



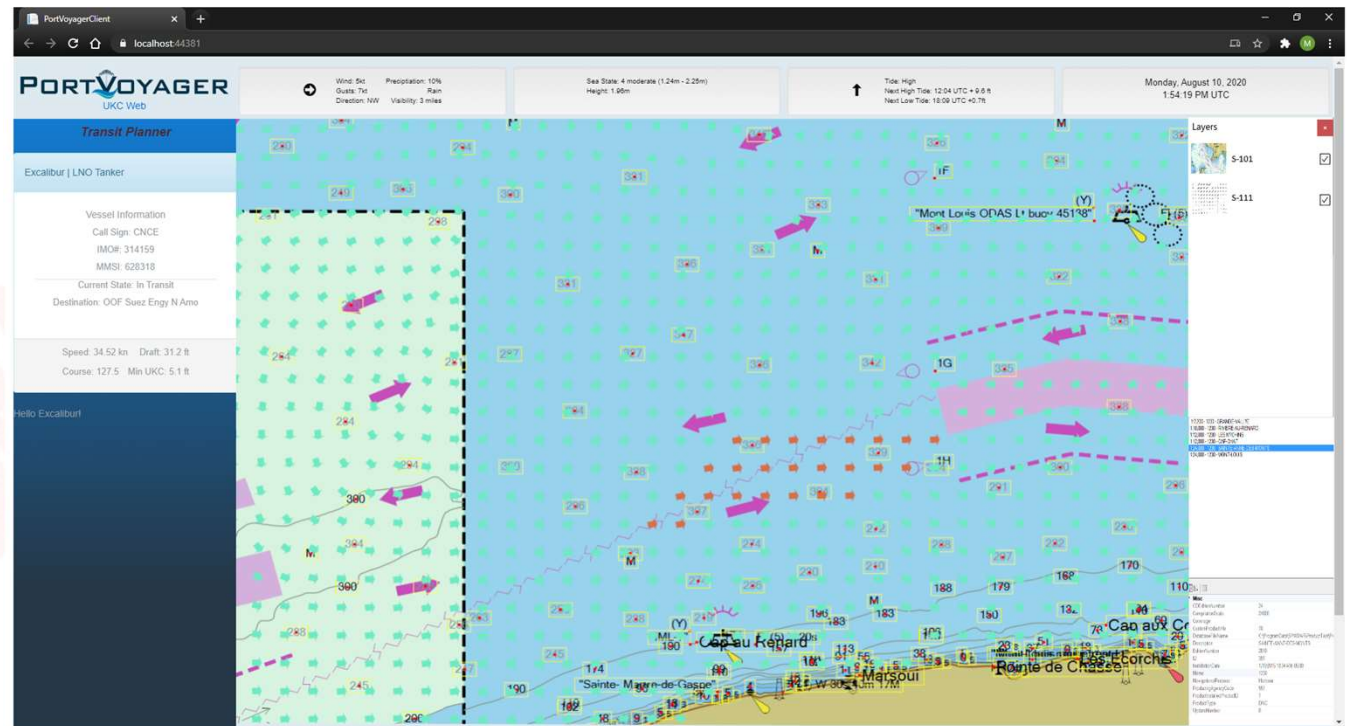
GeoNavigation Technologies

Trust and Safety Underway

Agenda

➤ Port Voyager NOAA AWS S-111 Implementation

- Background
- Technology
- Process





PORTVOYAGER

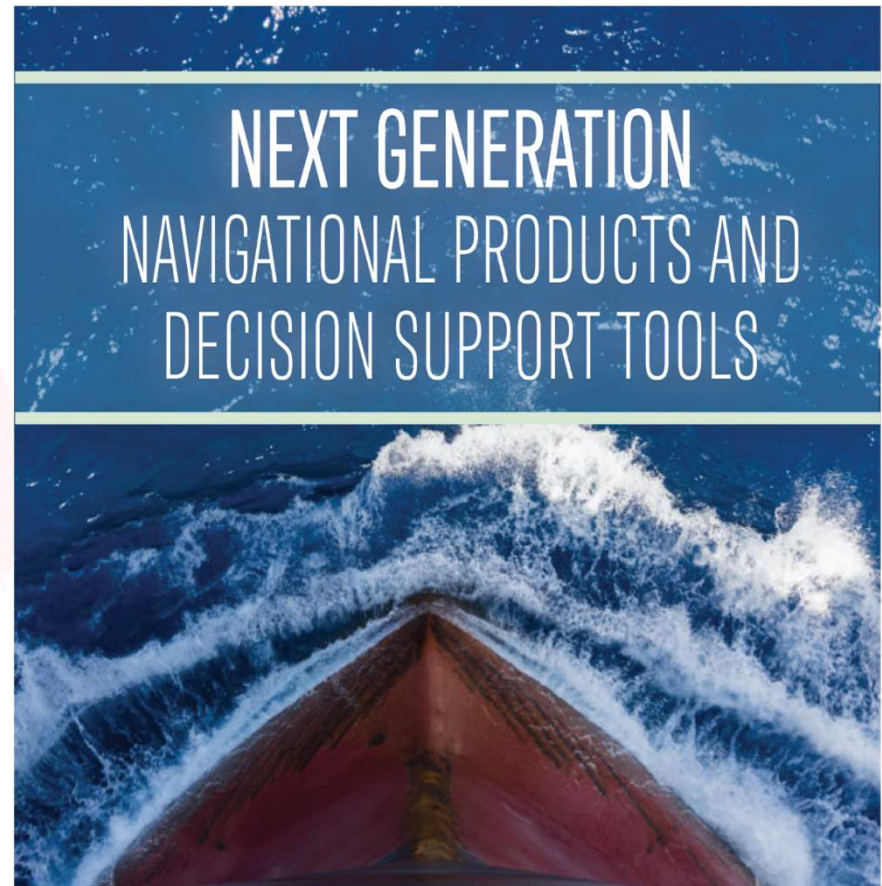
The Port Voyager software is a maritime port traffic management support system. Its primary purpose is to develop and distribute S-129 Under Keel Clearance (UKC) route plans to transiting vessels to reduce the risk of grounding and optimize route plans based on port traffic. The software uses S-100 hydrographic information such as weather, tides, currents, vessel characteristics, and real-time data.

- ❖ Purpose is to develop and distribute S-129 Under Keel Clearance (UKC) exchange sets to transiting vessels to reduce the risk of grounding and optimize route plans based on port traffic
- ❖ Functionality
 - ❖ S-129 UKC exchange set generation and distribution
 - ❖ UKC and anti-grounding analysis
 - ❖ Port traffic management, monitoring, analysis, and optimization
 - ❖ Control Center Route planning and monitoring
 - ❖ Chart Display
 - ❖ Day, Night, Dusk, and custom presentation modes
- ❖ Cross platform
- ❖ [Product Webpage](#)
- ❖ [Product Slick](#)

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- ❖ Port Voyager Focus
 - ❖ New S-100 navigational products
 - ❖ With S-57 legacy support
- ❖ Port Voyager AWS Technology Stack
 - ❖ .NET Core
 - ❖ C#
 - ❖ using Amazon;
 - ❖ using Amazon.S3;



Process - Step 1: Reviewed Registry, <https://registry.opendata.aws/noaa-s111/>

The screenshot shows a web browser window displaying the 'Registry of Open Data on AWS' for 'NOAA S-111 Surface Water Currents Data'. The page has a dark blue header with the AWS logo. Below the header, the title 'NOAA S-111 Surface Water Currents Data' is prominently displayed, followed by tags for 'oceans', 'sustainability', and 'water'. The 'Description' section provides a detailed overview of the S-111 data specification, its origin from NOAA/NOS Operational Forecast Systems, and its use in various modeling systems. It mentions that the data is encoded as HDF-5 files and is geospatially subset into individual tiles. The 'Resources on AWS' section lists two resources: 'NOAA S-111 Surface Water Currents Datasets' (an S3 Bucket) and 'NOAA S-111 Surface Water Currents New Dataset Notification' (an SNS Topic). Each resource entry includes its description, resource type, Amazon Resource Name (ARN), and AWS Region. The S3 bucket ARN is 'arn:aws:s3:::noaa-s111-pds' and the SNS topic ARN is 'arn:aws:sns:us-east-1:123901341784:NewS111object'. Both are located in the 'us-east-1' region. The page also includes an 'Update Frequency' section stating that data is updated four times per day for each OFS, except for Global RTOFS which updates once per day. The browser's address bar shows the URL 'registry.opendata.aws/noaa-s111/'. The Windows taskbar at the bottom shows various application icons and the system clock indicating 11:59 AM on 9/28/2020.

Registry of Open Data on AWS

NOAA S-111 Surface Water Currents Data

oceans sustainability water

Description

S-111 is a data and metadata encoding specification that is part of the S-100 Universal Hydrographic Data Model, an international standard for hydrographic data. This collection of data contains surface water currents forecast guidance from NOAA/NOS Operational Forecast Systems, a set of operational hydrodynamic nowcast and forecast modeling systems, for various U.S. coastal waters and the great lakes. The collection also contains surface current forecast guidance output from the NCEP Global Real-Time Ocean Forecast System (GRTOFS) for some offshore areas. These datasets are encoded as HDF-5 files conforming to the S-111 specification, and are geospatially subset into individual tiles conforming to the NOAA/OCS Nautical Product Tiling Scheme, with filenames indicating the corresponding NOAA Electronic Navigational Chart (ENC) Cell Identifier. A full set of S-111 tiles is created for each new model run cycle, which occurs four times per day for all models except for RTOFS, which updates only once per day. Files are organized using a path naming convention that includes the OFS identifier (e.g. 'cbofs' corresponding with output from the Chesapeake Bay Operational Forecast System) as well as the year, month, day, and hour corresponding with each model run initialization time. Each individual S-111 (HDF-5) file contains all forecast projections from a single model run for that geographic area. In other words, a single S-111 file will contain multiple gridded arrays each containing a forecast valid at a distinct time in the future, out to the forecast horizon of the underlying modeling system. All surface currents forecasts in this collection are computed at a depth of 4.5 meters below water surface, or half the water column depth, whichever is shallower.

Update Frequency

Four times per day for each OFS, except Global RTOFS which updates once per day

Resources on AWS

Description
NOAA S-111 Surface Water Currents Datasets

Resource type
S3 Bucket

Amazon Resource Name (ARN)
`arn:aws:s3:::noaa-s111-pds`

AWS Region
`us-east-1`

AWS CLI Access (No AWS account required)
`aws s3 ls s3://noaa-s111-pds/ --no-sign-request`

Description
NOAA S-111 Surface Water Currents New Dataset Notification

Resource type
SNS Topic

Amazon Resource Name (ARN)
`arn:aws:sns:us-east-1:123901341784:NewS111object`

AWS Region
`us-east-1`

Process (Cont.) Step 2: Reviewed ReadMe information, <https://noaa-s111-pds.s3.amazonaws.com/README.html>

NOAA S-111 Surface Water Currents Data on AWS

Overview

Forecast guidance of surface water currents from NOAA's operational oceanographic forecast modeling systems are now available in S-111/HDF-5 format on Amazon S3. These files are part of a preliminary service for delivering surface water currents for marine navigation systems. The goal of this service is to provide manufacturers with samples of S-111 surface water currents files to test and implement into their navigational systems.

This service is made possible through a public-private partnership enabled by the [NOAA Big Data Program](#).

Accessing the Data on AWS

Access to the datasets is being provided on Amazon Web Services (AWS) via Simple Storage Service (S3). Files can be downloaded via the native AWS S3 API using tools such as the [AWS CLI](#) or AWS SDK libraries such as the [Python boto3 package](#).

AWS S3 also provides direct HTTP access to the files, so datasets can be downloaded using any HTTP client such as a web browser. To make discovering and accessing the data easier, a simple [bucket explorer web application](#) is also provided which allows you to navigate through the object key structure and download files using a web browser.

The Amazon Resource Name (ARN) for the S3 Bucket is: `arn:aws:s3:::noaa-s111-pds`.

Additionally, an AWS Simple Notification Service (SNS) Topic has also been created to provide automated notifications when new files are added to the S3 Bucket. Users who operate their own infrastructure on AWS can integrate directly with this SNS Topic to trigger automated workflows using AWS Lambda or other services.

The Amazon Resource Name (ARN) for the SNS Topic is: `arn:aws:sns:us-east-1:123901341784:NewS111Object`.

Format

S-111 is a data encoding standard which is part of the International Hydrographic Organization's (IHO) [S-100 Universal Hydrographic Data Model](#). Individual S-111 files are encoded in [HDF-5](#) format, with the internal structure of each file conforming to the [S-111 Standard](#). Because S-111 is built upon HDF-5, files can be read and written using existing software such as the [official](#) HDF-5 libraries/utilities and [h5py](#).

For the purpose of supporting marine navigation, surface currents can be defined as the horizontal motion of the water at a depth which directly affects surface vessels. The S-111 files in this data collection contain predictions of surface currents calculated at a depth of 4.5 meters below water surface, or half the distance to the seafloor, whichever is shallower.

The S-111 standard supports encoding the data using any of the following Data Coding Formats (DCFs):

Process (Cont.)

➤ Process

- Step 3: Need to use;
 - Amazon Resource Name (ARN)
 - `arn:aws:S3::noaa-s111-pds`
 - AWS Region
 - `us-east-1`
 - Create the modelCatalogKey to get the S111 catalog.xml file to get the appropriate metadata
 - We used the objectKey to keep the same folder structure locally
 - Using FileStream methods, retrieved the requested dataset (.h file)
 - Used the S-100 Lua transformation process for product rendering
-
- Step 3: Created a NOS





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Questions?



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