U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

HORIZONTAL AND VERTICAL CONTROL REPORT

Type of Survey Navigable Area

Project No. OPR-R302-KR-22

Time Frame June – August, 2022

LOCALITY

State Alaska

General Locality Bering Sea

2022

CHIEF OF PARTY

ANDREW ORTHMANN

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Horizontal and Vertical Control Report

OPR-R302-KR-22

Nunivak, AK

December 27th, 2022

Southern Nunivak Island, NE of Cape Mendenhall. August 18th, 2022

Project Name:	***Nunivak, AK***
General Locality:	***Bering Sea***
Sub Localities:	***H13589 – Vicinity of Mekoryuk*** ***H13590 – Nash Harbor to Kikartik*** ***H13591 – Cape Mohican to Iloodak Point*** ***H13592 – Cape Mendenhall*** ***H13593 – Chackwakamiat to Datheekook Point*** ***F00847 – Kuskokwim to Etolin***
Vessel(s):	***R/V Qualifier 105 and ASV-CW5***
Field Unit:	***TerraSond***
Lead Hydrographer:	***Andrew Orthmann***

A. Vertical Control

Mean lower low water (MLLW) was the vertical control datum for this survey. All soundings are referenced to MLLW.

All time measurements were made in Universal Time Coordinated (UTC). The local time zone was offset from UTC by eight hours (Alaska Daylight Time = UTC – 8 hours). No measurements were made using local time.

A.1. Tide Corrector Stations

No tertiary tide stations were installed for this project. However, two GNSS tide buoys, provided by JOA Surveys, LLC, were deployed off the west side of Nunivak Island. These are described in the table below.

General Area / Sublocality / Buoy ID	Station No.	Latitude (NAD83)	Longitude (NAD83)	Julian Days of Operation (2022)	Configuration
Northwest Nunivak Island / Dooksook / NUN1	946AAAA	60-03-05.8 N	167-15-43.4 W	174 – 181, 196 - 207	1 JOA GNSS buoy, no tilt sensor
Southwest Nunivak Island / Cape Mendenhall / NUN2	946BBBB	59-48-47.0 N	166-18-59.2 W	175 - 209	1 JOA GNSS buoy, included tilt sensor

Table 1 – GNSS Tide Buoy Deployment Descriptions

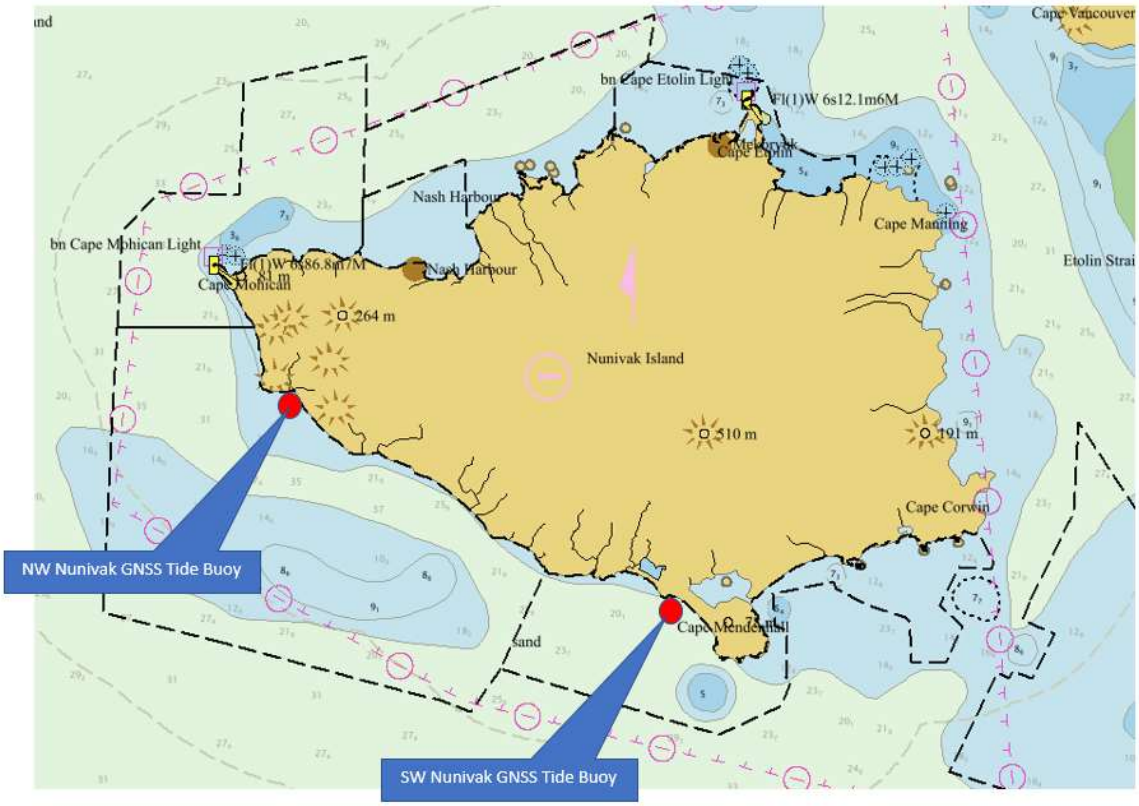

Figure 1 – Image showing GNSS Tide Buoy deployment locations relative to Nunivak Island and the survey areas.

TerraSond contracted JOA Surveys, LLC (JOA) for tide support. JOA provided the GNSS Tide Buoys as well as services relating to processing of the tide data, datum computations, tide analysis, and tide report compilation. TerraSond's tasks included the on-site recovery and deployment of the buoys and completion of static floats with the survey vessels for vessel versus buoy water line comparisons.

A.2. Tide Equipment

A wide range of tide and supporting equipment were utilized on this project. An overview of equipment was provided in tables 1 and 2 above. Refer to Appendix I for specific models as well as their configurations and calibrations.

Figure 2 – The two project GNSS tide buoys after retrieval. The Southwest Nunivak buoy is on the left, while the Northwest Nunivak buoy is on the right.

Figure 3 – Trimble 5700 GNSS antenna on the back deck of the survey vessel used for comparisons with the buoy data. Vessel POSMV data was also used.

A.3. Tide Correctors

Tidal corrections for hydrography was accomplished using ERS methodology. The NAD83 to MLLW grid file "OPR-R302-KR-22_Sheets08232022_ERTDM2021_NAD83(2011)-MLLW" provided by NOAA was used for all corrections. The grid file has an estimated uncertainty of 0.13 m (specified in the Project Instructions). Refer to the DRs for correspondence relating to this grid file.

A.4. Tide Buoy Issues

The Northwest Nunivak GNSS tide buoy experienced issues on this survey, especially regarding GNSS tracking. The buoy was initially deployed on 6/24/22 but was pulled for troubleshooting on 7/2/22. Issues were addressed and the buoy was redeployed at the same location on 7/15/22, but stopped tracking satellites again and was retrieved a final time on 8/13/22. It was able to log approximately 19 days of data, which was short of the 30 required.

In consultation with the CO and COR, unlogged days were converted to additional LNM and collected by the survey vessels. Refer to correspondence included with the DRs for communication regarding the conversion to LNM.

The Southwest Nunivak GNSS tide buoy did not experience any significant issues and was able to complete approximately 37 days of logging.

For more information, refer to the tide buoy processing reports in Appendix II.

B. Horizontal Control

The horizontal control datum used for this survey was NAD83 (2011). All final positions are NAD83 (2011).

Vessel positions were post-processed in Applanix POSPac MMS (v8.7) software using the Trimble PP-RTX corrections service. A small number of survey lines were subsequently post-processed during office processing with Applanix Smart Base (ASB) or Singlebase (SB) processing to address vertical busts. These are itemized when they occurred in the applicable Descriptive Report.

HVCR Site ID	Base Station ID
MEKORYUK__AK2008	AB08

Table 2 – CORS Stations commonly used in ASB and SB network solutions.

Real-time positions were provided by either Atlas H10 SBAS RTK correctors or FAA WAAS on ITRF2008. However, all real-time corrections were replaced in post-processing for final data with NAD83(2011) SBET solutions. Refer to the DAPR for details on positioning methodology.

Vessel position confidence checks were performed by comparing PPRTX and ASB/SB methodology, with good results. These checks are available with each DR.

Correspondence relating to tides are also available with the project DRs.

Note that all tide data and associated detailed reports have been separately submitted to CO-OPS. The transmittal letters for the submissions are also included in the tides correspondence with the DRs, as well as in Appendix I of this report.

Post-processed positioning data and GNSS processing files are available with the survey deliverables.

APPROVAL SHEET

For

Horizontal and Vertical Control Report: H13589 through H13593 and F00847

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the completion of this project were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report, digital data, and accompanying records have been closely reviewed and are considered complete and adequate per the Statement of Work and Project Work Instructions. Other reports submitted with this survey include the Descriptive Report (DR) (one for each survey sheet) and the Data Acquisition and Processing Report (DAPR).

This survey is complete and adequate for its intended purpose.

Andrew Orthmann
Digitally signed by Andrew Orthmann
Date: 2022.12.27 13:56:45 -09'00'

Andrew Orthmann
NSPS/THSOA Certified Hydrographer (2005), Certificate No. 225
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TerraSond