

7th Tides, Water Level and Currents Working Group(TWCWG7)

Survey on TIDES, WATER LEVEL AND CURRENTS DATA PRODUCTION METHOD AND FORMAT (S104 & S111 PRODUCTS)

Agenda Item 8.3

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KHOA

TWCWG7, VTC – 28 Feb ~ 2 March 2023



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INTRODUCTION

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- TWCWG-6 approved the questionnaire on "TWCWG member's opinion over the tides, water level and currents data production method and data format" proposed by Republic of KOREA.
- The general objective of the survey is to identify TWCWG members' production and service status of S-104 and S-111 Products. Also, the outcome of the survey is planned in order to set 'priority order' in the data type, and suggest useful guidance on S-104 and S-111 Product Specifications.
- KHOA invited Member States to participate in the survey by email on October 2022 .
We received 16 answers.

Canada, Chile, Finland, Italy, Japan, Netherland, New Zealand, Norway, Romania, ROK, Sweden, Spain, US-NGA, US-NMOC, US-NOAA, UK



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RESULTS OF THE QUESTIONNAIRE(S-104)

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Q1. Does your country produce S-104 Products? **Yes 2 / No 13**
Canada, ROK

Q1.1 If Yes, which type do you produce? Please select all the types of water level data.

Canada ① Historical observation ② Real-time observation ③ Astronomical prediction ④ Analysis or hybrid method ⑤ Hindcast ⑥ Forecast
ROK ① Historical observation ② Real-time observation ③ Astronomical prediction ④ Analysis or hybrid method ⑤ Hindcast ⑥ Forecast

Q1.2 In regarding with your products, what is the **data update interval** and **data type** of your products?

Canada ② , ③ On-demand REST API/P(DCF 8), ⑥ On-demand REST API/P(DCF 8) and 4 or 1 time a day(DCF 2)
ROK ③ Once a year(Grid)

Romania ② Provides real-time water level at 4 coastal points

UK ③,⑥-planned to be update daily

UKHO is not routinely producing S-104 data sets and still in the process of developing internal production capability.
UKHO has only so far created a 'trial' S-104 dataset for a small region of the UK coastline.





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RESULTS OF THE QUESTIONNAIRE(S-104)

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Q1.3 If you produce in the gridded type, how many numerical model do you operate ?

- ① 1 Sweden, UK
- ② 2 or more Canada(10ea)

Q1.3.1 What are the numerical models in operation and the grid resolution of each model? Please answer all cases.

① Delft3D ② FVCOM ③ MOHID ④ ADCIRC ⑤ TELMAC ⑥ others()

- ⑥ Canada NEMO 20m~7km, ECCC-H2D2 5m~200m, Sweden NEMO 1NM, UK NEMO 1.5km
ROK calculates with 'Time difference for tide' and 'Height ratio for tide' on reference station, 10m-90m

Q1.3.2 If you use two or more numerical models, how do you apply each model data to S-104 Product?

Canada Models results will be mostly consistent between scales where their respective 2D domains overlap.
We are using tiles (like for CHS S102 products) at different scales and resolutions depending on the models grid resolution and scale for the products.

Q1.4 What vertical datum are you using to produce the S-104?

- ① LAT(Lowest Astronomical Tide) Sweden, UK
- ② MLLW(Mean Lower Low Water) US-NOAA(except for inland)
- ③ MSL Romania
- ④ ISLW(Indian Spring Low Water) Japan(for charting), ROK
- ⑤ others() Canada(Lower Law Water Large Tide, Lowest Law Water(Inland), Sweden(BSCD2000)





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RESULTS OF THE QUESTIONNAIRE(S-104)

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Q2. Does your country also service and provide the S-104 products to end-users?

② Partially **Canada, ROK**

Q2.1 If you choose ② partially, which kind of products do you provide? and, please explain the reason?

- Canada** 1) Our S104 DCF2 products will be provided by external partners
2) Our S104 DCF8 (stationwise) products will be directly provided to end-users using our REST API driven by
'https://github.com/DFO-CHS-Dynamic-Hydrographic-Products/IWLS_pygeoapi(IN TEST: NOT READY YET)
- ROK** provides S-104 for Korean e-navigation(ECS)

Q3. If you don't currently produce S-104 Products, do you have a plan to produce ?

- ① Yes(12) **Chile, Finland, Italy, Netherland, New Zealand, Norway, Romania, Sweden, Spain, US-NGA, US-NMOC, US-NOAA, UK**
- ② No(1) **Japan** (Will consider to develop such a plan)

* not answer : Canada, ROK



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RESULTS OF THE QUESTIONNAIRE(S-111)

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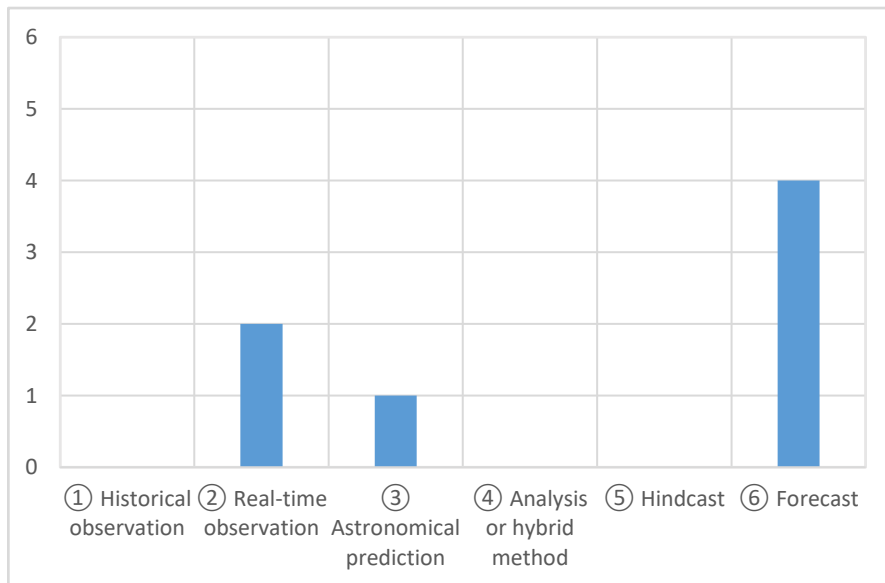
Q1. Does your country produce S-111 Products? Yes 3 / No 12

Canada, ROK, US-NOAA

Q1.1 If Yes, which type do you produce? Please select all the types of water level data.

① Historical observation ② Real-time observation ③ Astronomical prediction ④ Analysis or hybrid method ⑤ Hindcast ⑥ Forecast

Q1.2 In regarding with your products, what is the data update interval and data type of your products?



Canada

② On-demand REST API/P – DCF 8

⑥ 4 or 1 time a day – DCF 3, DCF2

ROK

③ Once a year- Grid

US-NOAA

⑥ 1day and 6h/day - Grid

Romania

② 4 hours surface data - Grid, ⑥ 6 hours forecast - Grid

UK

③ The UKHO S-111 trial data set is comprised of one HDF5 file covering a fixed 3 three day period 'in the past'

⑥ planned to be update daily





Q1.3 If you produce in the gridded type, how many numerical model do you operate ?

- ① 1 Japan, ROK, Sweden, UK
 ② 2 or more Canada(10ea), Romania(2ea), US-NOAA(6ea)

Q1.3.1 What are the numerical models in operation and the grid resolution of each model? Please answer all cases.

① Delft3D ② FVCOM ③ MOHID ④ ADCIRC ⑤ TELEMAC ⑥ others()

- ① Japan Delft3D
 ⑥ Canada NEMO 20m~7km, ECCO-H2D2 5m~200m
 ROK ROMS 3km
 Sweden NEMO 1NM
 UK NEMO 1.5km x 1.5 km
 Romania ROMS 3km, HYCOM 3km
 US-NOAA ROMS, FVCOM, SCHISH, POM (500m~1000m)

Q1.3.2 If you use two or more numerical models, how do you apply each model data to S-111 Product?

Canada Models results will be mostly consistent between scales when their respective 2D domains overlap.

We are using tiles (like for our CHS S102 products) at different scales and resolutions depending on the models grid resolution and scale for the products.

US-NOAA has different spatial coverage areas.





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RESULTS OF THE QUESTIONNAIRE(S-111)

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Q2. Dose your country also service and provide the S-111 products to end-users?

- ① Yes **US-NOAA**
- ② Partially **Canada, ROK**

Q2.1 If you choose ② partially, which kind of products do you provide? and, please explain the reason?

Canada We want to deliver the S-111 DCF8 products directly to PPU and ECDIS apps to navigation clients mainly because of the real-time HADCP measurements at the CHS tide gauges.

We want to have the same LOS for S-111 DCF8 for clients as we will have for S-104 DCF8.

ROK provides S-104 for Korean e-navigation(ECS)

Romania provides real time data for military use

Q3. If you don't currently produce S-111 Products, do you have a plan to produce ?

- ① Yes(9) **Chile, Finland, Netherland, New Zealand, Norway, Romania, Sweden, Spain, US-NMOC, UK**
- ② No(3) **Italy, Japan (Will consider to develop such a plan), US-NGA**

* not answer : Canada, ROK, US-NOAA



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SUMMARY

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- S-104

- Canada and ROK produce S-104 products and provide them to clients partially.
- UK creates a 'trial' S-104 dataset.
- Canada, ROK, Sweden, UK produce S-104 products(or tide datasets) in gridded type.

- S-111

- Canada, ROK and US-NOAA produce S-111 products and provide them to clients partially.
- UK creates a 'trial' S-111 dataset.
- Canada, ROK, Romania, Japan, Sweden, UK and US-NOAA produce S-111 products(or currents datasets) in gridded type.

- Most MSs that don't produce S-104 & S-111 currently also have plans to do it in the future.





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CONSIDERATIONS

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- MSs are using different kinds of vertical datums, numerical models and grid sizes.
- How to set 'priority order' in the data type and suggest useful guidance on S-104 and S-111 Product Specifications.
- We consider the reason why several MSs don't produce S-104, S-111.
What problem or situation do MSs have? Do we need additional survey?
- How does the TWCWG help MSs to produce S-104, S-111?



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