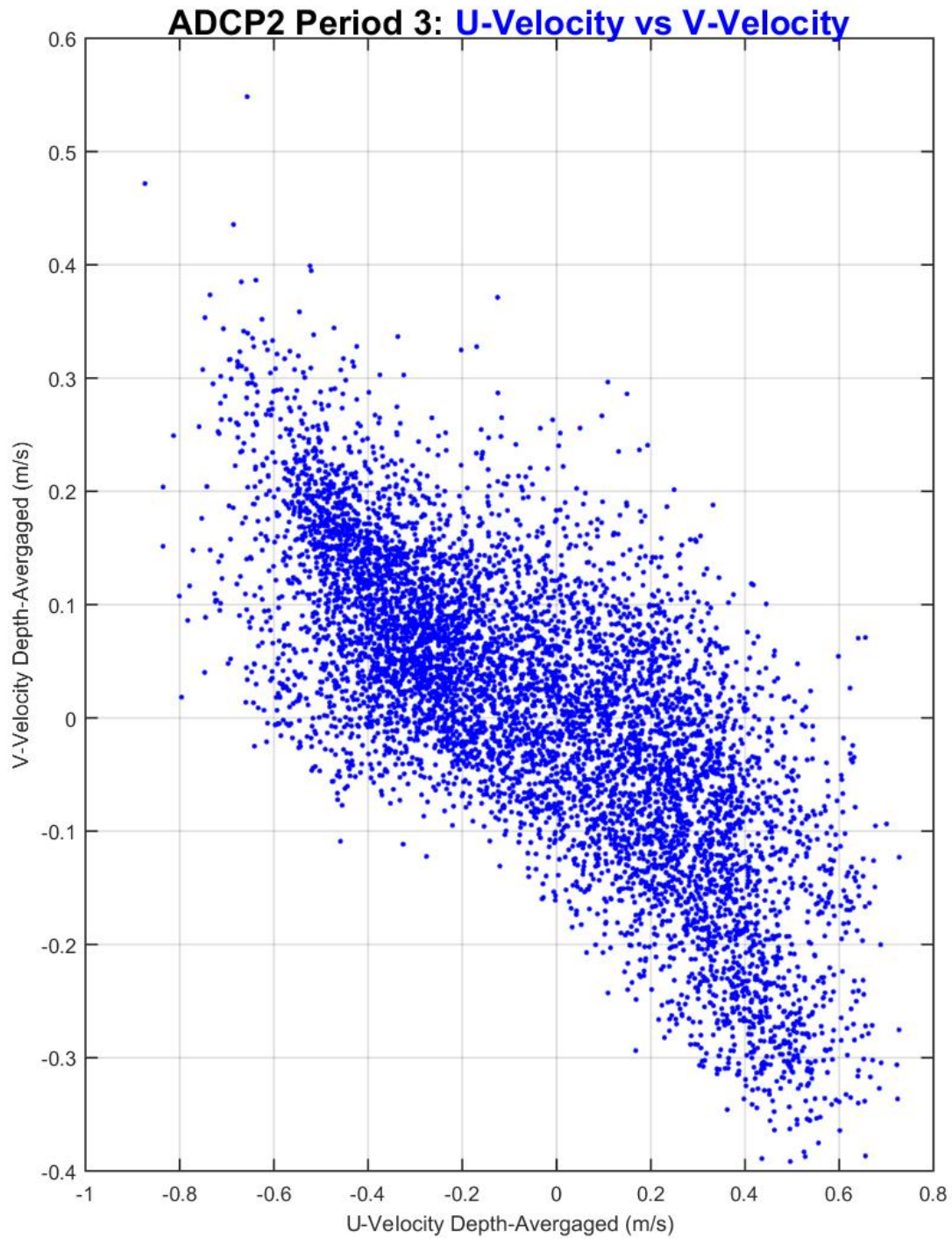
\*\* includes the calm winds which are evenly distributed amongst the directional bins

### Data Information:

Project: 301001-02112  
 Location: ADCP2 [151° 39.140' E , 23° 05.734' S]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP2 Period 3  
 Data summary: Complete  
 Number of Records: 6901  
 Missing data (%): 0.00  
 Calm (% < 0.01m/s): 0.04

### Key Data Statistics:

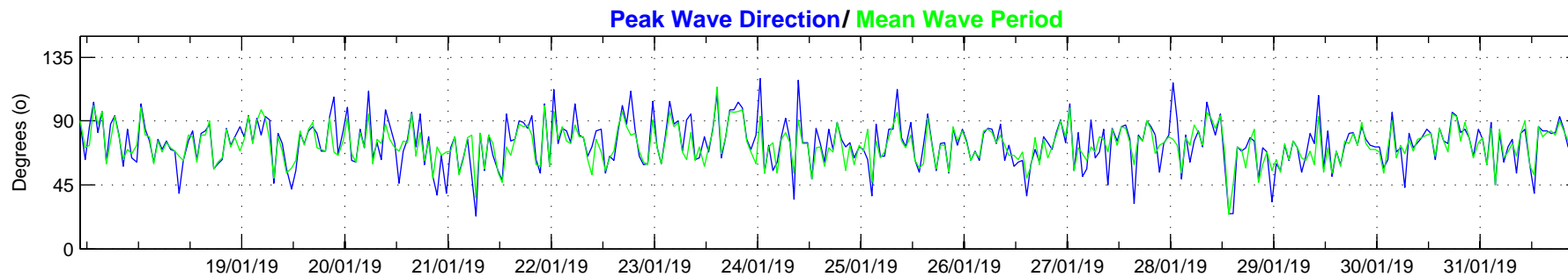
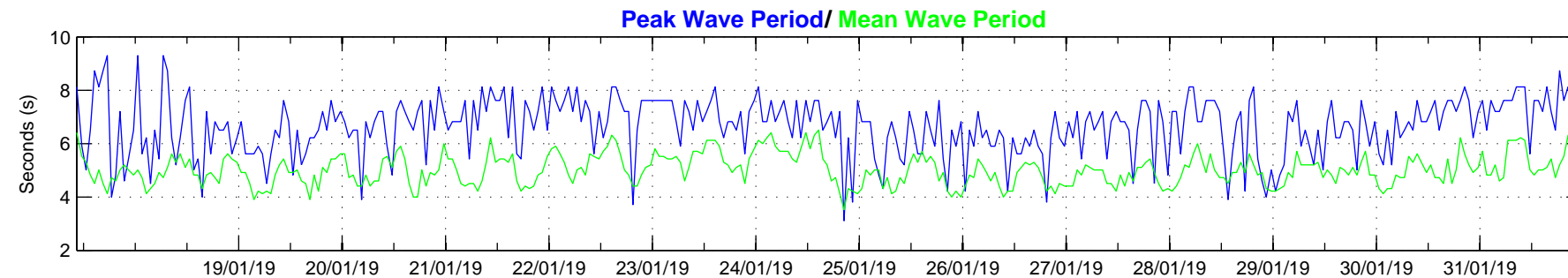
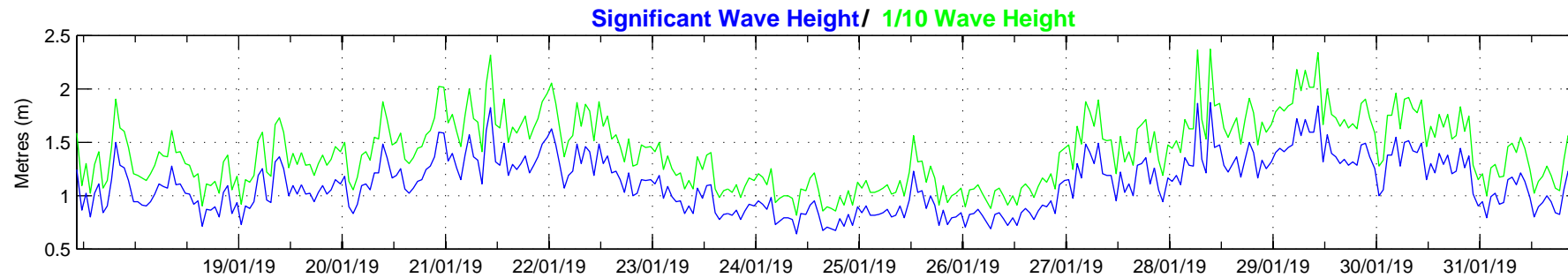
Max Curr Spd: 0.99 m/s  
 Mean Curr Spd: 0.31 m/s  
 StdDev. Curr Spd: 0.17 m/s







**Appendix F**  
**ADCP1: Wave Time Series Plots**



**Data Information:**

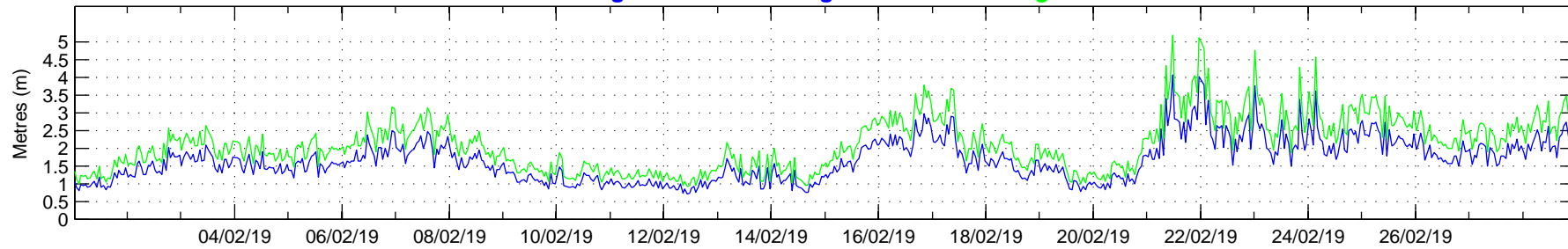
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: January 2019 (17-Jan-2019 to 31-Jan-2019)  
 Data source: ADCP1 Period 1  
 Data summary: January 2019  
 Number of Records: 350  
 Missing data (%): 0.00

**Key Data Statistics:**

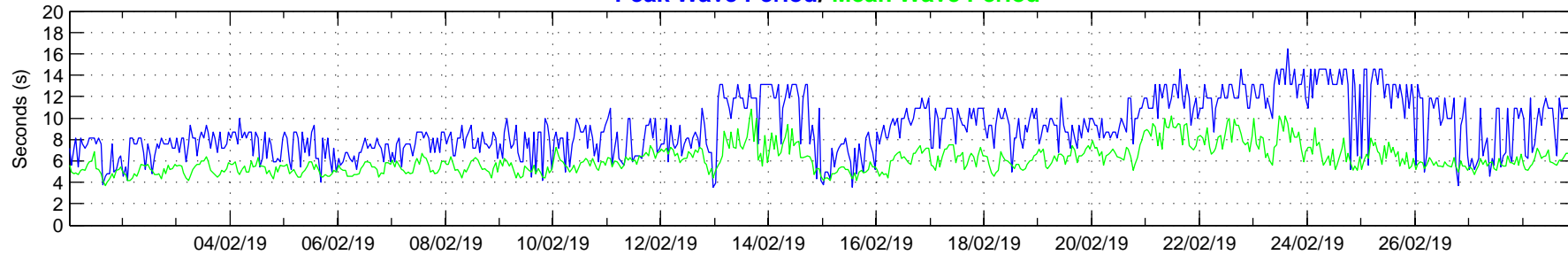
Max Hs: 1.87 m	Max Tp: 9.30 s
Mean Hs: 1.11 m	Mean Tp: 6.63 s
StdDev. Hs: 0.25 m	StdDev. Tp: 1.08 s

**Wave Summary January 2019**

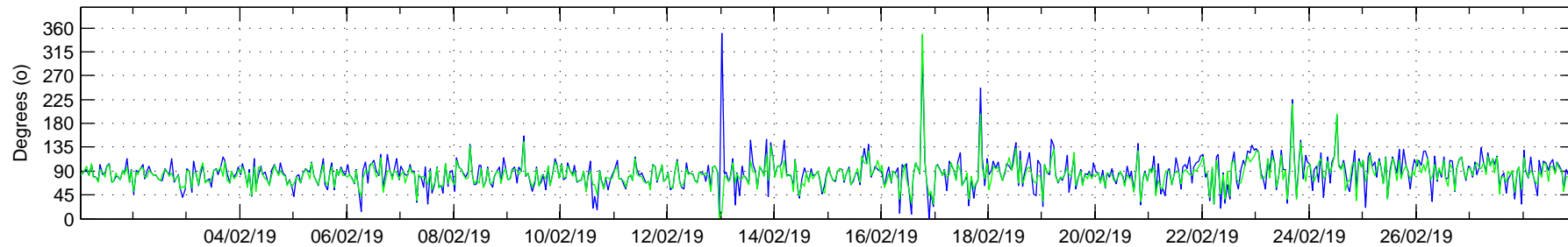
Significant Wave Height/ 1/10 Wave Height



Peak Wave Period/ Mean Wave Period



Peak Wave Direction/ Mean Wave Period



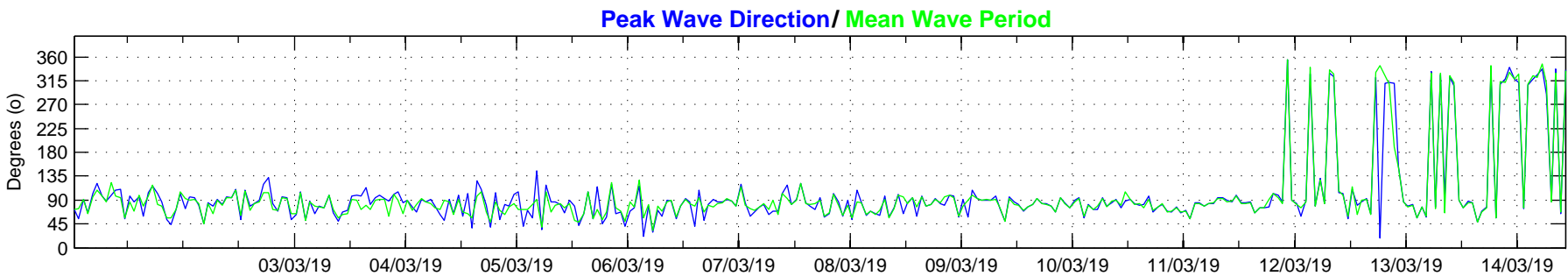
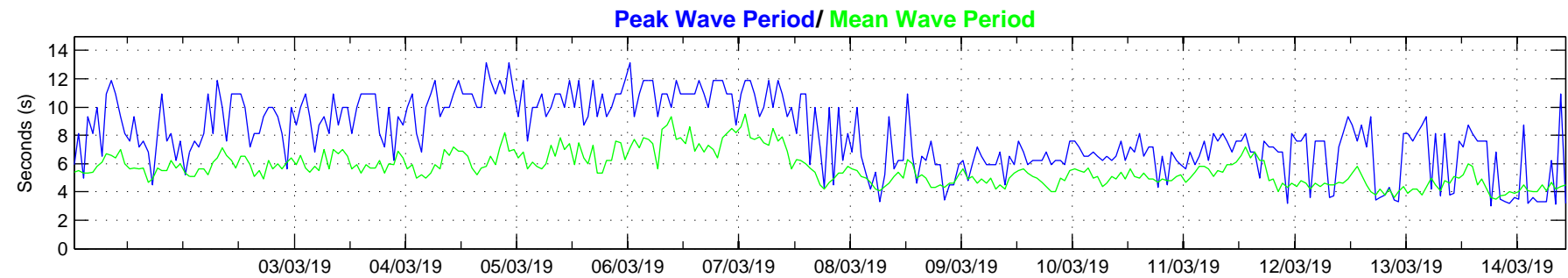
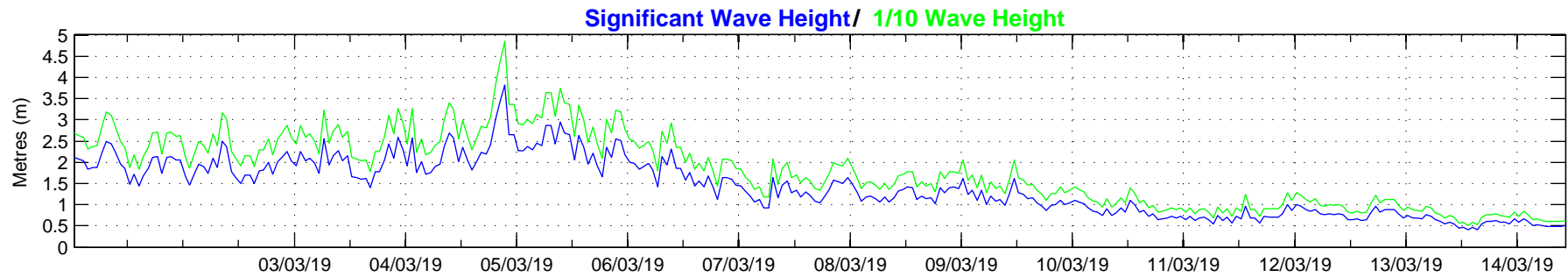
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: February 2019 (01-Feb-2019 to 28-Feb-2019)  
 Data source: ADCP1 Period 1  
 Data summary: February 2019  
 Number of Records: 672  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 4.07 m	Max Tp: 16.50 s
Mean Hs: 1.67 m	Mean Tp: 9.09 s
StdDev. Hs: 0.58 m	StdDev. Tp: 2.58 s

Wave Summary February 2019



**Data Information:**

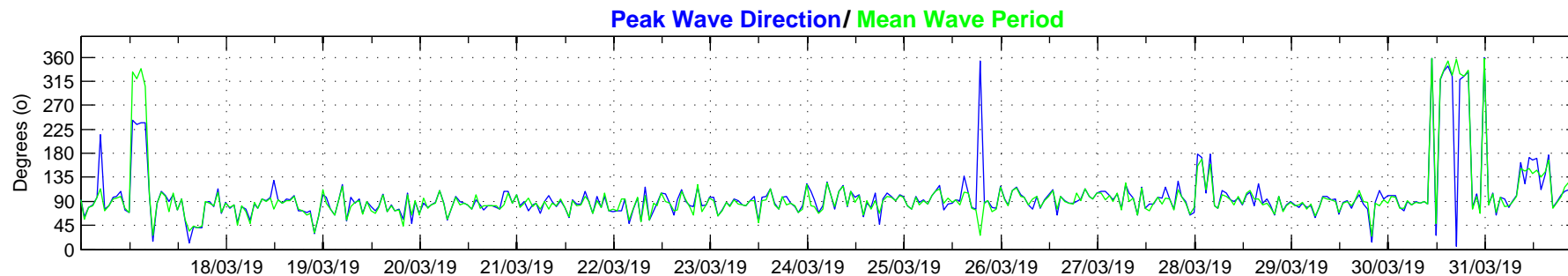
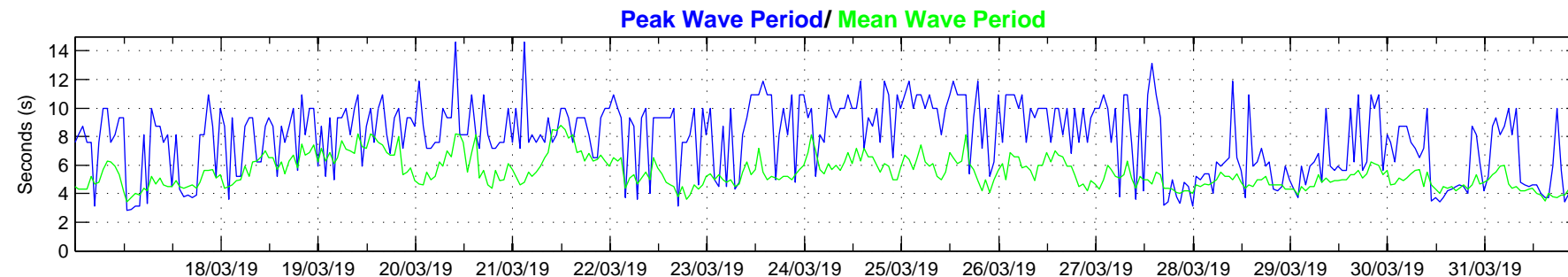
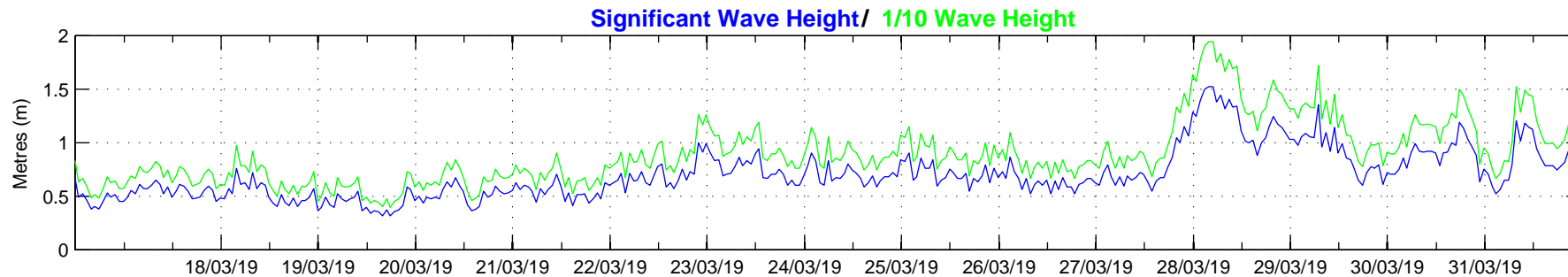
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period1 [151° 39.588E , 23° 06.017S]  
 Data period: March 2019 (01-Mar-2019 to 14-Mar-2019)  
 Data source: ADCP1 Period 1  
 Data summary: March 2019  
 Number of Records: 323  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.82 m	Max Tp: 13.10 s
Mean Hs: 1.42 m	Mean Tp: 8.05 s
StdDev. Hs: 0.66 m	StdDev. Tp: 2.47 s

**Wave Summary March 2019**





**Data Information:**

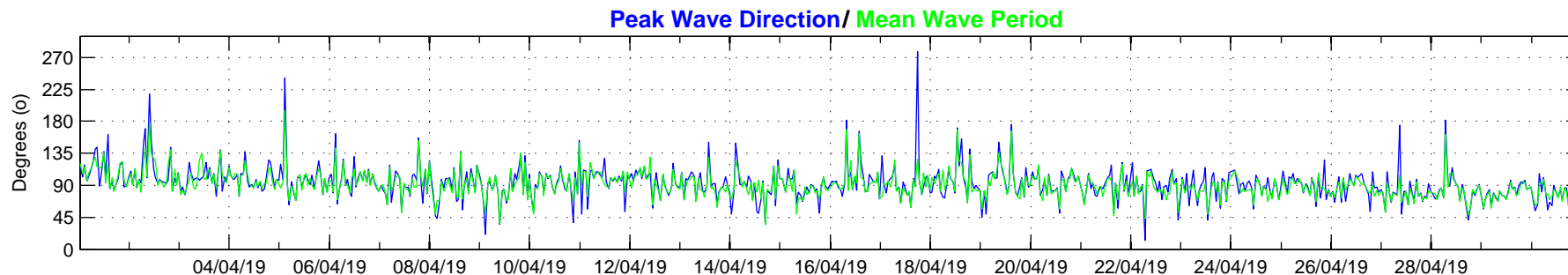
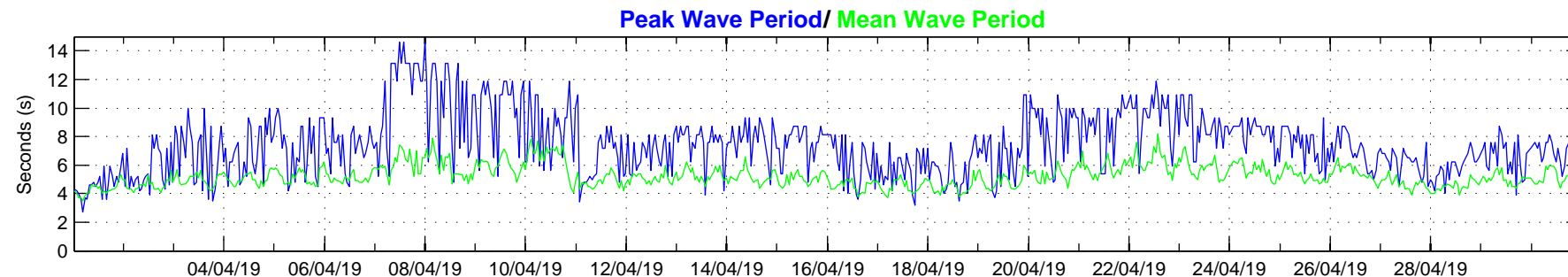
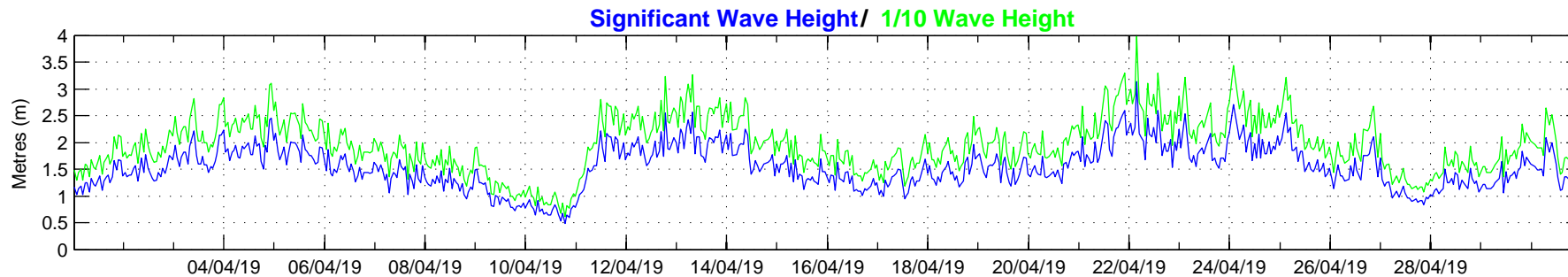
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: March 2019 (16-Mar-2019 to 31-Mar-2019)  
 Data source: ADCP1 Period 2  
 Data summary: March 2019  
 Number of Records: 373  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 1.52 m	Max Tp: 14.60 s
Mean Hs: 0.70 m	Mean Tp: 7.86 s
StdDev. Hs: 0.23 m	StdDev. Tp: 2.48 s

**Wave Summary March 2019**





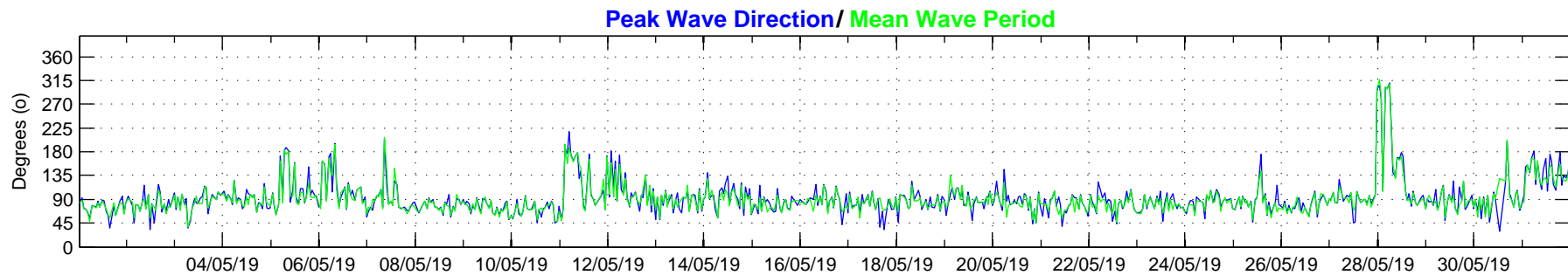
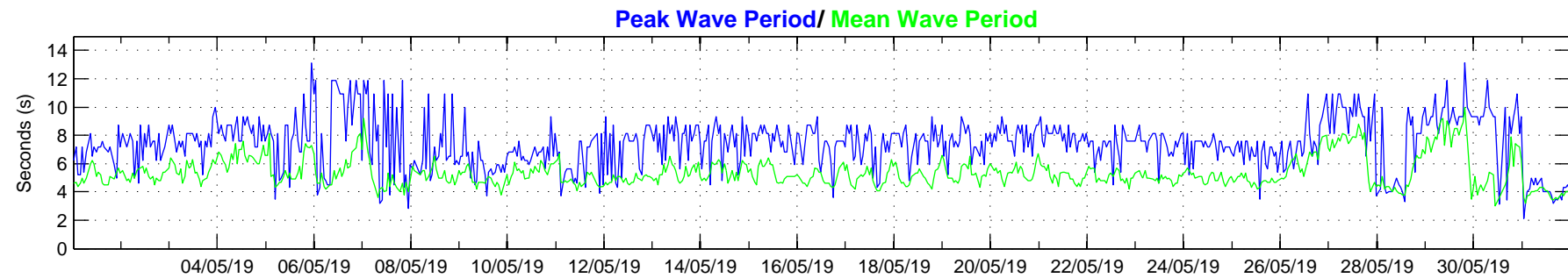
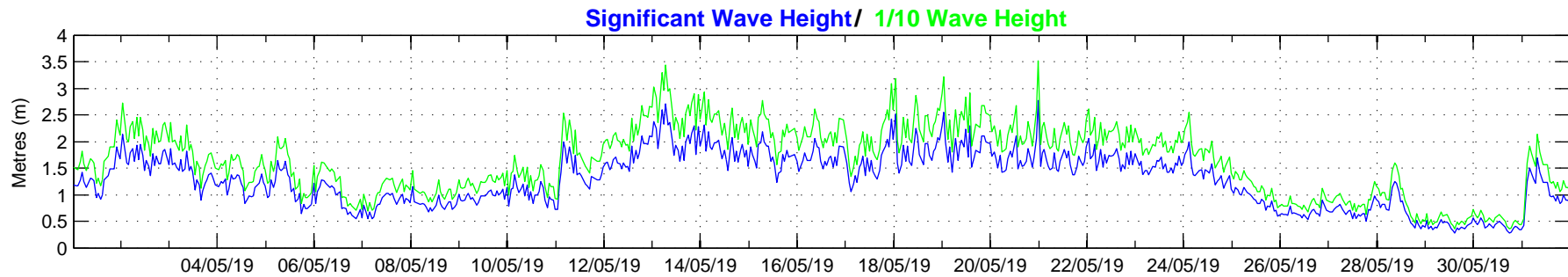
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: April 2019 (01-Apr-2019 to 30-Apr-2019)  
 Data source: ADCP1 Period 2  
 Data summary: April 2019  
 Number of Records: 699  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.14 m	Max Tp: 14.60 s
Mean Hs: 1.54 m	Mean Tp: 7.43 s
StdDev. Hs: 0.40 m	StdDev. Tp: 2.19 s

Wave Summary April 2019



**Data Information:**

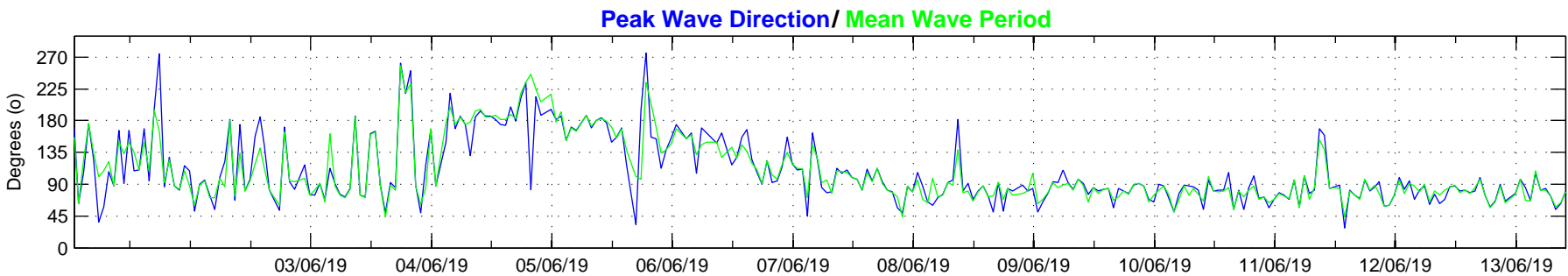
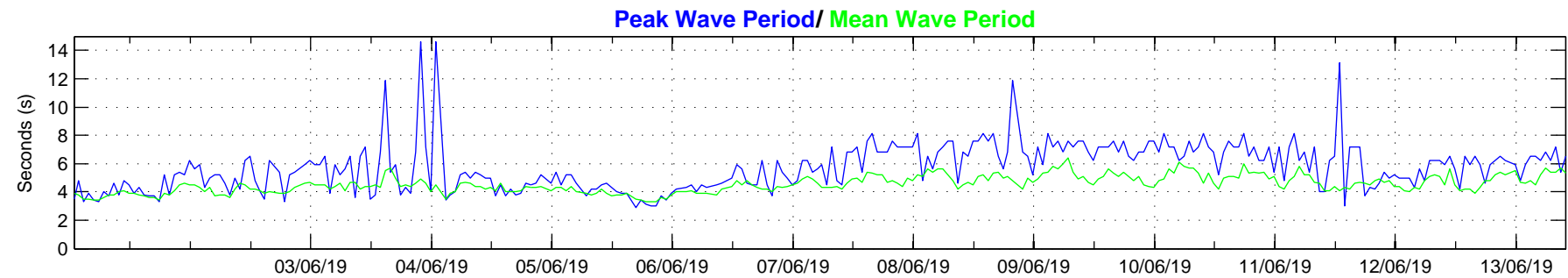
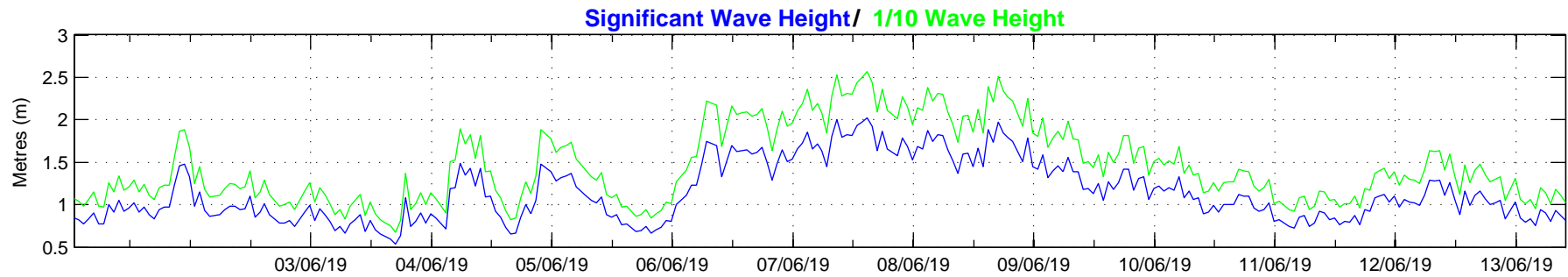
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: May 2019 (01-May-2019 to 31-May-2019)  
 Data source: ADCP1 Period 2  
 Data summary: May 2019  
 Number of Records: 707  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 2.77 m	Max Tp: 13.10 s
Mean Hs: 1.30 m	Mean Tp: 7.40 s
StdDev. Hs: 0.51 m	StdDev. Tp: 1.80 s

**Wave Summary May 2019**





**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period2 [151° 39.597E , 23° 06.030S]  
 Data period: June 2019 (01-Jun-2019 to 13-Jun-2019)  
 Data source: ADCP1 Period 2  
 Data summary: June 2019  
 Number of Records: 287  
 Missing data (%): 0.00

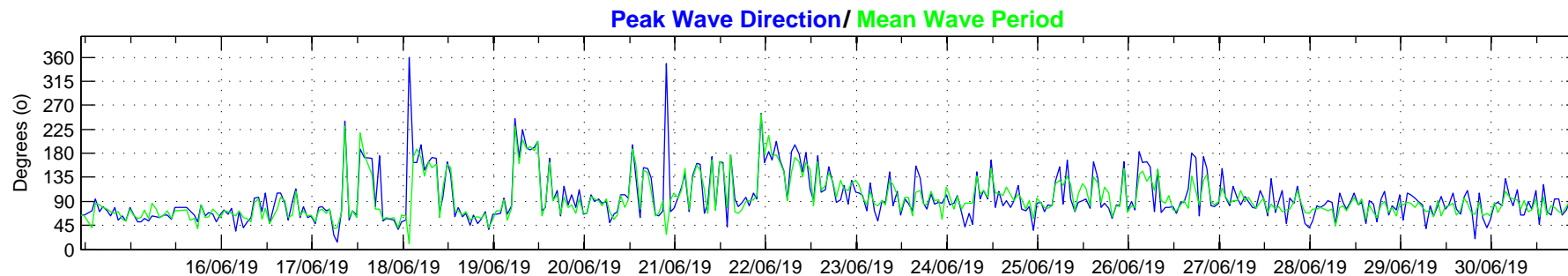
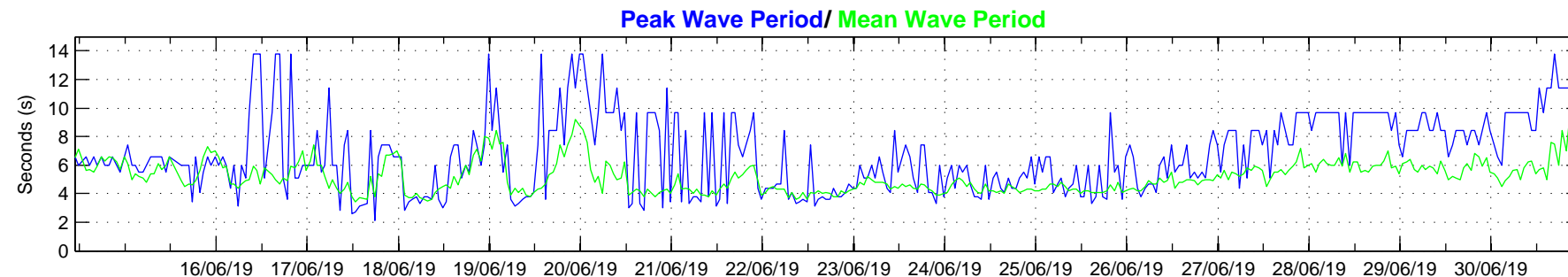
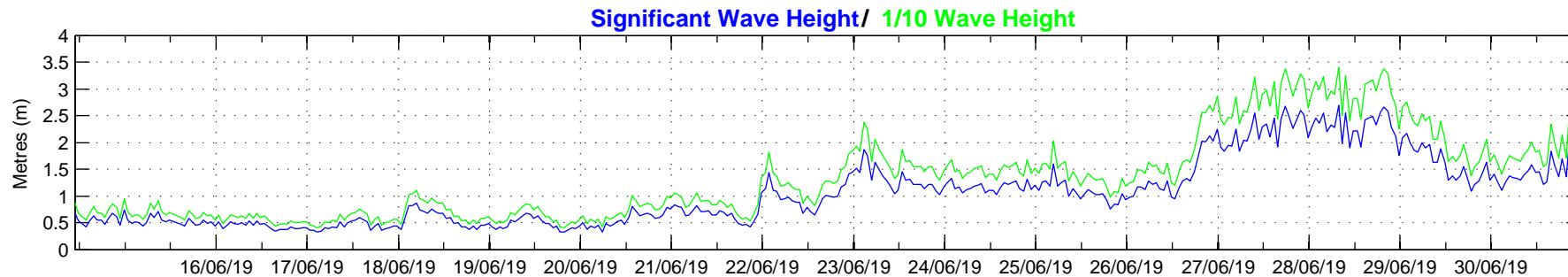
**Key Data Statistics:**

Max Hs: 2.02 m	Max Tp: 14.60 s
Mean Hs: 1.15 m	Mean Tp: 5.73 s
StdDev. Hs: 0.35 m	StdDev. Tp: 1.69 s

**Wave Summary June 2019**







**Data Information:**

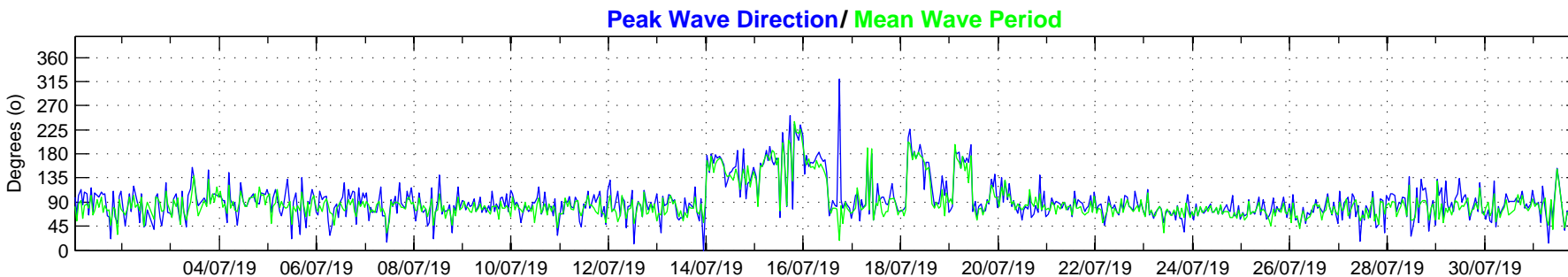
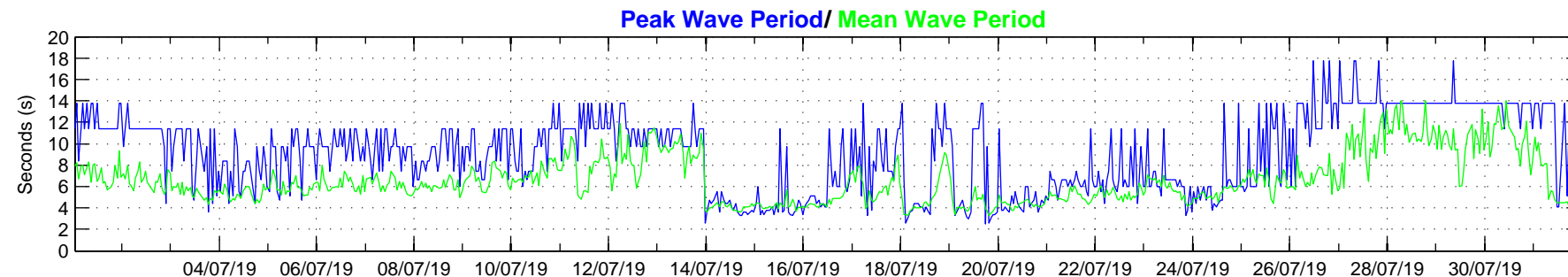
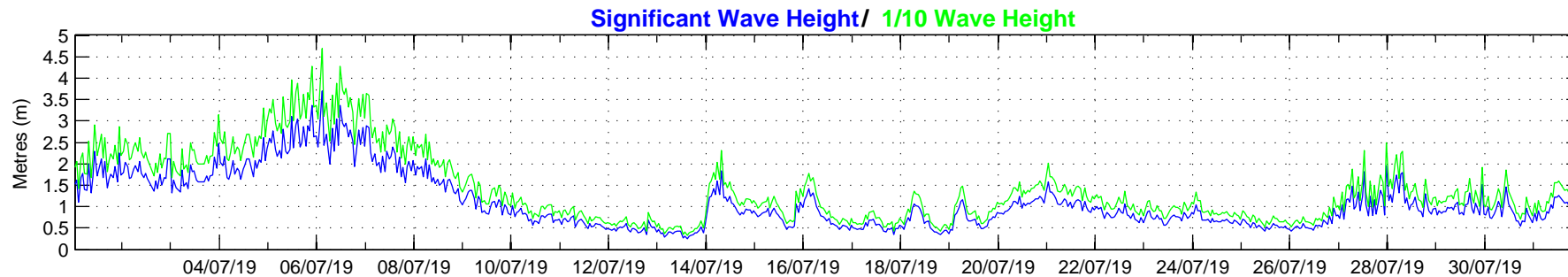
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
 Data period: June 2019 (14-Jun-2019 to 30-Jun-2019)  
 Data source: ADCP1 Period 3  
 Data summary: June 2019  
 Number of Records: 393  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 2.69 m	Max Tp: 13.80 s
Mean Hs: 1.07 m	Mean Tp: 6.81 s
StdDev. Hs: 0.62 m	StdDev. Tp: 2.65 s

**Wave Summary June 2019**





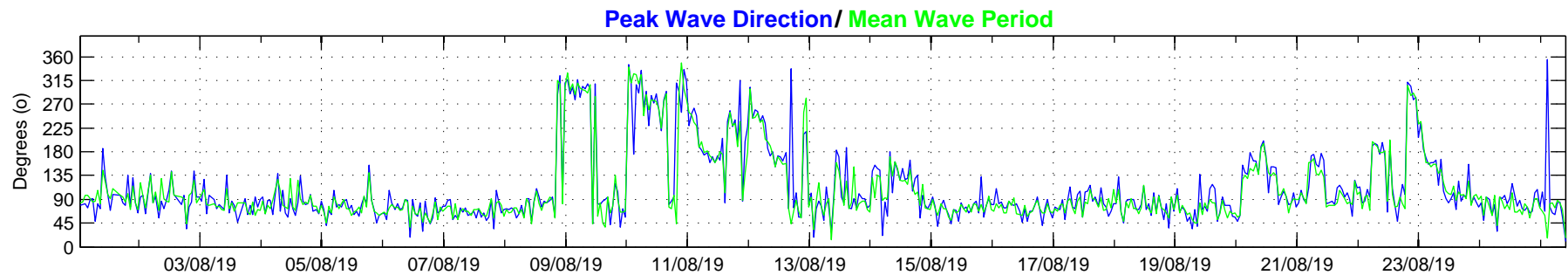
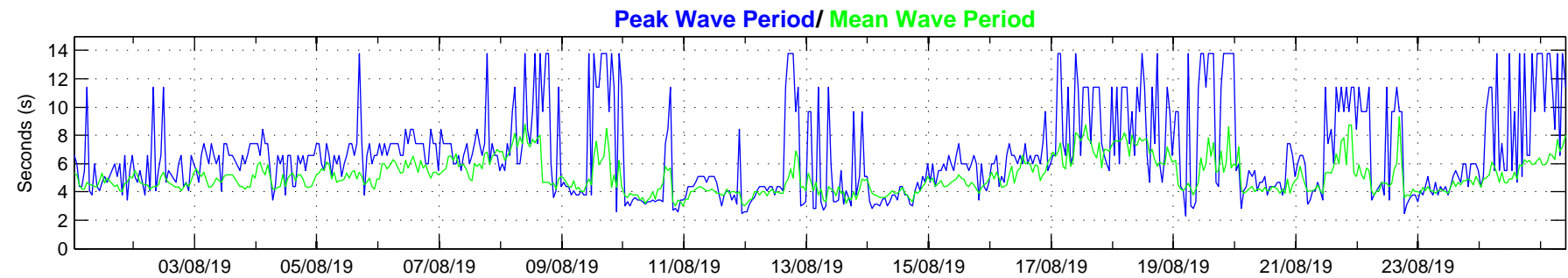
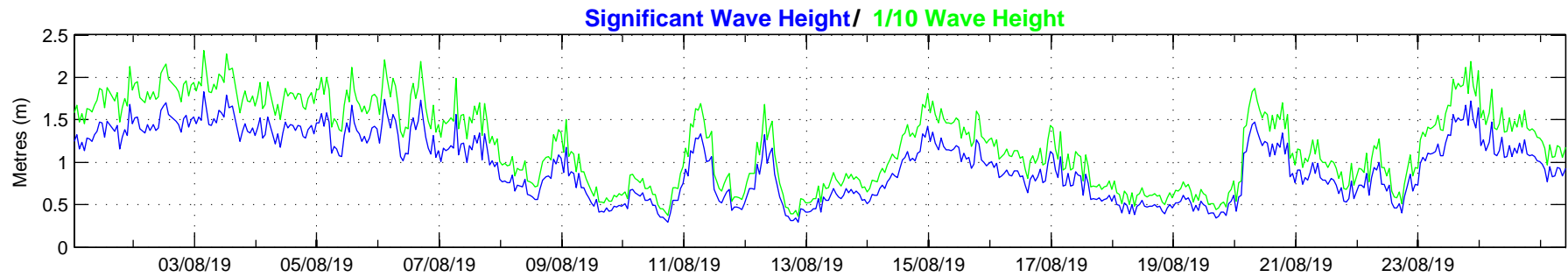
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
 Data period: July 2019 (01-Jul-2019 to 31-Jul-2019)  
 Data source: ADCP1 Period 3  
 Data summary: July 2019  
 Number of Records: 735  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.70 m	Max Tp: 17.70 s
Mean Hs: 1.11 m	Mean Tp: 9.14 s
StdDev. Hs: 0.63 m	StdDev. Tp: 3.58 s

**Wave Summary July 2019**



**Data Information:**


Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP1 Period3 [151° 39.602E , 23° 06.030S]  
 Data period: August 2019 (01-Aug-2019 to 25-Aug-2019)  
 Data source: ADCP1 Period 3  
 Data summary: August 2019  
 Number of Records: 577  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 1.83 m	Max Tp: 13.80 s
Mean Hs: 0.95 m	Mean Tp: 6.70 s
StdDev. Hs: 0.37 m	StdDev. Tp: 3.09 s

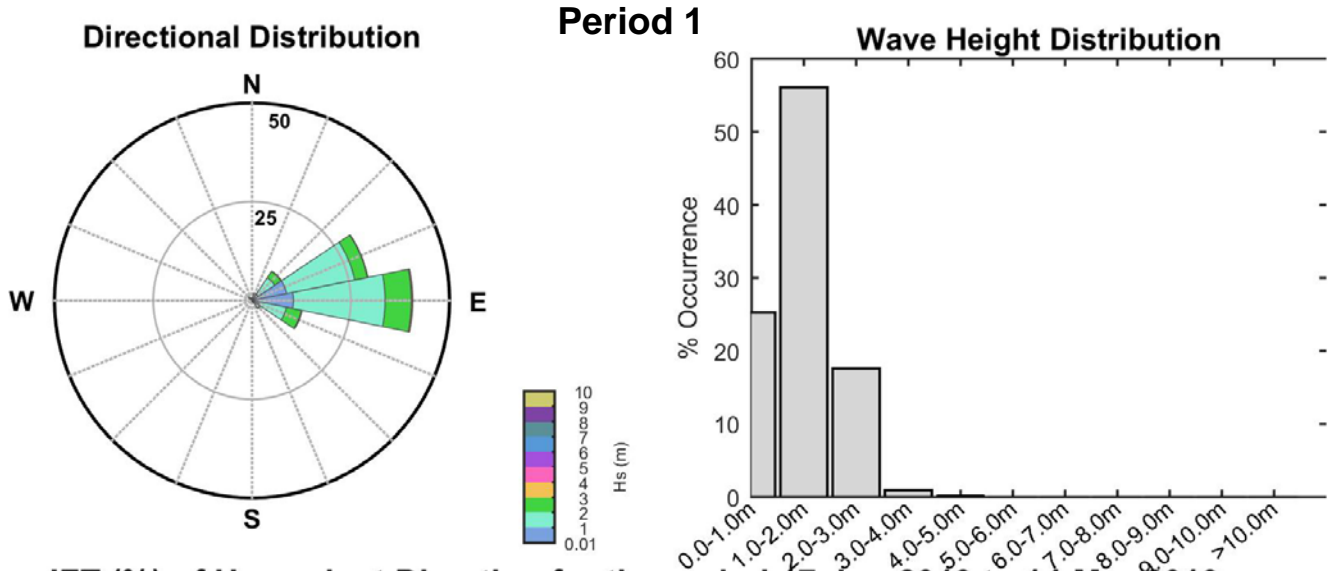
**Wave Summary August 2019**

**Advisian**  
 Worley Group



**Appendix G**  
**ADCP1: Wave Rose, Histogram and Joint  
Frequency Table Plots**

## Wave Height for ADCP1 Location



JFT (%) of Hs against Direction for the period 17-Jan-2019 to 14-Mar-2019

N=1345	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-1	-	0.22	1.86	8.92	10.48	1.71	0.07	0.22	-	-	-	-	-	0.07	1.12	0.59	25.28	100.00
1-2	0.30	1.19	5.06	17.55	23.20	7.14	1.19	0.22	-	0.07	0.07	0.07	-	-	-	-	56.06	74.72
2-3	0.15	0.52	1.93	3.27	6.62	3.87	1.19	-	-	-	-	-	-	-	0.07	-	17.62	18.66
3-4	-	-	0.15	0.15	0.30	0.15	0.07	0.07	-	-	-	-	-	-	-	-	0.89	1.04
4-5	-	-	-	-	0.07	0.07	-	-	-	-	-	-	-	-	-	-	0.15	0.15
5-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.45	1.93	9.00	29.89	40.67	12.94	2.53	0.52	-	0.07	0.07	0.07	-	0.07	1.19	0.59		
<b>Cumul.</b>	0.45	2.38	11.38	41.26	81.93	94.87	97.40	97.92	97.92	97.99	98.07	98.14	98.14	98.22	99.41	100.00		

\* denotes values less than 0.01% - denotes no records in bin

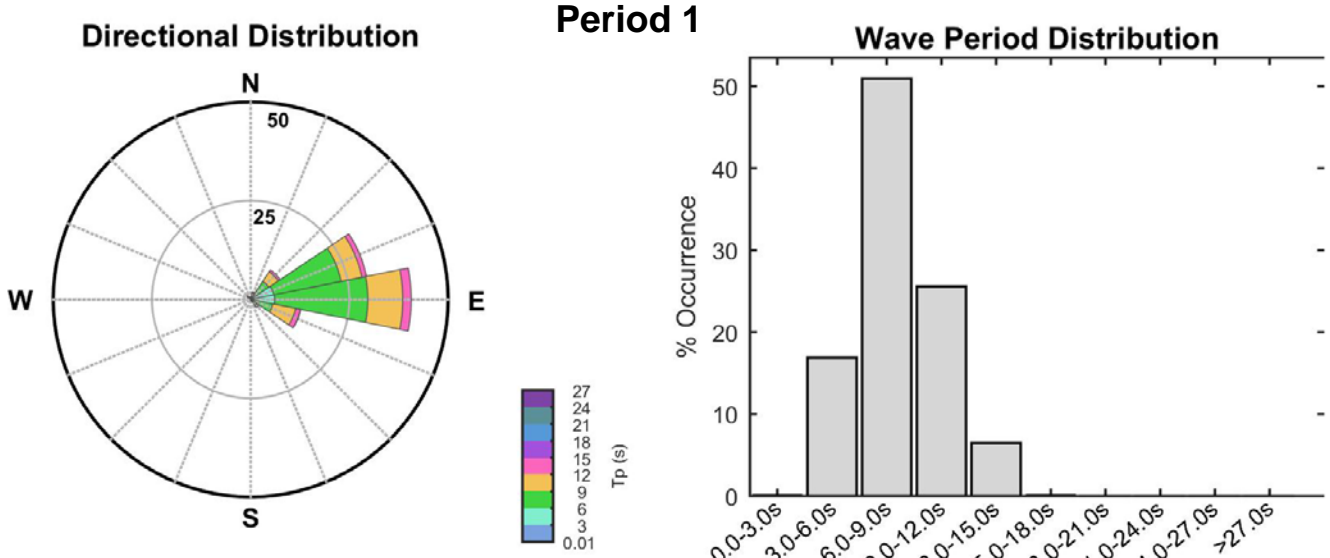
### Data Information:

Project: 301001-02112  
 Location: ADCP1 [151° 39.588 E , 23° 06.017' S ]  
 Data period: All data (17-Jan-2019 to 14-Mar-2019)  
 Data source: ADCP1 Period 1  
 Data summary: Complete  
 Number of Records: 1345  
 Missing data (%): 0.00  
 Calm (% < 0.01m): 0.00

### Key Data Statistics:

Max Hs: 4.07 m  
 Mean Hs: 1.46 m  
 StdDev. Hs: 0.59 m

## Wave Period for ADCP1 Location



**JFT (%) of Tp against Direction for the period 17-Jan-2019 to 14-Mar-2019**

N=1345	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07	100.00
3-6	0.22	0.45	1.34	5.95	6.10	0.74	0.30	0.07	-	-	-	-	-	0.07	1.12	0.52	16.88	99.93
6-9	-	0.37	4.16	17.40	23.57	4.98	0.37	0.07	-	-	-	-	-	-	-	-	50.93	83.05
9-12	0.22	0.89	2.90	5.35	8.85	5.87	1.19	0.15	-	-	-	0.07	-	-	0.07	-	25.58	32.12
12-15	-	0.22	0.59	1.19	2.16	1.26	0.67	0.22	-	0.07	0.07	-	-	-	-	-	6.47	6.54
15-18	-	-	-	-	-	0.07	-	-	-	-	-	-	-	-	-	-	0.07	0.07
18-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.45	1.93	9.00	29.89	40.67	12.94	2.53	0.52	-	0.07	0.07	0.07	-	0.07	1.19	0.59		
<b>Cumul.</b>	0.45	2.38	11.38	41.26	81.93	94.87	97.40	97.92	97.92	97.99	98.07	98.14	98.14	98.22	99.41	100.00		

\* denotes values less than 0.01% - denotes no records in bin

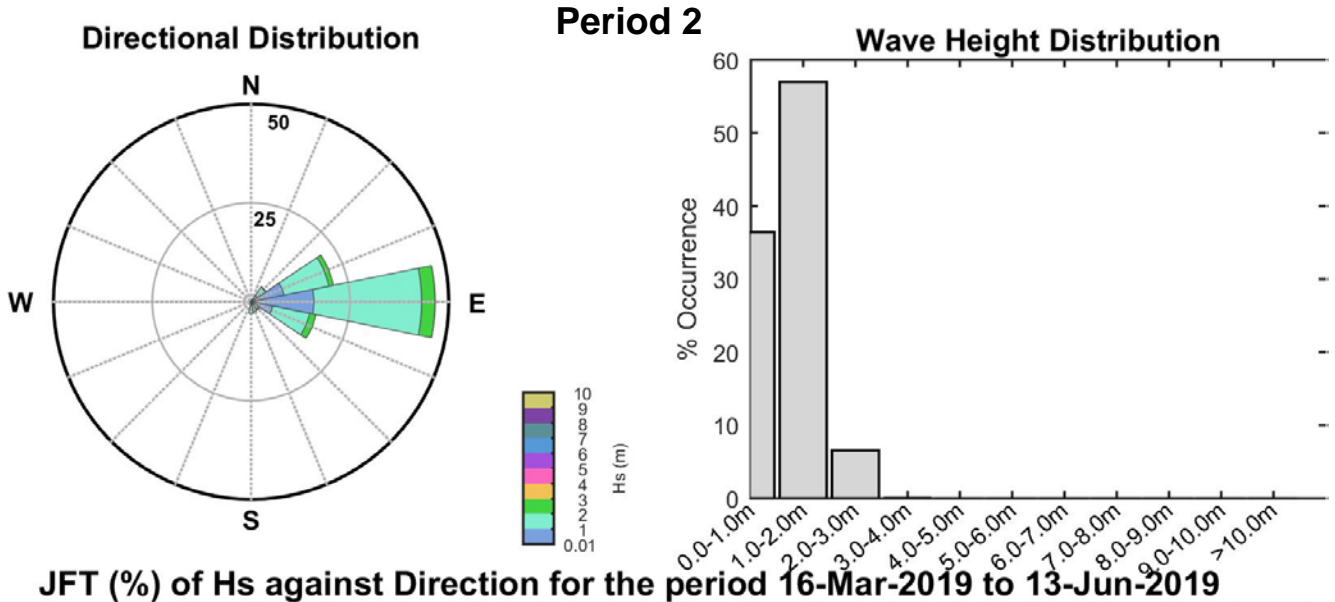
### Data Information:

Project: 301001-02112  
 Location: ADCP1 [151° 39.588 E , 23° 06.017' S ]  
 Data period: All data (17-Jan-2019 to 14-Mar-2019)  
 Data source: ADCP1 Period 1  
 Data summary: Complete  
 Number of Records: 1345  
 Missing data (%): 0.00

### Key Data Statistics:

Max Tp: 16.50 s  
 Mean Tp: 8.20 s  
 StdDev. Tp: 2.47 s

## Wave Height for ADCP1 Location



**JFT (%) of Hs against Direction for the period 16-Mar-2019 to 13-Jun-2019**

N=2066	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-1	0.19	0.39	1.89	8.47	15.88	5.57	0.77	0.92	1.06	0.29	0.15	0.19	0.19	0.15	0.19	0.10	36.40	100.00
1-2	-	0.15	2.52	11.57	27.25	9.49	1.65	1.74	1.98	0.15	0.24	0.05	0.05	-	0.10	0.05	56.97	63.60
2-3	-	0.05	0.19	1.16	3.39	1.65	0.15	-	-	-	-	-	-	-	-	-	6.58	6.63
3-4	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	0.05	0.05
4-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.19	0.58	4.60	21.20	46.56	16.70	2.57	2.66	3.05	0.44	0.39	0.24	0.24	0.15	0.29	0.15		
<b>Cumul.</b>	0.19	0.77	5.37	26.57	73.14	89.84	92.40	95.06	98.11	98.55	98.94	99.18	99.42	99.56	99.85	100.00		

\* denotes values less than 0.01% - denotes no records in bin

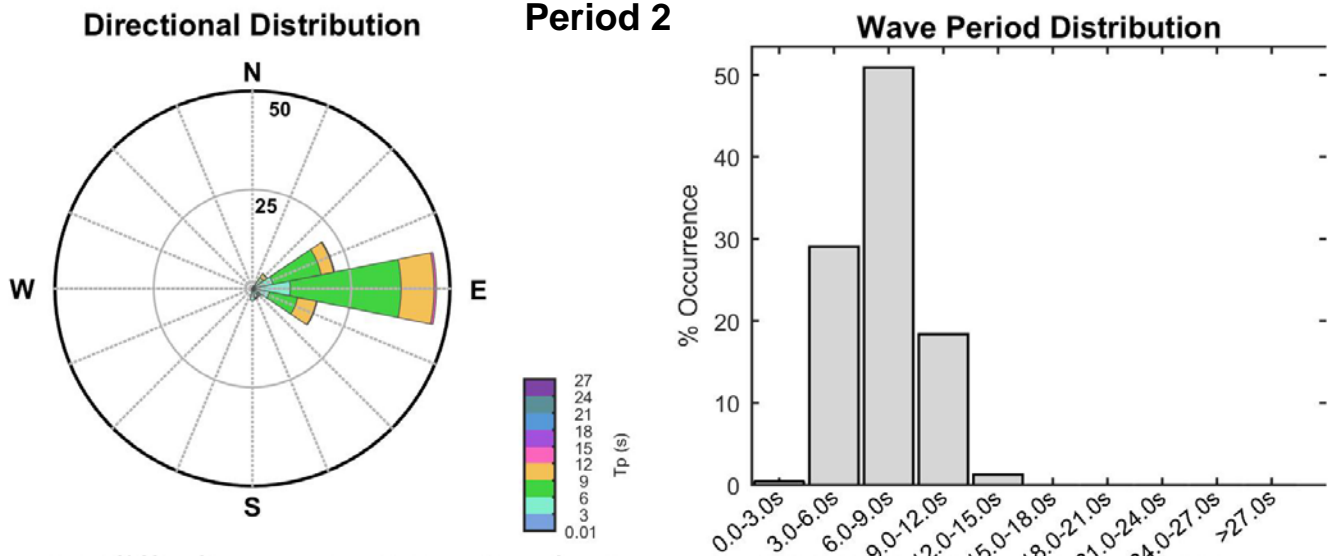
**Data Information:**

Project: 301001-02112  
 Location: ADCP1 [151° 39.597' E , 23° 06.030' S ]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP1 Period 2  
 Data summary: Complete  
 Number of Records: 2066  
 Missing data (%): 0.00  
 Calm (% < 0.01m): 0.00

**Key Data Statistics:**

Max Hs: 3.14 m  
 Mean Hs: 1.25 m  
 StdDev. Hs: 0.50 m

## Wave Period for ADCP1 Location



**JFT (%) of Tp against Direction for the period 16-Mar-2019 to 13-Jun-2019**

N=2066	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-3	-	0.10	-	-	0.10	0.05	-	0.10	-	-	0.05	0.05	-	-	-	-	0.44	100.00
3-6	0.15	0.19	0.77	5.28	9.49	4.36	1.69	2.32	3.05	0.44	0.34	0.15	0.24	0.15	0.29	0.15	29.04	99.56
6-9	-	0.10	2.57	12.44	28.03	7.26	0.44	0.05	-	-	-	-	-	-	-	-	50.87	70.52
9-12	0.05	0.19	1.11	3.24	8.37	4.84	0.39	0.15	-	-	-	0.05	-	-	-	-	18.39	19.65
12-15	-	-	0.15	0.24	0.58	0.19	0.05	0.05	-	-	-	-	-	-	-	-	1.26	1.26
15-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.19	0.58	4.60	21.20	46.56	16.70	2.57	2.66	3.05	0.44	0.39	0.24	0.24	0.15	0.29	0.15		
<b>Cumul.</b>	0.19	0.77	5.37	26.57	73.14	89.84	92.40	95.06	98.11	98.55	98.94	99.18	99.42	99.56	99.85	100.00		

\* denotes values less than 0.01%      - denotes no records in bin

**Data Information:**

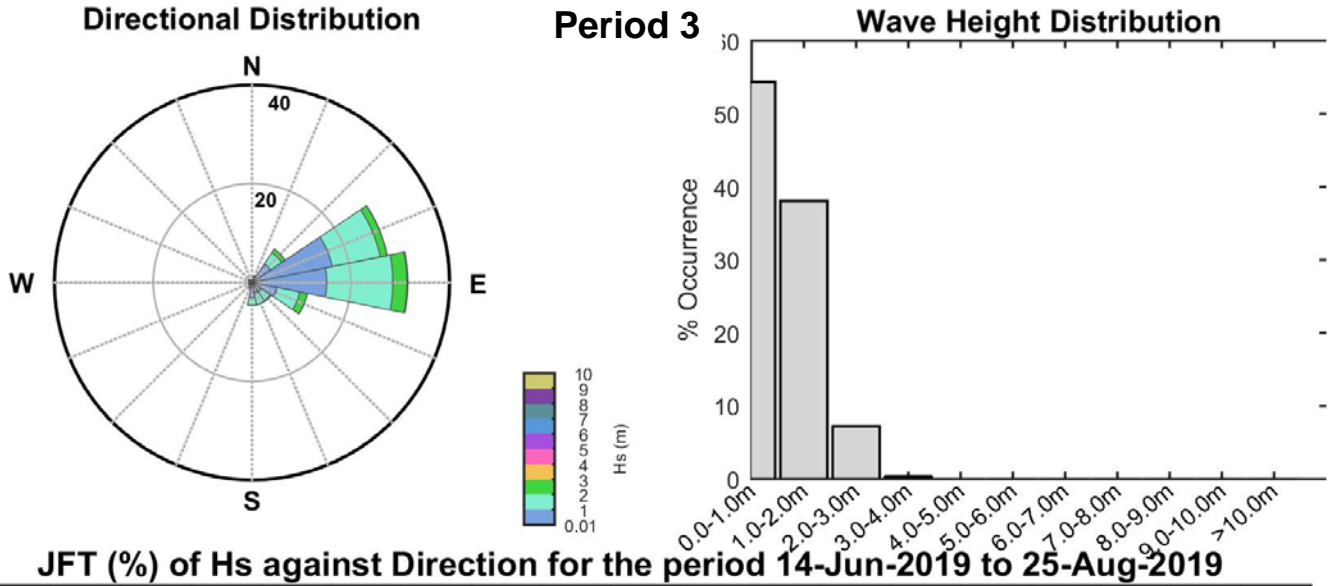
Project: 301001-02112  
 Location: ADCP1 [151° 39.597' E , 23° 06.030' S ]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP1 Period 2  
 Data summary: Complete  
 Number of Records: 2066  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Tp: 14.60 s  
 Mean Tp: 7.26 s  
 StdDev. Tp: 2.15 s



## Wave Height for ADCP1 Location



**JFT (%) of Hs against Direction for the period 14-Jun-2019 to 25-Aug-2019**

N=1705	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-1	0.23	0.65	4.52	16.54	15.13	5.16	2.17	2.11	3.05	1.17	0.65	0.76	0.41	0.70	0.82	0.29	54.37	100.00
1-2	-	0.53	2.70	9.91	13.37	4.69	2.23	2.46	1.58	0.12	0.18	0.06	0.06	0.12	0.06	-	38.06	45.63
2-3	-	0.12	0.88	1.41	2.87	1.52	0.29	0.06	0.06	-	-	-	-	-	-	-	7.21	7.57
3-4	-	0.06	-	0.06	0.18	0.06	-	-	-	-	-	-	-	-	-	-	0.35	0.35
4-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.23	1.35	8.09	27.92	31.55	11.44	4.69	4.63	4.69	1.29	0.82	0.82	0.47	0.82	0.88	0.29		
<b>Cumul.</b>	0.23	1.58	9.68	37.60	69.15	80.59	85.28	89.91	94.60	95.89	96.72	97.54	98.01	98.83	99.71	100.00		

\* denotes values less than 0.01% - denotes no records in bin

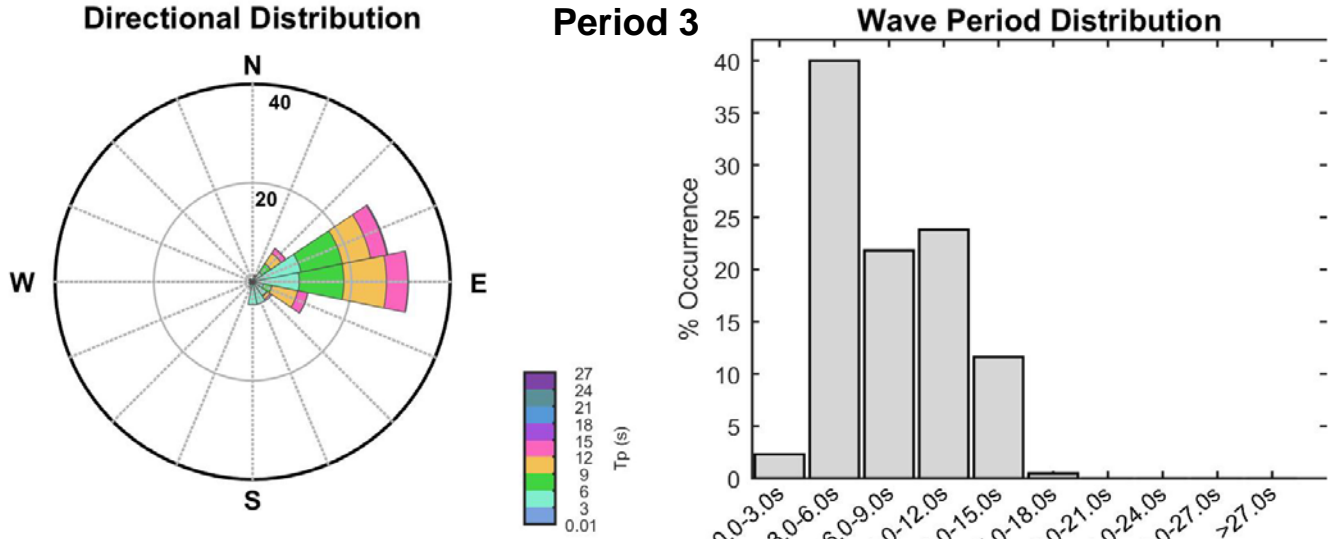
**Data Information:**

Project: 301001-02112  
 Location: ADCP1 [151° 39.602' E , 23° 06.030' S ]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP1 Period 3  
 Data summary: Complete  
 Number of Records: 1705  
 Missing data (%): 0.00  
 Calm (% < 0.01m): 0.00

**Key Data Statistics:**

Max Hs: 3.70 m  
 Mean Hs: 1.05 m  
 StdDev. Hs: 0.56 m

## Wave Period for ADCP1 Location



**JFT (%) of Tp against Direction for the period 14-Jun-2019 to 25-Aug-2019**

N=1705	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-3	0.06	0.06	0.18	0.35	0.35	0.06	0.06	0.29	0.23	0.18	0.06	0.12	-	0.12	0.06	0.12	2.29	100.00
3-6	-	0.06	2.17	9.62	9.09	2.17	3.40	4.34	4.46	1.11	0.76	0.70	0.47	0.70	0.82	0.12	40.00	97.71
6-9	-	0.29	2.05	8.56	9.03	1.76	0.12	-	-	-	-	-	-	-	-	-	21.82	57.71
9-12	0.12	0.70	2.52	5.81	8.62	5.34	0.70	-	-	-	-	-	-	-	-	-	23.81	35.89
12-15	0.06	0.23	1.11	3.34	4.34	2.05	0.41	-	-	-	-	-	-	-	-	0.06	11.61	12.08
15-18	-	-	0.06	0.23	0.12	0.06	-	-	-	-	-	-	-	-	-	-	0.47	0.47
18-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.23	1.35	8.09	27.92	31.55	11.44	4.69	4.63	4.69	1.29	0.82	0.82	0.47	0.82	0.88	0.29		
<b>Cumul.</b>	0.23	1.58	9.68	37.60	69.15	80.59	85.28	89.91	94.60	95.89	96.72	97.54	98.01	98.83	99.71	100.00		

\* denotes values less than 0.01%    - denotes no records in bin

**Data Information:**

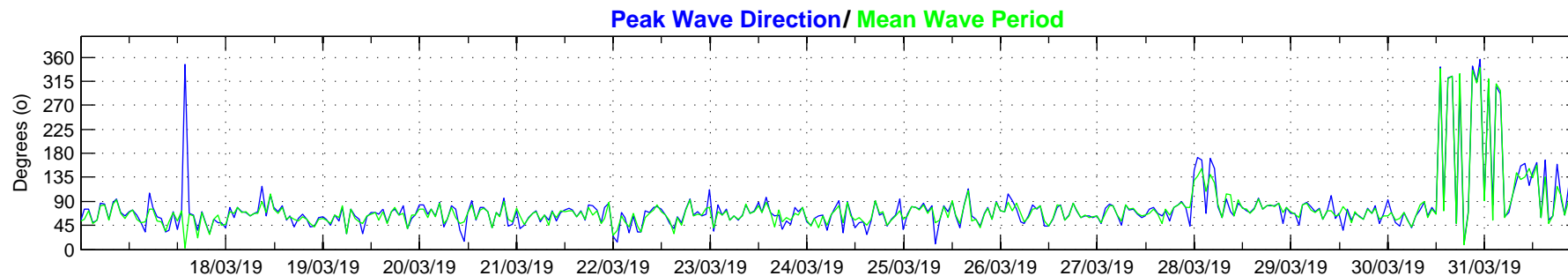
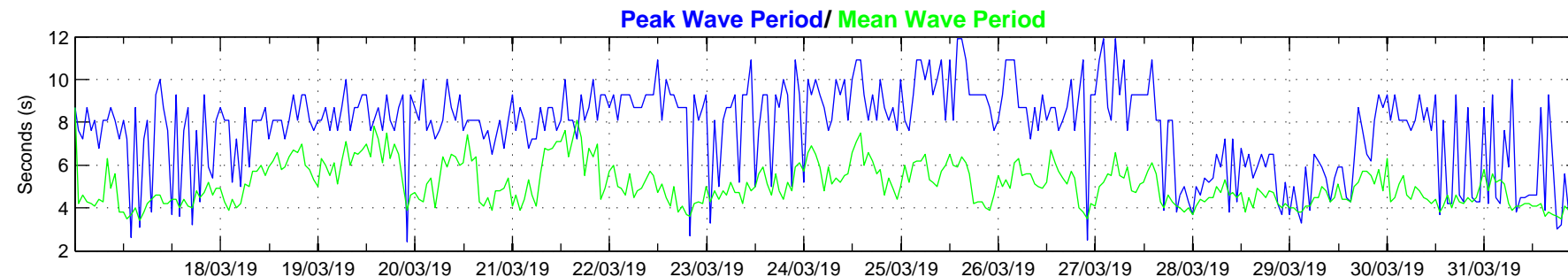
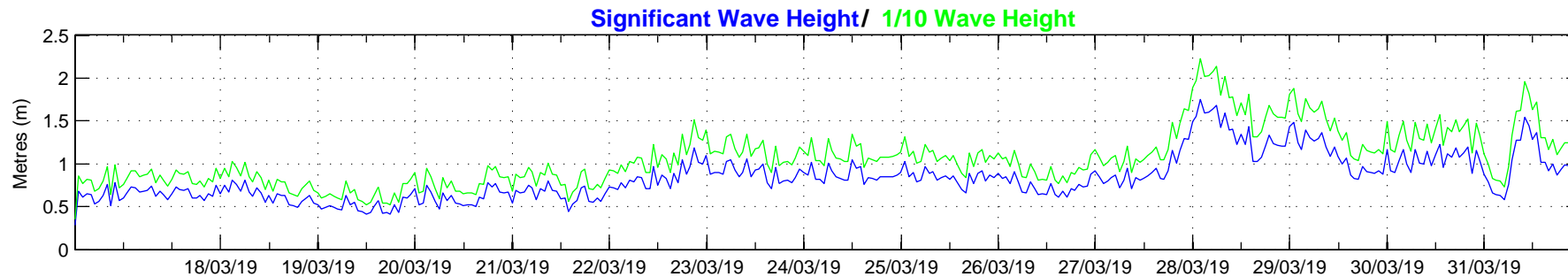
Project: 301001-02112  
 Location: ADCP1 [151° 39.602' E , 23° 06.030' S ]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP1 Period 3  
 Data summary: Complete  
 Number of Records: 1705  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Tp: 17.70 s  
 Mean Tp: 7.78 s  
 StdDev. Tp: 3.43 s



**Appendix H**  
**ADCP2: Wave Time Series Plots**



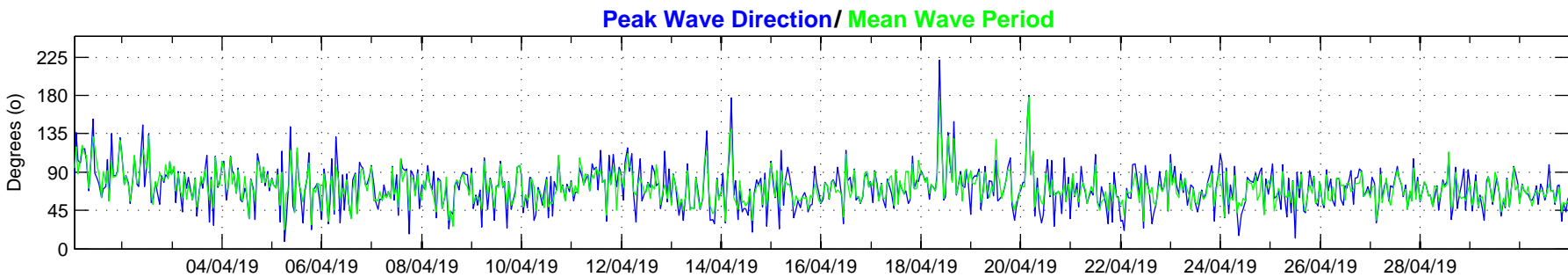
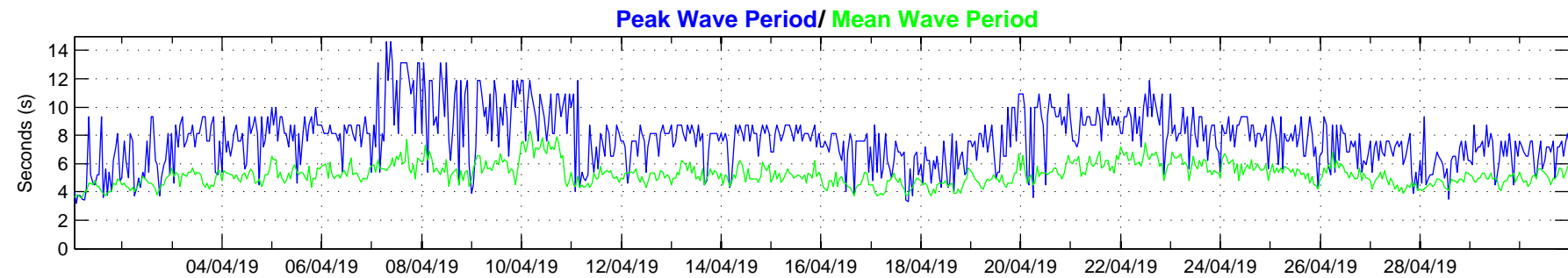
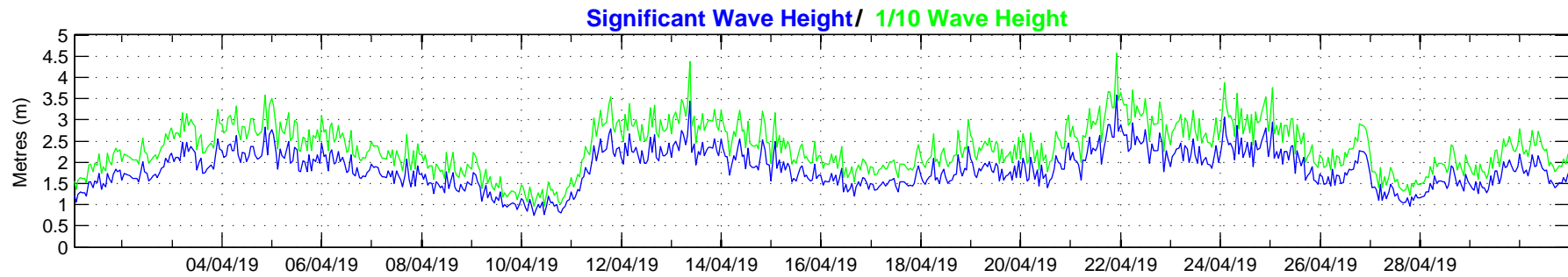
**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: March 2019 (16-Mar-2019 to 31-Mar-2019)  
 Data source: AWAC  
 Data summary: March 2019  
 Number of Records: 373  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 1.75 m	Max Tp: 11.90 s
Mean Hs: 0.84 m	Mean Tp: 7.72 s
StdDev. Hs: 0.26 m	StdDev. Tp: 2.03 s

**Wave Summary March 2019**



**Data Information:**

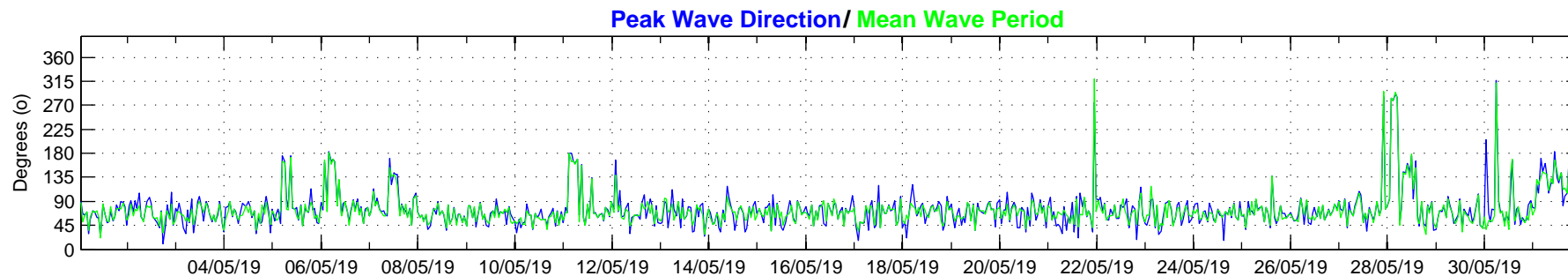
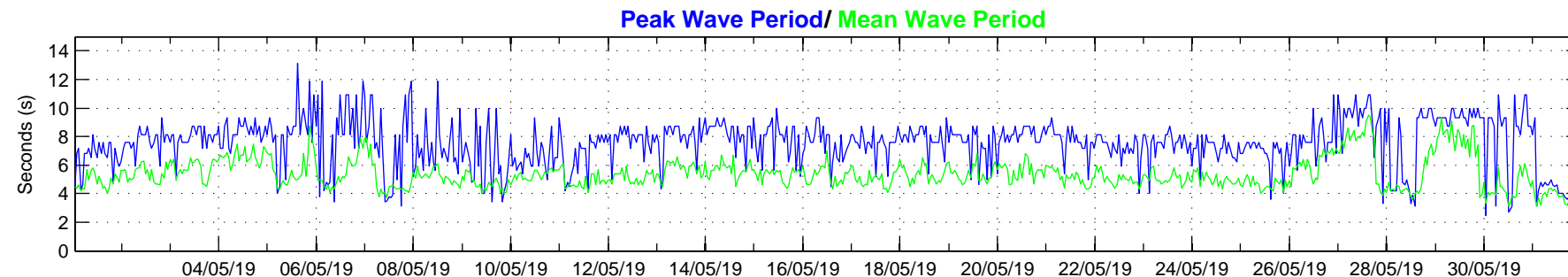
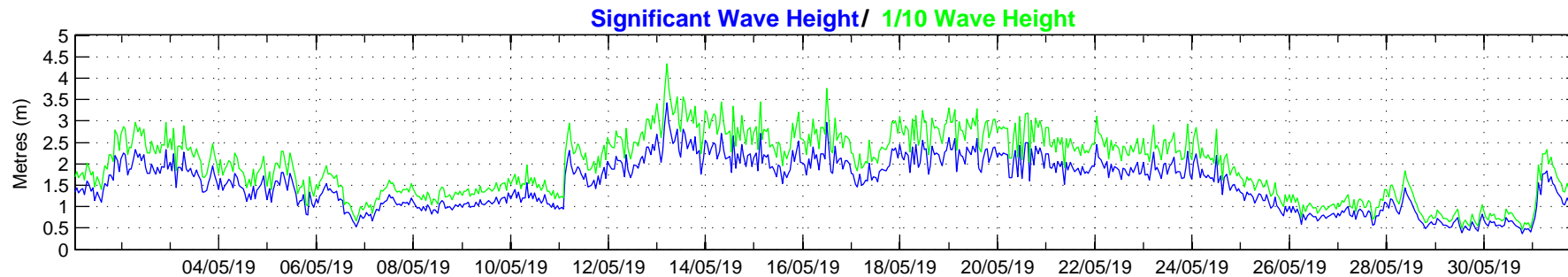
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: April 2019 (01-Apr-2019 to 30-Apr-2019)  
 Data source: AWAC  
 Data summary: April 2019  
 Number of Records: 720  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.59 m	Max Tp: 14.60 s
Mean Hs: 1.84 m	Mean Tp: 7.74 s
StdDev. Hs: 0.45 m	StdDev. Tp: 1.95 s

**Wave Summary April 2019**





**Data Information:**

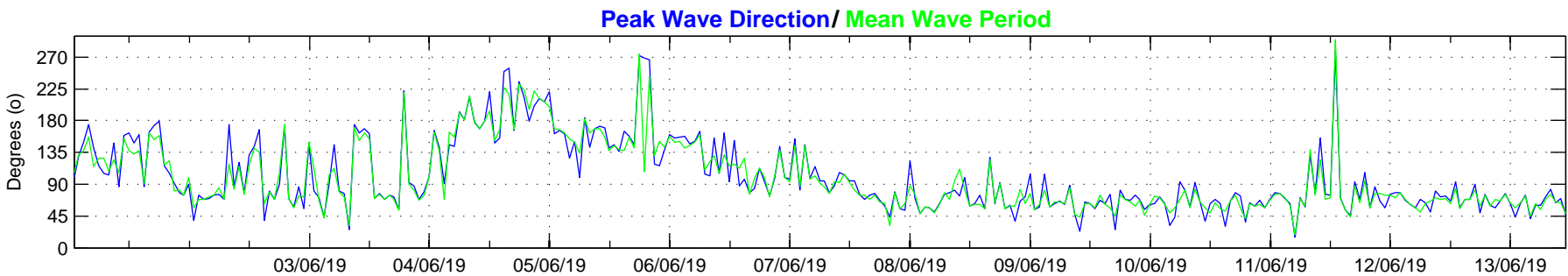
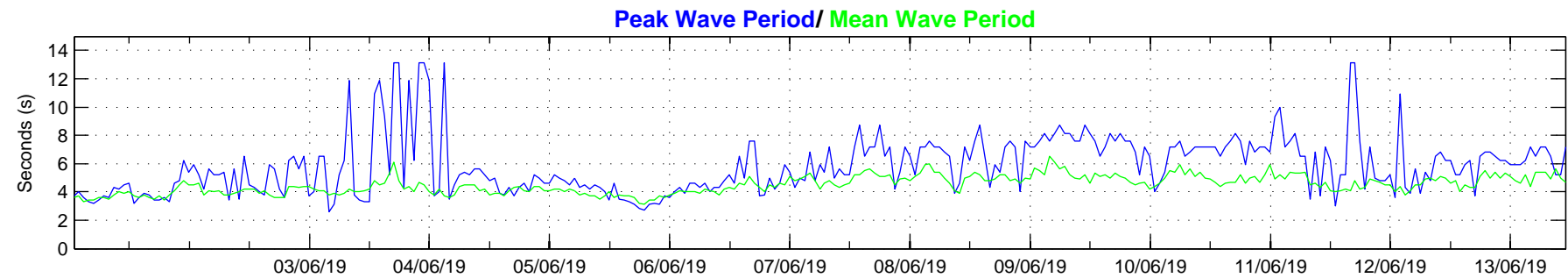
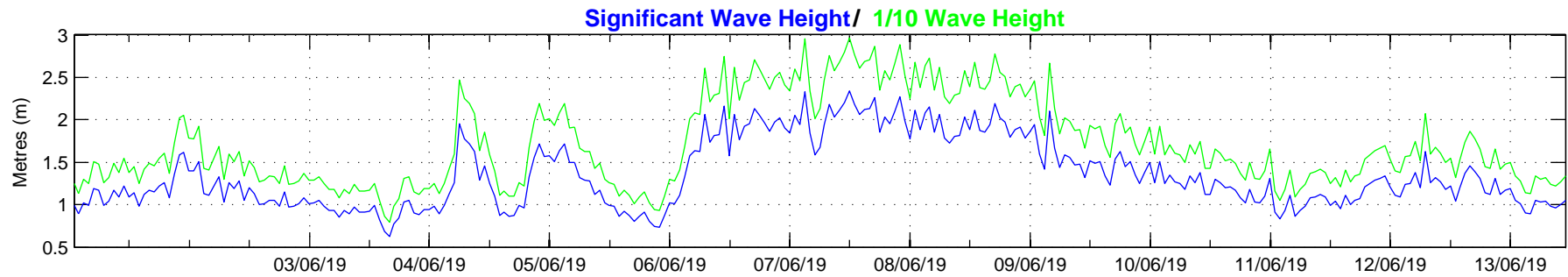
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: May 2019 (01-May-2019 to 31-May-2019)  
 Data source: AWAC  
 Data summary: May 2019  
 Number of Records: 744  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.42 m	Max Tp: 13.10 s
Mean Hs: 1.54 m	Mean Tp: 7.54 s
StdDev. Hs: 0.58 m	StdDev. Tp: 1.69 s

**Wave Summary May 2019**





**Data Information:**

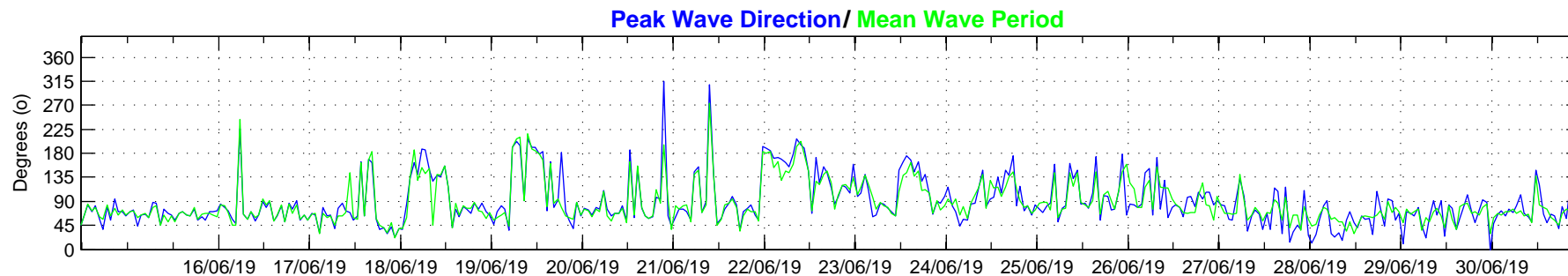
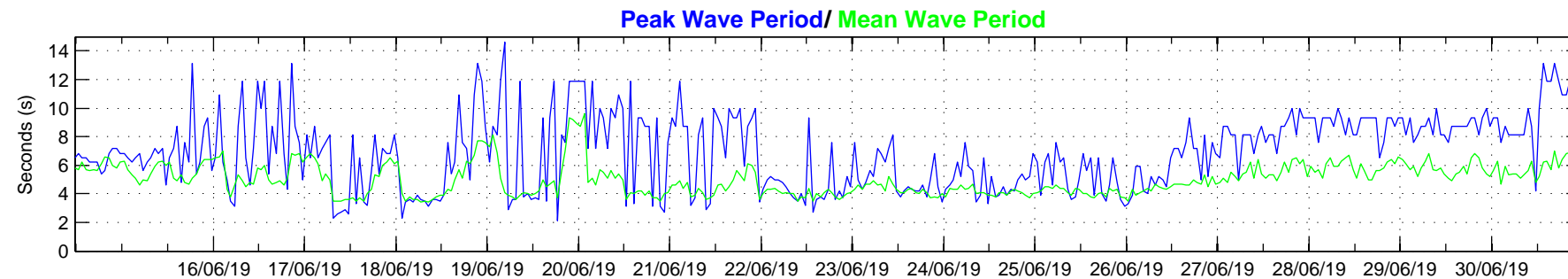
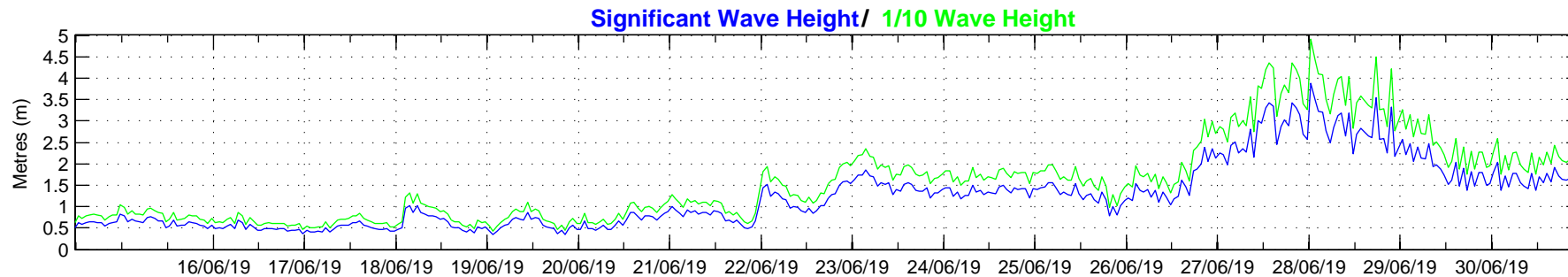
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period2 [151° 39.132E , 23° 05.730S]  
 Data period: June 2019 (01-Jun-2019 to 13-Jun-2019)  
 Data source: AWAC  
 Data summary: June 2019  
 Number of Records: 299  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 2.34 m	Max Tp: 13.10 s
Mean Hs: 1.35 m	Mean Tp: 5.85 s
StdDev. Hs: 0.40 m	StdDev. Tp: 2.08 s

**Wave Summary June 2019**





**Data Information:**

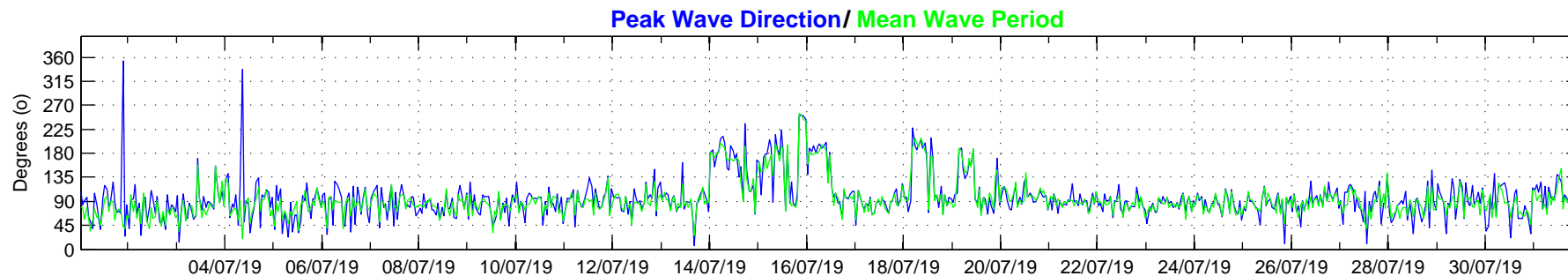
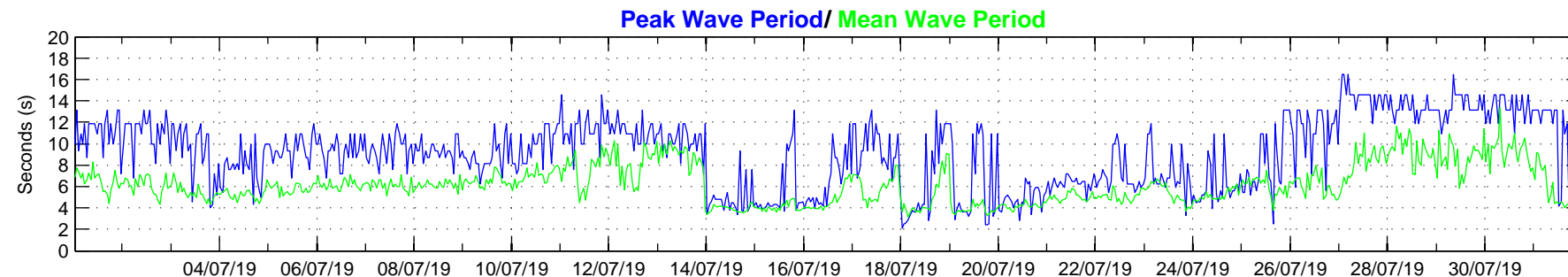
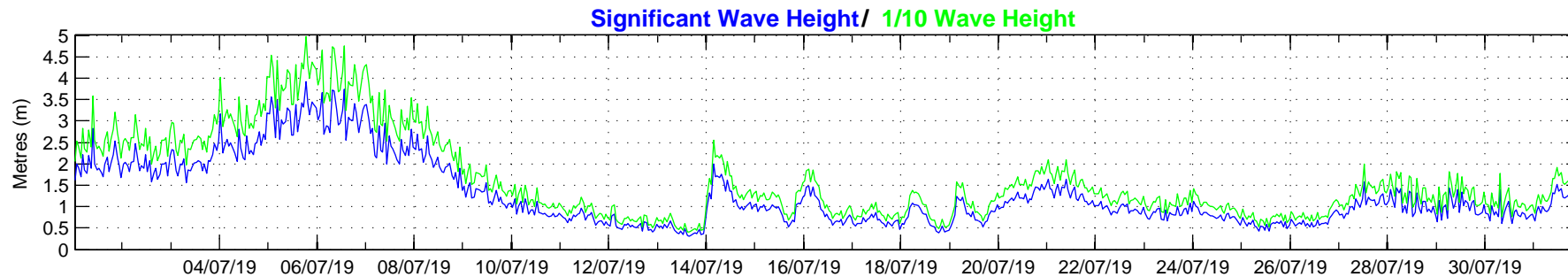
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
 Data period: June 2019 (14-Jun-2019 to 30-Jun-2019)  
 Data source: AWAC  
 Data summary: June 2019  
 Number of Records: 397  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.87 m	Max Tp: 14.60 s
Mean Hs: 1.25 m	Mean Tp: 6.94 s
StdDev. Hs: 0.76 m	StdDev. Tp: 2.60 s

Wave Summary June 2019





**Data Information:**

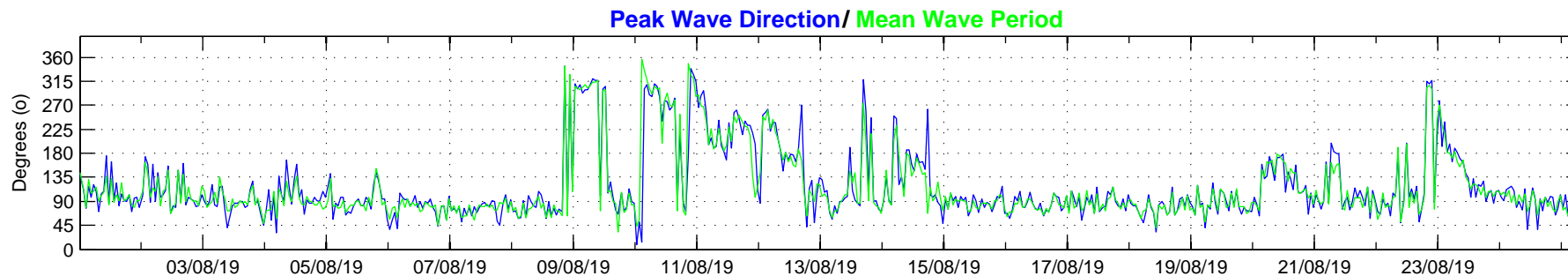
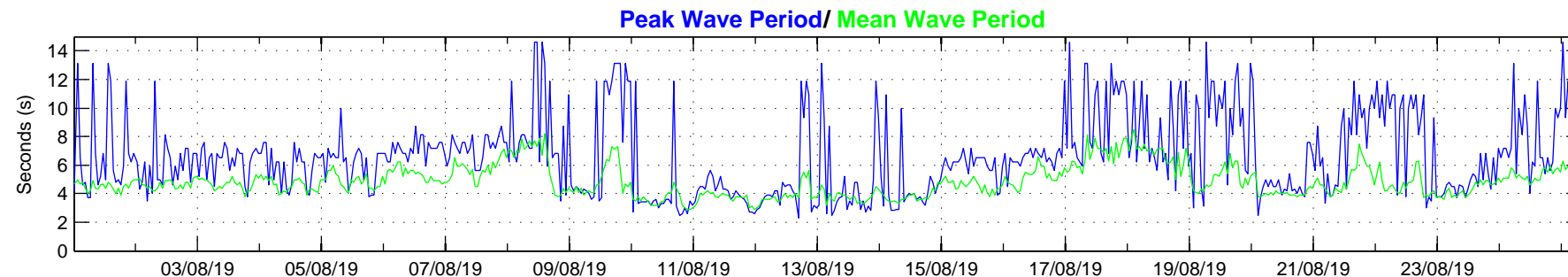
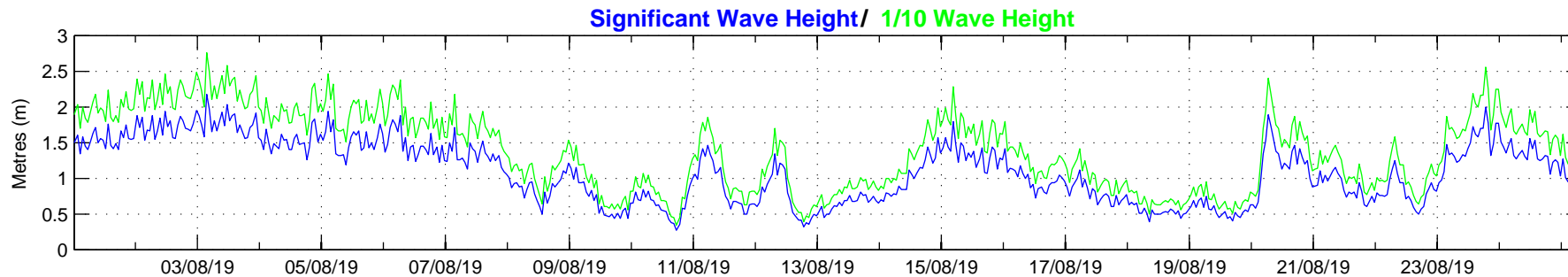
Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
 Data period: July 2019 (01-Jul-2019 to 31-Jul-2019)  
 Data source: AWAC  
 Data summary: July 2019  
 Number of Records: 744  
 Missing data (%): 0.00

**Key Data Statistics:**

Max Hs: 3.92 m	Max Tp: 16.50 s
Mean Hs: 1.29 m	Mean Tp: 9.17 s
StdDev. Hs: 0.76 m	StdDev. Tp: 3.25 s

**Wave Summary July 2019**





**Data Information:**

Project: 301001-02112 Douglas Shoal Remediation Project  
 Location: ADCP2 Period3 [151° 39.140E , 23° 05.734S]  
 Data period: August 2019 (01-Aug-2019 to 25-Aug-2019)  
 Data source: AWAC  
 Data summary: August 2019  
 Number of Records: 584  
 Missing data (%): 0.00

**Key Data Statistics:**

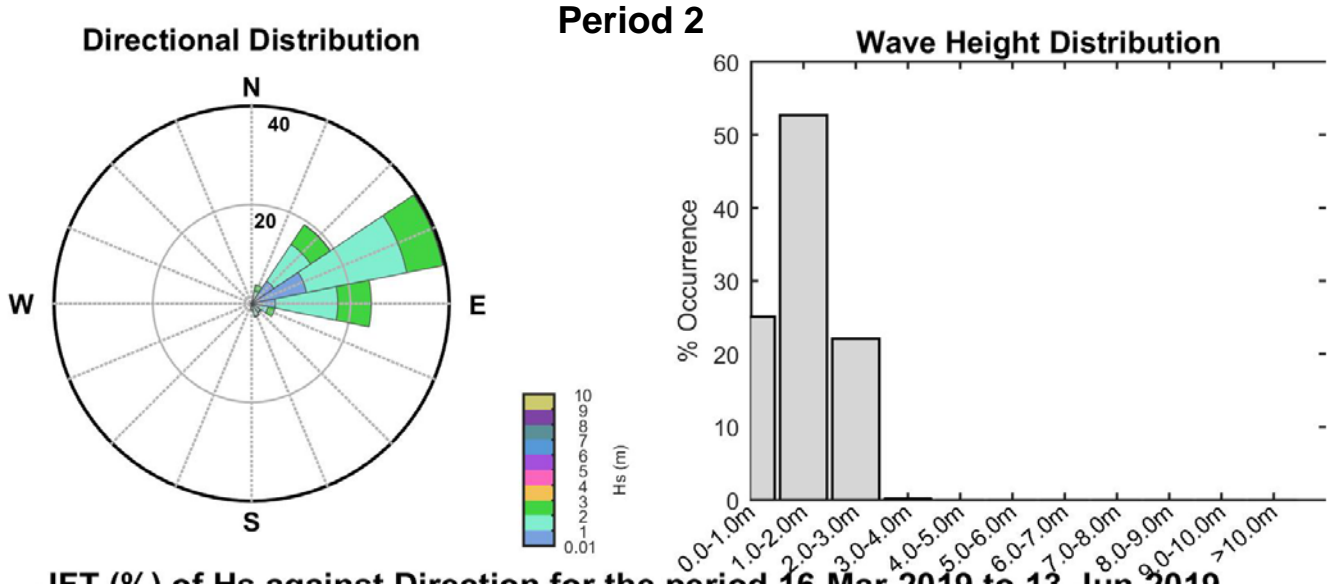
Max Hs: 2.17 m	Max Tp: 14.60 s
Mean Hs: 1.09 m	Mean Tp: 6.63 s
StdDev. Hs: 0.42 m	StdDev. Tp: 2.82 s

**Wave Summary August 2019**



**Appendix I**  
**ADCP2: Wave Rose, Histogram and Joint**  
**Frequency Table Plots**

## Wave Height for ADCP2 Location



**JFT (%) of Hs against Direction for the period 16-Mar-2019 to 13-Jun-2019**

N=2140	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-1	0.05	0.80	5.43	11.32	4.82	0.80	0.42	0.61	0.09	0.09	0.05	0.09	0.14	0.14	0.14	0.09	25.08	100.00
1-2	0.14	1.82	8.94	20.68	12.63	2.62	1.68	2.06	1.22	0.19	0.23	-	0.14	0.14	0.14	0.05	52.69	74.92
2-3	0.05	1.22	4.73	7.44	6.79	1.40	0.19	0.19	0.05	-	-	-	-	-	-	-	22.04	22.23
3-4	-	-	0.09	0.09	-	-	-	-	-	-	-	-	-	-	-	-	0.19	0.19
4-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.23	3.84	19.19	39.54	24.24	4.82	2.29	2.85	1.36	0.28	0.28	0.09	0.28	0.28	0.28	0.14		
<b>Cumul.</b>	0.23	4.07	23.26	62.80	87.04	91.86	94.15	97.01	98.36	98.64	98.92	99.02	99.30	99.58	99.86	100.00		

\* denotes values less than 0.01% - denotes no records in bin

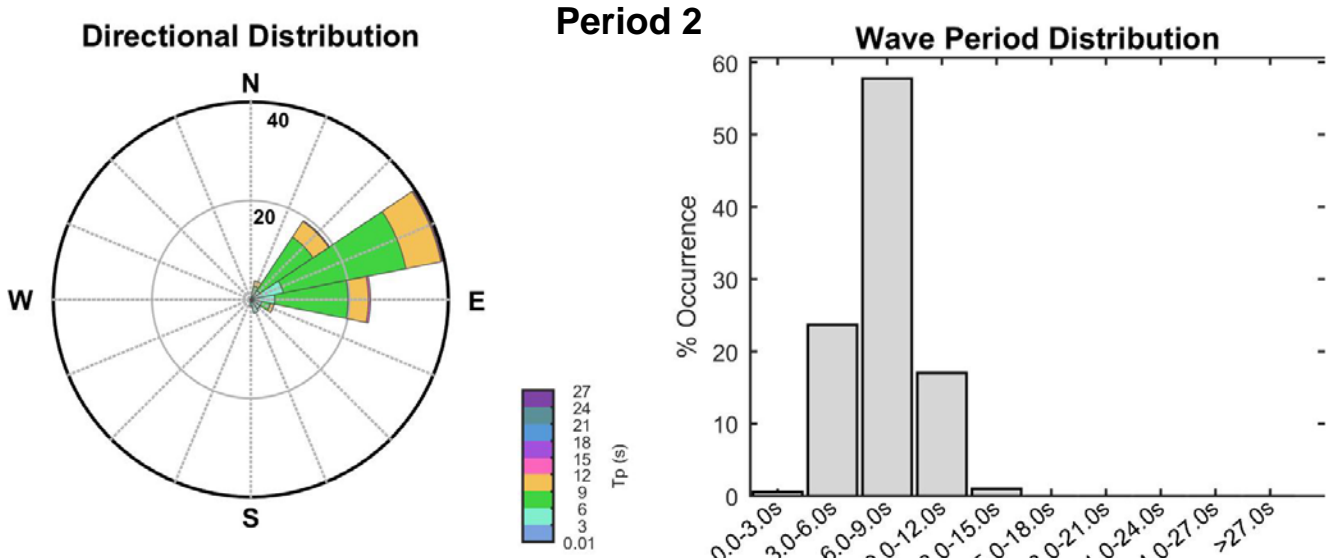
**Data Information:**

Project: 301001-02112  
 Location: ADCP2 [151° 39.132' E , 23° 05.730' S]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP2 Period 2  
 Data summary: Complete  
 Number of Records: 2140  
 Missing data (%): 0.00  
 Calm (% < 0.01m): 0.00

**Key Data Statistics:**

Max Hs: 3.59 m  
 Mean Hs: 1.49 m  
 StdDev. Hs: 0.58 m

## Wave Period for ADCP2 Location



**JFT (%) of Tp against Direction for the period 16-Mar-2019 to 13-Jun-2019**

N=2140	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-3	-	-	0.05	0.19	0.05	0.05	-	0.05	-	0.05	-	-	0.14	-	-	-	0.56	100.00
3-6	0.09	0.14	2.15	6.50	4.82	2.20	2.20	2.81	1.36	0.23	0.28	0.09	0.09	0.28	0.28	0.14	23.68	99.44
6-9	0.09	2.62	12.96	25.32	14.83	1.78	0.09	-	-	-	-	-	0.05	-	-	-	57.74	75.76
9-12	0.05	1.08	3.79	7.25	4.12	0.75	-	-	-	-	-	-	-	-	-	-	17.03	18.02
12-15	-	-	0.23	0.28	0.42	0.05	-	-	-	-	-	-	-	-	-	-	0.98	0.98
15-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.23	3.84	19.19	39.54	24.24	4.82	2.29	2.85	1.36	0.28	0.28	0.09	0.28	0.28	0.28	0.14		
<b>Cumul.</b>	0.23	4.07	23.26	62.80	87.04	91.86	94.15	97.01	98.36	98.64	98.92	99.02	99.30	99.58	99.86	100.00		

\* denotes values less than 0.01% - denotes no records in bin

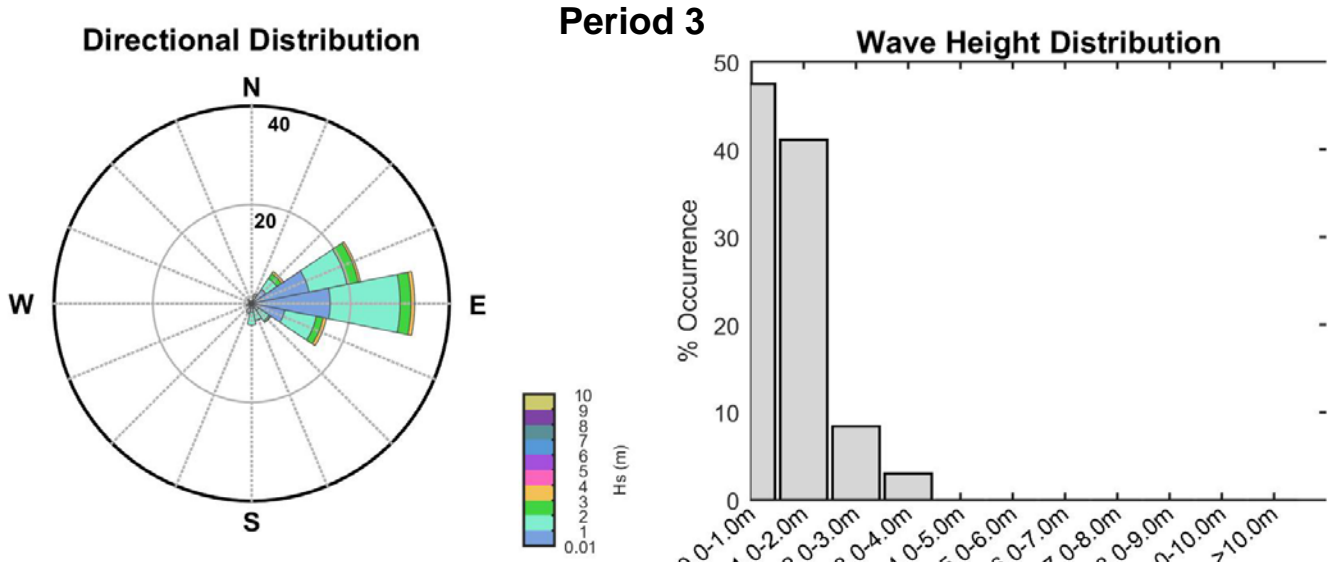
### Data Information:

Project: 301001-02112  
 Location: ADCP2 [151° 39.132' E , 23° 05.730' S]  
 Data period: All data (16-Mar-2019 to 13-Jun-2019)  
 Data source: ADCP2 Period 2  
 Data summary: Complete  
 Number of Records: 2140  
 Missing data (%): 0.00

### Key Data Statistics:

Max Tp: 14.60 s  
 Mean Tp: 7.41 s  
 StdDev. Tp: 2.01 s

## Wave Height for ADCP2 Location



**JFT (%) of Hs against Direction for the period 14-Jun-2019 to 25-Aug-2019**

N=1725	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.
0-1	0.17	0.46	3.48	11.83	15.88	6.84	1.74	1.04	1.74	0.99	0.46	0.70	0.46	0.64	0.87	0.17	47.48	100.00
1-2	0.12	0.29	2.61	7.83	14.14	6.49	2.49	2.49	2.61	1.04	0.17	0.41	0.17	0.06	0.17	-	41.10	52.52
2-3	0.12	0.75	1.16	2.32	2.20	1.39	0.35	0.06	-	-	-	-	-	-	-	0.06	8.41	11.42
3-4	-	0.46	0.52	0.46	0.75	0.70	0.12	-	-	-	-	-	-	-	-	-	3.01	3.01
4-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.41	1.97	7.77	22.43	32.99	15.42	4.70	3.59	4.35	2.03	0.64	1.10	0.64	0.70	1.04	0.23		
<b>Cumul.</b>	0.41	2.38	10.14	32.58	65.57	80.99	85.68	89.28	93.62	95.65	96.29	97.39	98.03	98.72	99.77	100.00		

\* denotes values less than 0.01% - denotes no records in bin

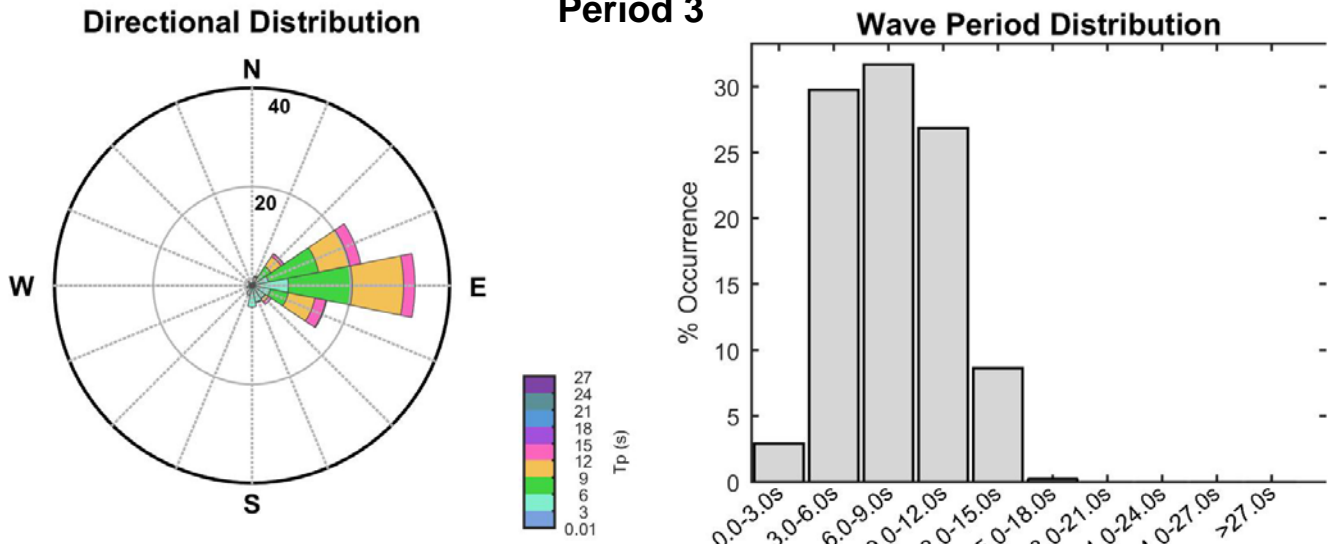
**Data Information:**

Project: 301001-02112  
 Location: ADCP2 [151° 39.140' E , 23° 05.734' S ]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP2 Period 3  
 Data summary: Complete  
 Number of Records: 1725  
 Missing data (%): 0.00  
 Calm (% < 0.01m): 0.00

**Key Data Statistics:**

Max Hs: 3.92 m  
 Mean Hs: 1.21 m  
 StdDev. Hs: 0.67 m

## Wave Period for ADCP2 Location



**JFT (%) of Tp against Direction for the period 14-Jun-2019 to 25-Aug-2019**

N=1725	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	Cumul.	
0-3	0.06	-	0.12	0.70	0.70	0.23	0.12	-	0.23	0.17	0.06	0.23	0.06	-	0.17	0.06	2.90	100.00	
3-6	-	0.06	0.64	2.72	6.67	3.54	3.01	3.42	4.12	1.86	0.58	0.87	0.58	0.70	0.87	0.12	29.74	97.10	
6-9	0.06	0.58	3.88	10.32	12.93	3.71	0.12	-	-	-	-	-	-	-	-	-	0.06	31.65	67.36
9-12	0.12	1.10	2.43	6.43	10.38	5.51	0.75	0.12	-	-	-	-	-	-	-	-	-	26.84	35.71
12-15	0.17	0.23	0.64	2.26	2.32	2.26	0.70	0.06	-	-	-	-	-	-	-	-	-	8.64	8.87
15-18	-	-	0.06	-	-	0.17	-	-	-	-	-	-	-	-	-	-	-	0.23	0.23
18-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	0.41	1.97	7.77	22.43	32.99	15.42	4.70	3.59	4.35	2.03	0.64	1.10	0.64	0.70	1.04	0.23			
<b>Cumul.</b>	0.41	2.38	10.14	32.58	65.57	80.99	85.68	89.28	93.62	95.65	96.29	97.39	98.03	98.72	99.77	100.00			

\* denotes values less than 0.01% - denotes no records in bin

### Data Information:

Project: 301001-02112  
 Location: ADCP2 [151° 39.140' E , 23° 05.734' S ]  
 Data period: All data (14-Jun-2019 to 25-Aug-2019)  
 Data source: ADCP2 Period 3  
 Data summary: Complete  
 Number of Records: 1725  
 Missing data (%): 0.00

### Key Data Statistics:

Max Tp: 16.50 s  
 Mean Tp: 7.80 s  
 StdDev. Tp: 3.20 s