

Hvar endar lorturinn?

-frá havmyndlan og bitlasporing til betri umhvørvisráðlegging

Birgitta Andreasen



Skrá

- FarCoast (3D havmyndil)
 - Hvat er tað?
 - Bitlasporing
 - FarCoast í brúki
- ADepoPlan verkætlanin
 - Botnfalsmyndlan



FarCoast

Ocean model



Hvat er FarCoast? → 3D havmyndil fyri Føroyar

Um man spyr ChatGPT:

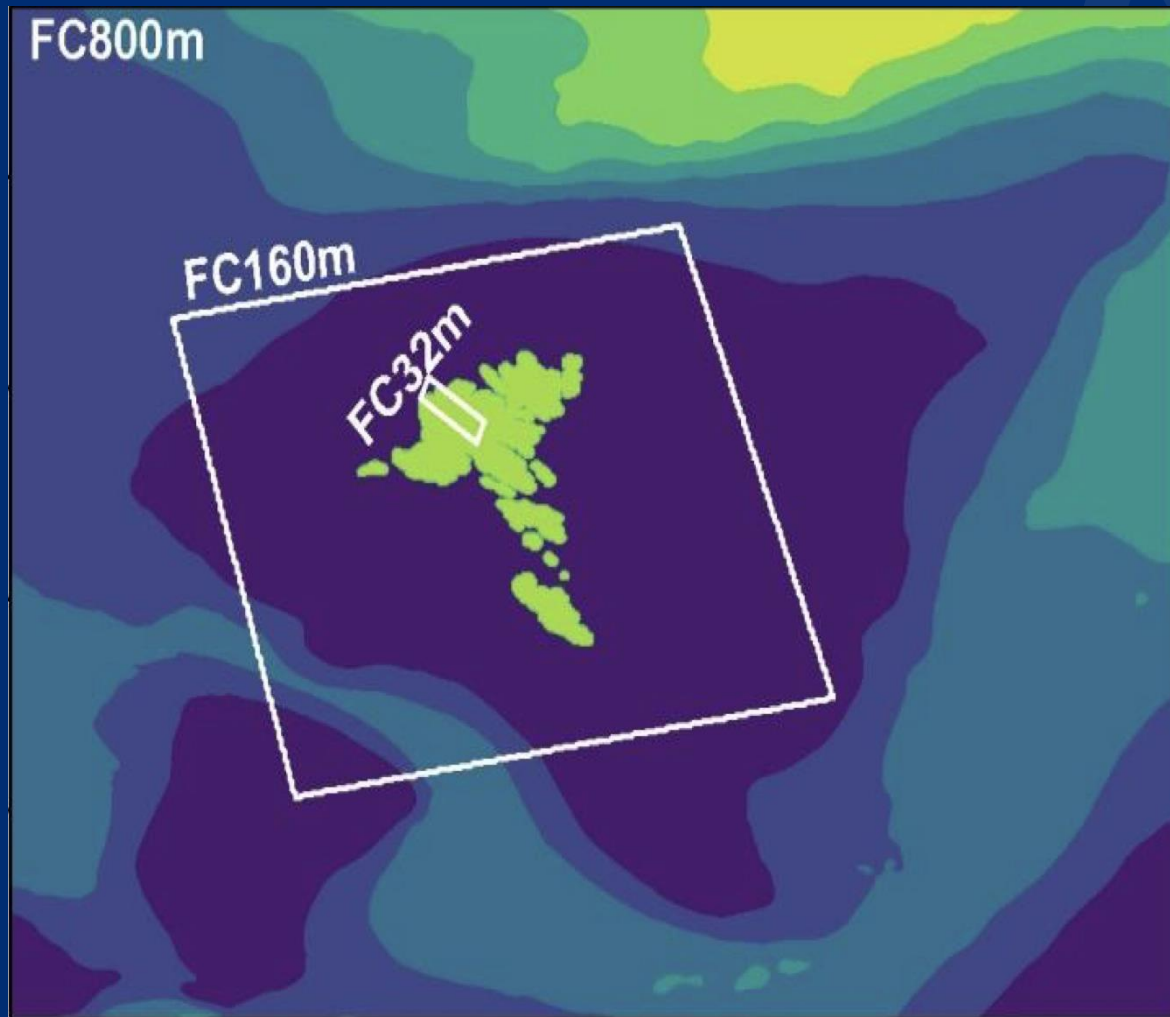
Explain an ocean model to a 5-year-old in one sentence

"An ocean model is a computer game that helps scientists understand and predict how the ocean moves and changes."

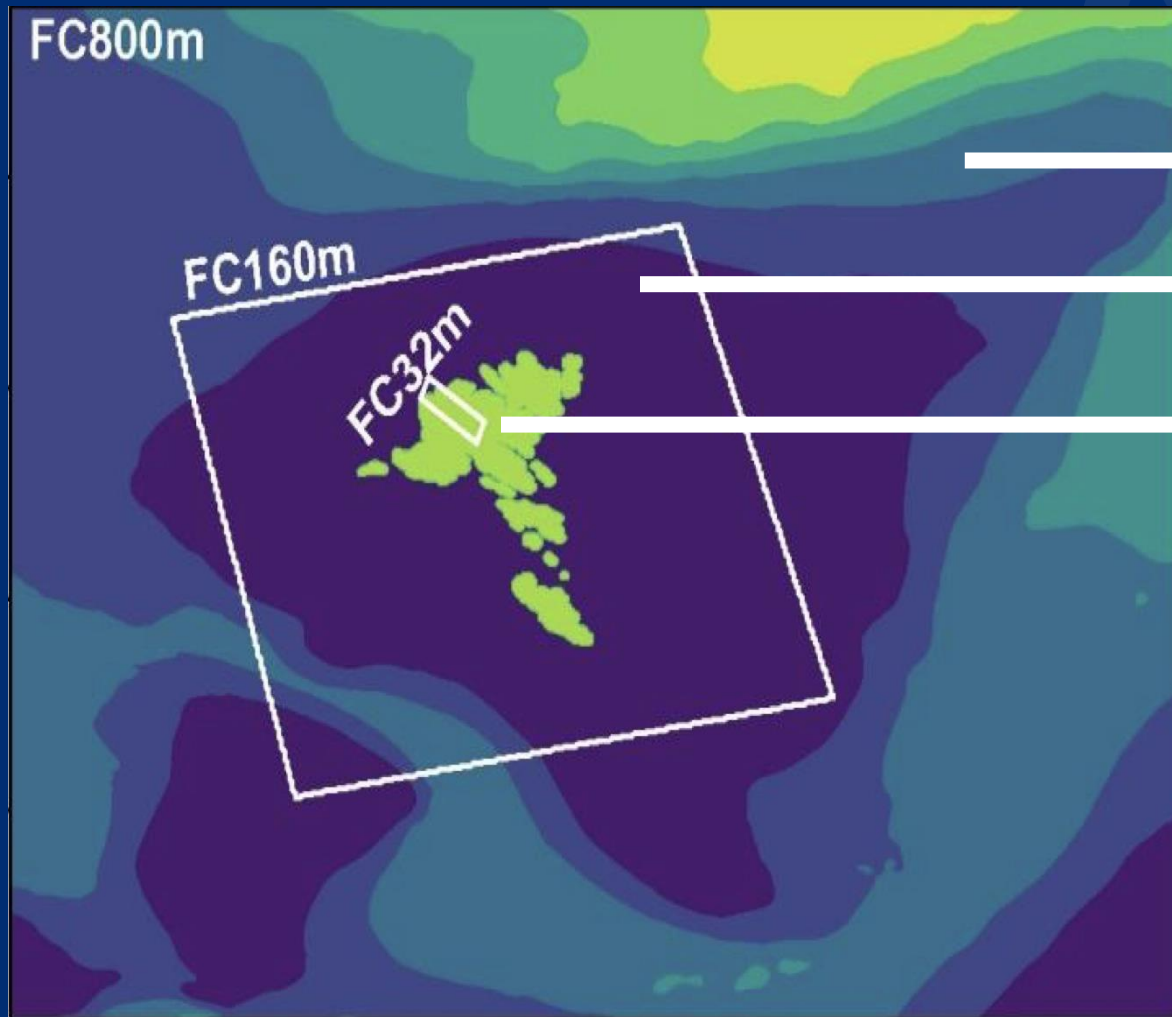
"Magical mathematics"



FarCoast – *heilt einkult!*



FarCoast – *heilt einkult!*



Upploysing

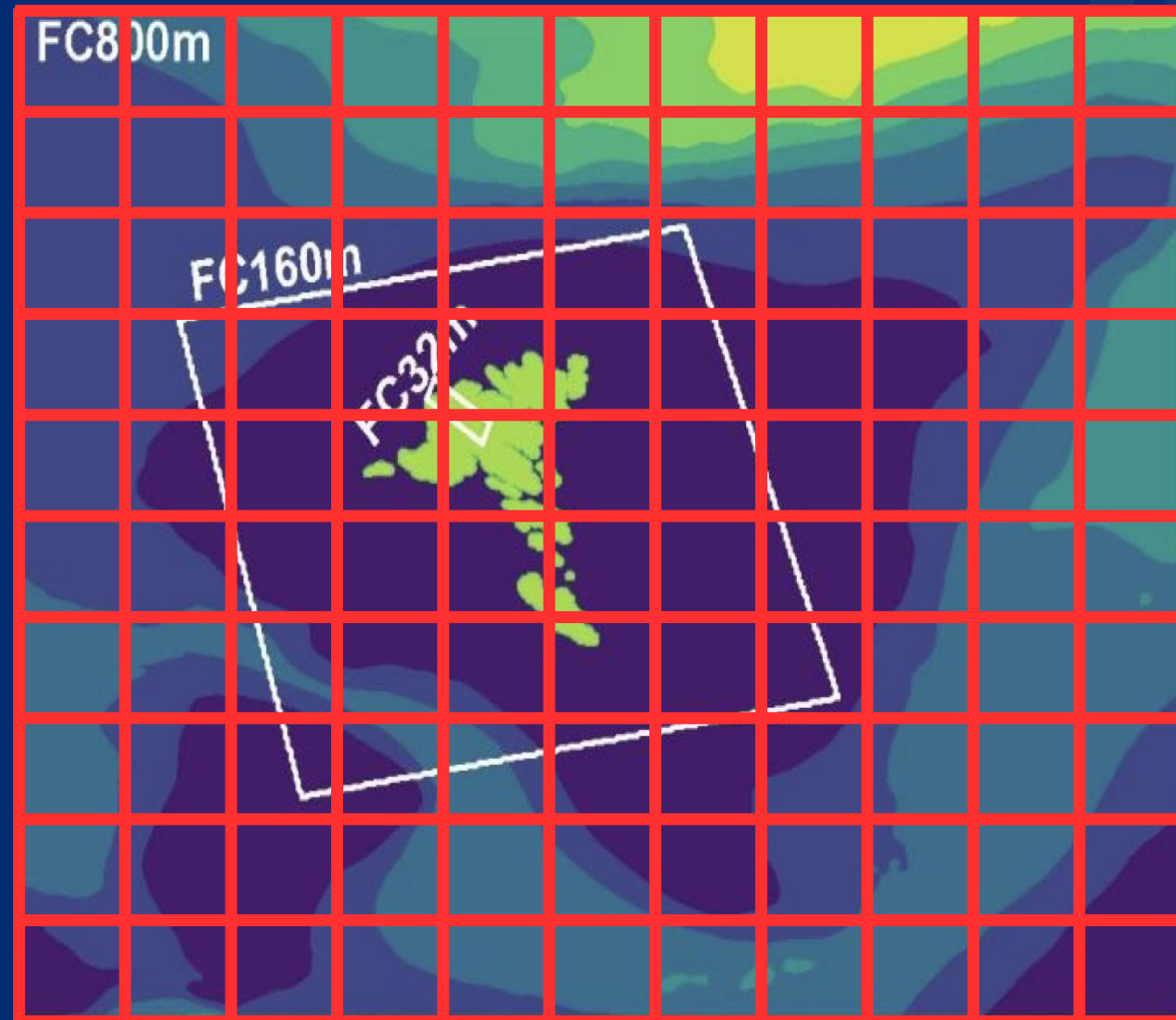
800 m

160 m

32 m

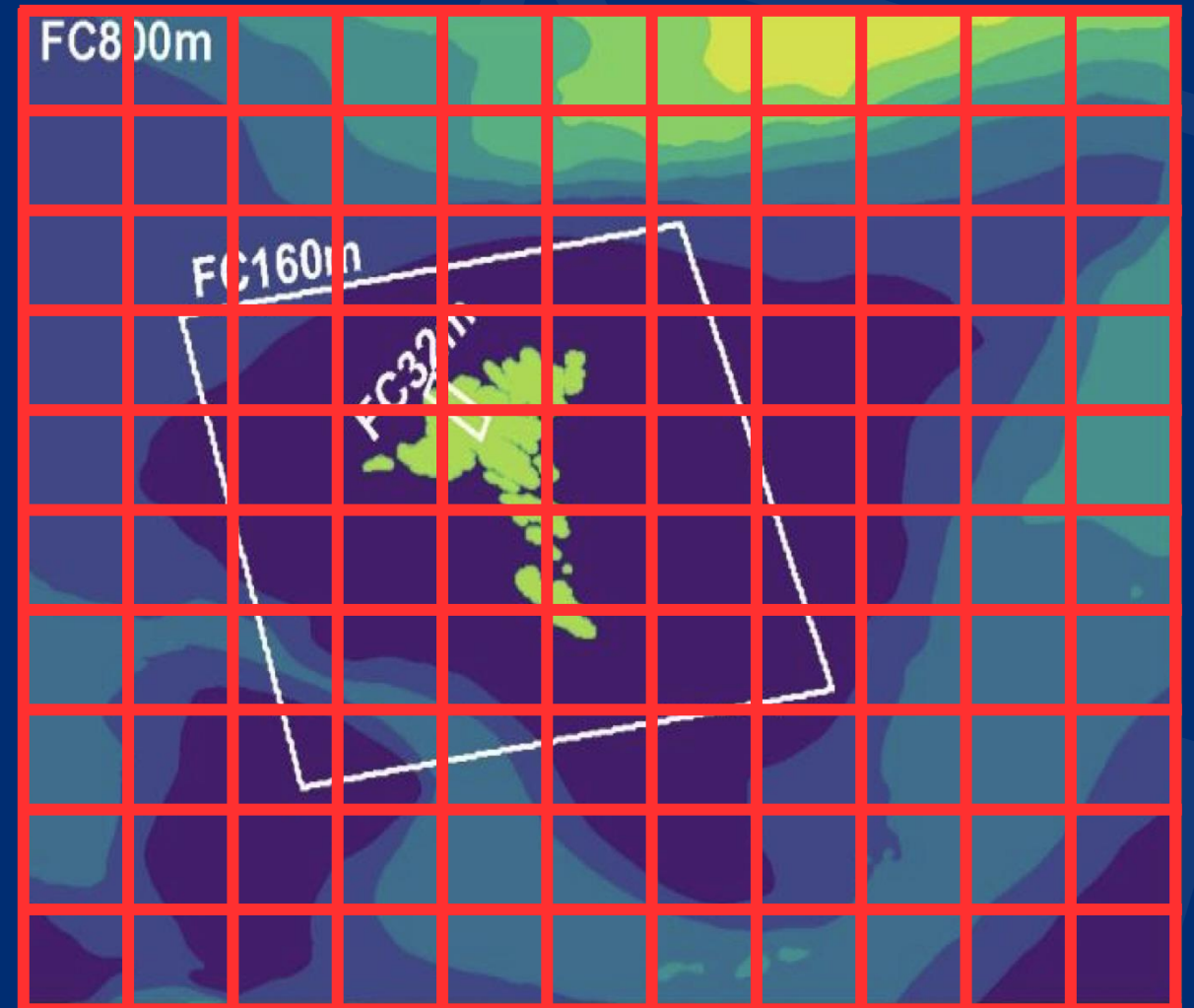
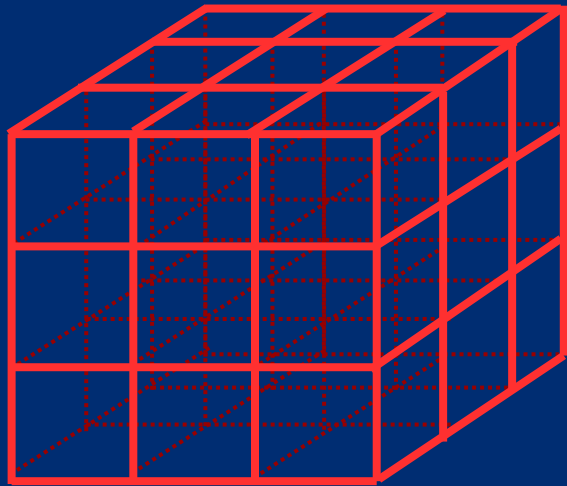
FarCoast – *heilt einkult!*

upplysing



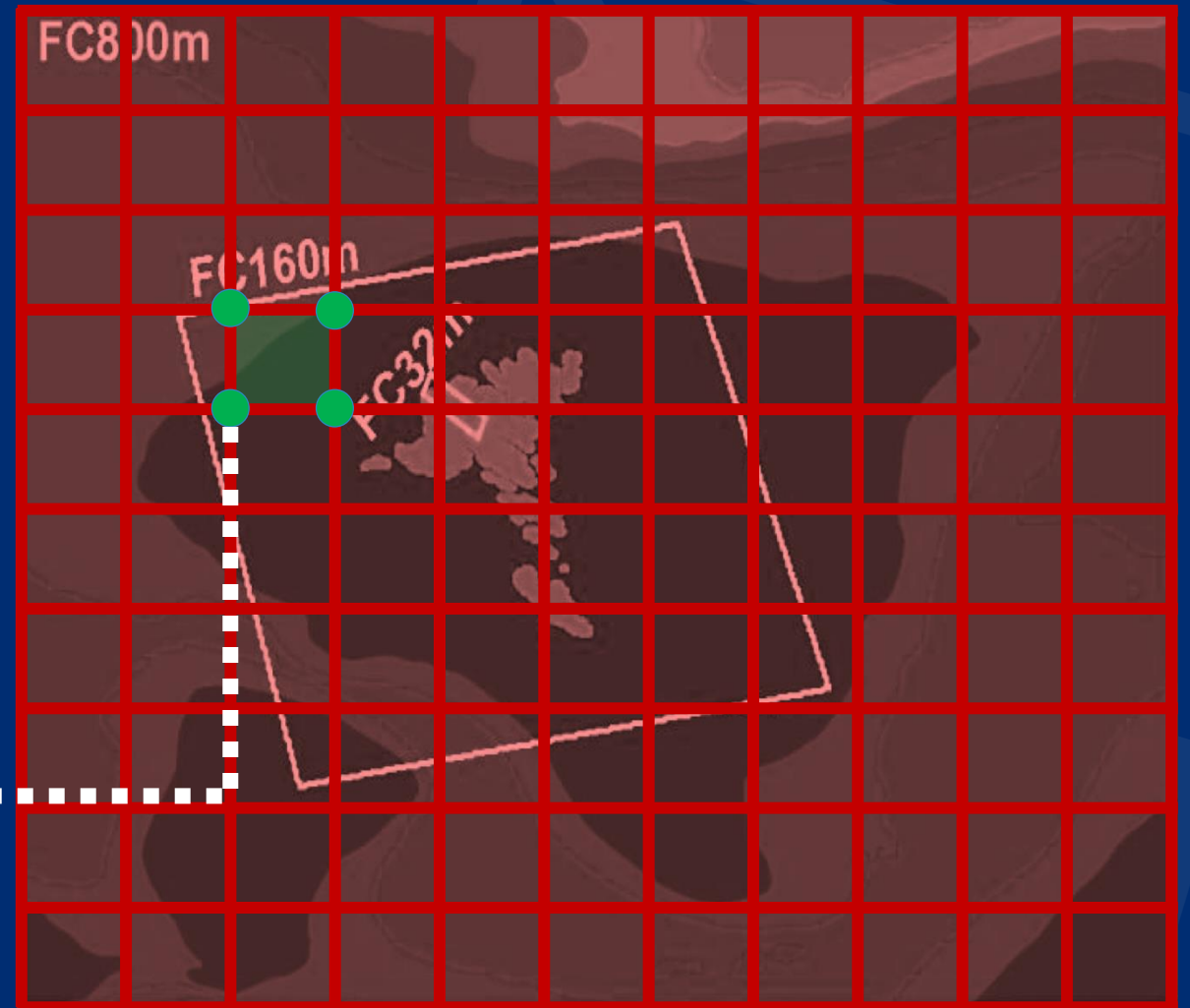
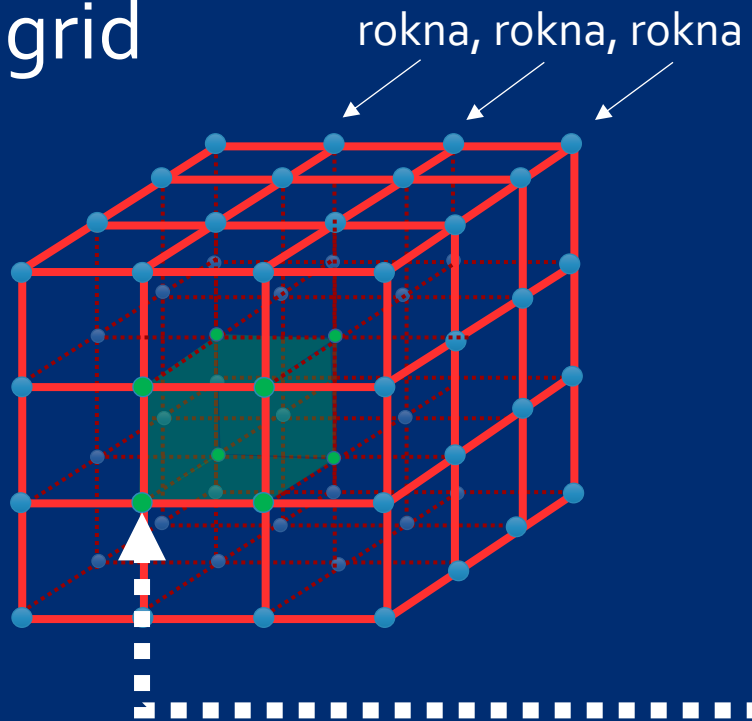
FarCoast – *heilt einkult!*

3D grid



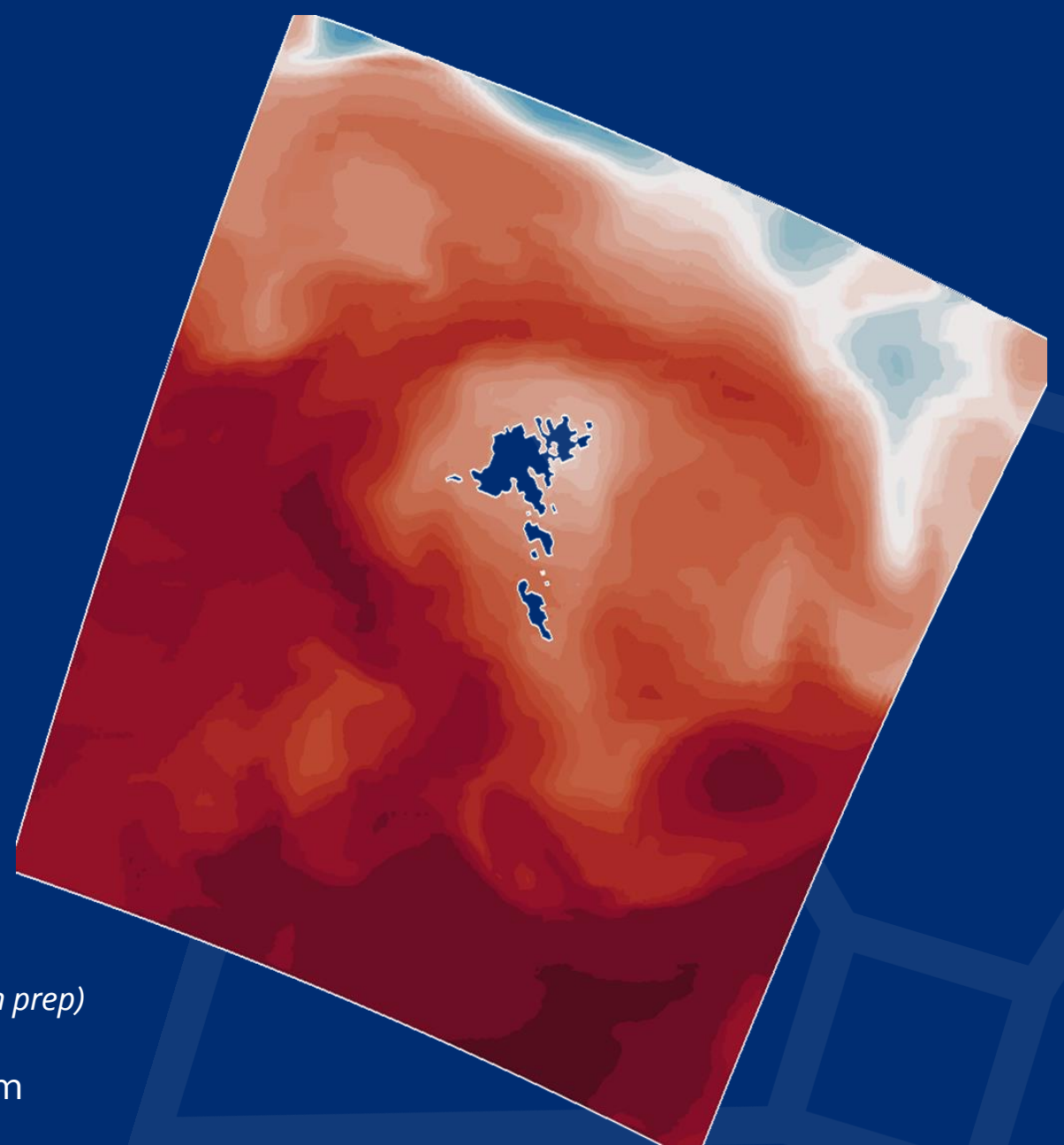
FarCoast – *heilt einkult!*

3D grid



FarCoast versiónir

- V₁
 - Resolutions: 800 m, 160 m og 32 m
 - Forcing:
 - Lateral: SVIM (4km)
 - Tidal: TPXO7.1
 - Atmospheric: WRF
 - River runoff: bert í Sundalagnum N
 - Validerað fyri ár 2013 (*Erenbjerg et al., 2020*)
- V₂
 - Resolutions: 2 km, 650 m, 130 m og 26 m
 - Forcing:
 - Lateral: GLORYS12V1 and Operational Mercator
 - Tidal: TPXO7.1
 - Atmospheric: ERA
 - River runoff: hydrological model FarRiv (*Erenbjerg, in prep*)
 - Validerað fyri 2 km (*Erenbjerg et al., in prep*)
 - Validering fyri rest er ávegis í ymiskum verkætlanum



Hitin í januar 2013, FarCoast V2

FarCoast í brúki

- **Verkætlanir í gongd:**

- **FMHAT** (Granskingarráðið), *føroyskur HPC miðdepil, 10 ára bókasavn av FarCoast V2*
- **FjordProcess** (MariNAO), *physics to fish*
- **BlueCea** (MariNAO), *tara botnseting case study í Føroyum og Grønlandi*
- **ADepoPlan** (Granskingarráðið), *botnfalsmyndlan*

- **Verkætlanir, ið fara í gongd:**

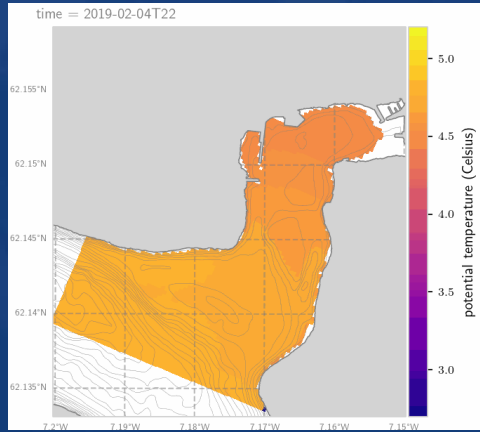
- **Samstarv við HAFRÓ**, *support til at seta IceROMS upp á firðunum í Íslandi*

- **Umsóknir til aðru rundu:**

- **OCCAM** (EU Horizon), *klimabroytingar og lús*
- **BLUECAST** (EU SBEP), *flutningur av føðslusøltum (nutrient flux)*

Bitlasporing - heilt einkult!

Vit brúka m.a. LADiM



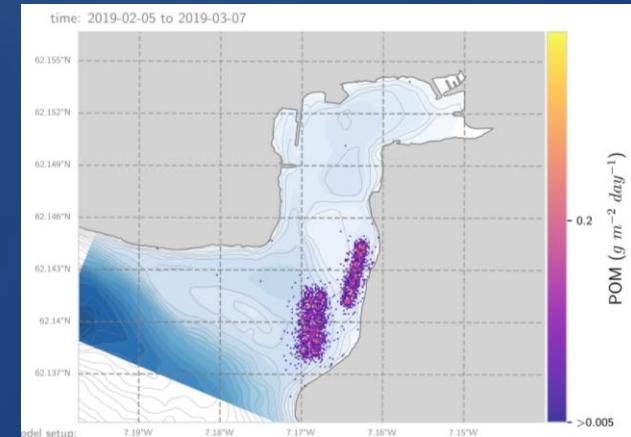
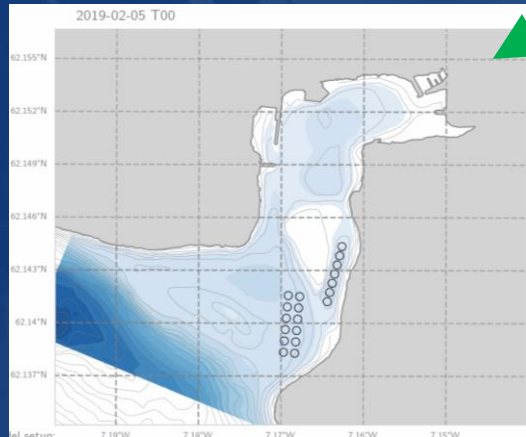
Hydrodynamic
model
Havmyndil

+

Lagrangian particle
tracking model
Bitlasporingsmodel

→

Connectivity matrix/
networks/concentrations



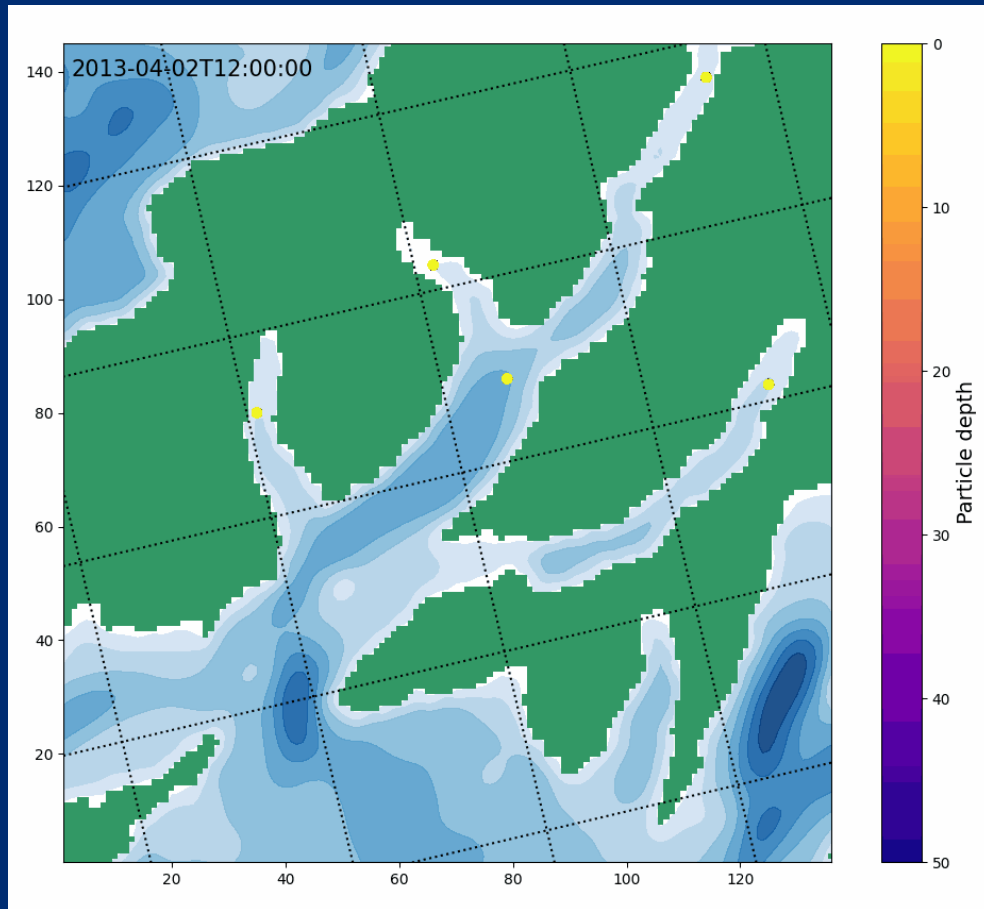
$$\text{Næsta position} = \text{fyrra position} + \text{flutningur} \pm \text{atburður} \pm \text{sökkiferð} \pm \text{random walk}$$

Velocity (m/s) · tíðarskritt (s)

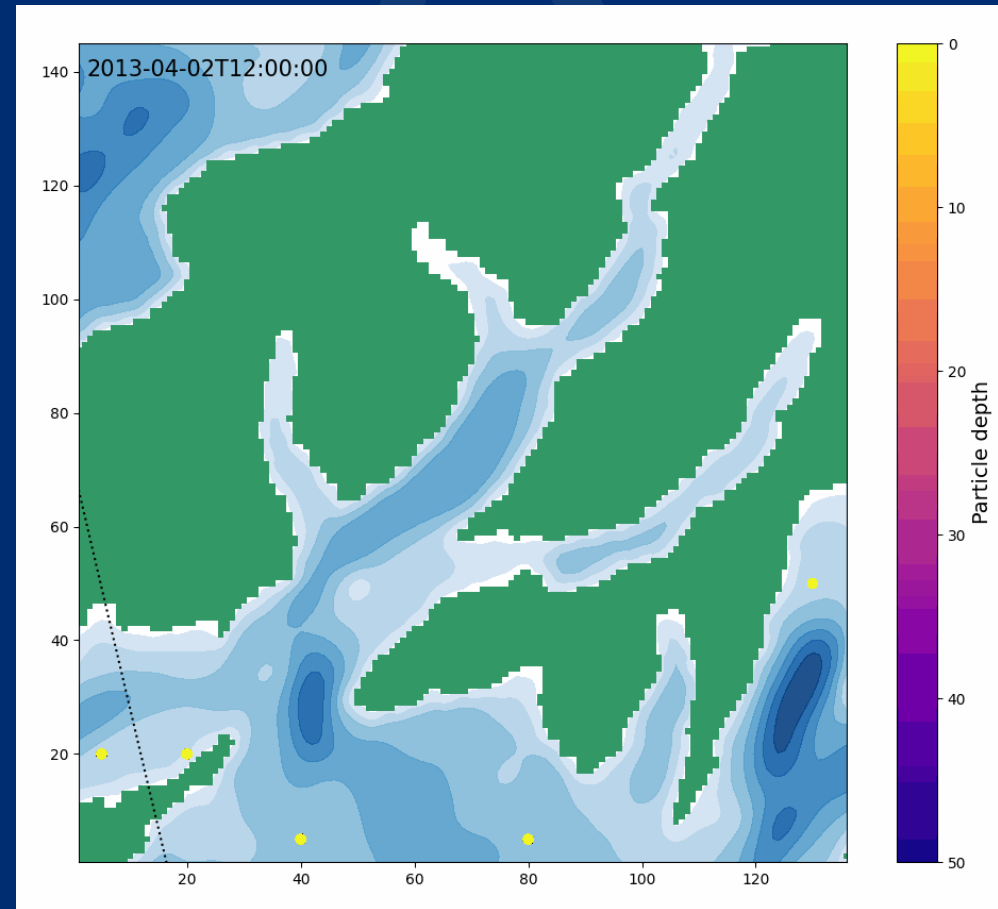
Eginleikar hjá bitlinum

FjordProcess

Hvussu bitlar/lívrinnið tilfar ferðast inn á firðirnar



Bitlar sleptir innarlaga



Bitlar sleptir uttarlaga

SLUG

SeaLice Uncertainty Group

- samstarv millum Scotland, Norra og Føroyar
- LADiM *Salmon Lice*
 - Slept frá øllum aliøkjum
 - Uml 5000 bitlar um dagin
 - 21 dagar

→ Connectivity matrix



10. – 31. oktober 2017

Forecast: 04-nov-2024 – 13-nov-2024

Forsøgnir !!

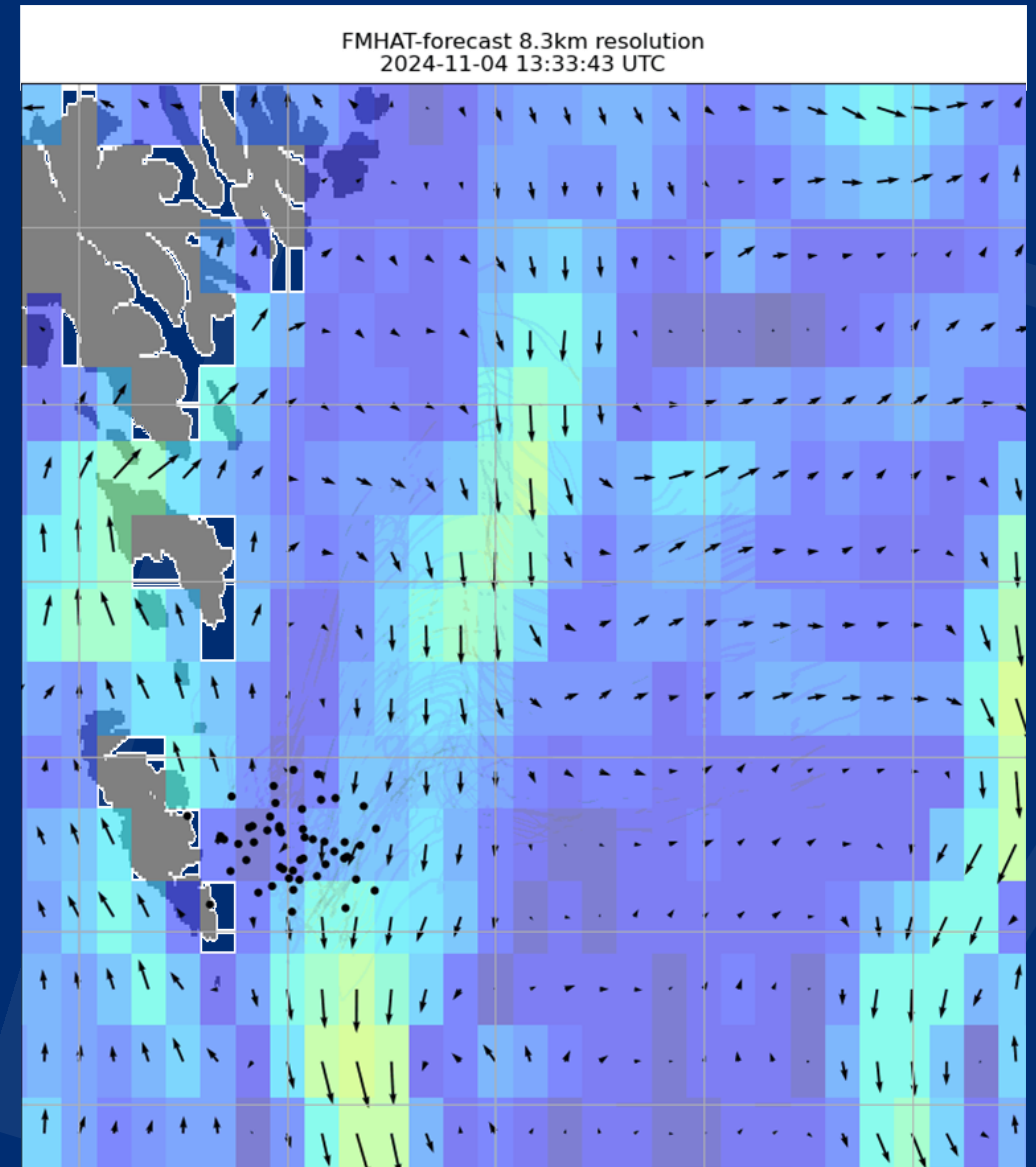
particle tracking í framtíðini!

Forcing (tað sama sum V2):

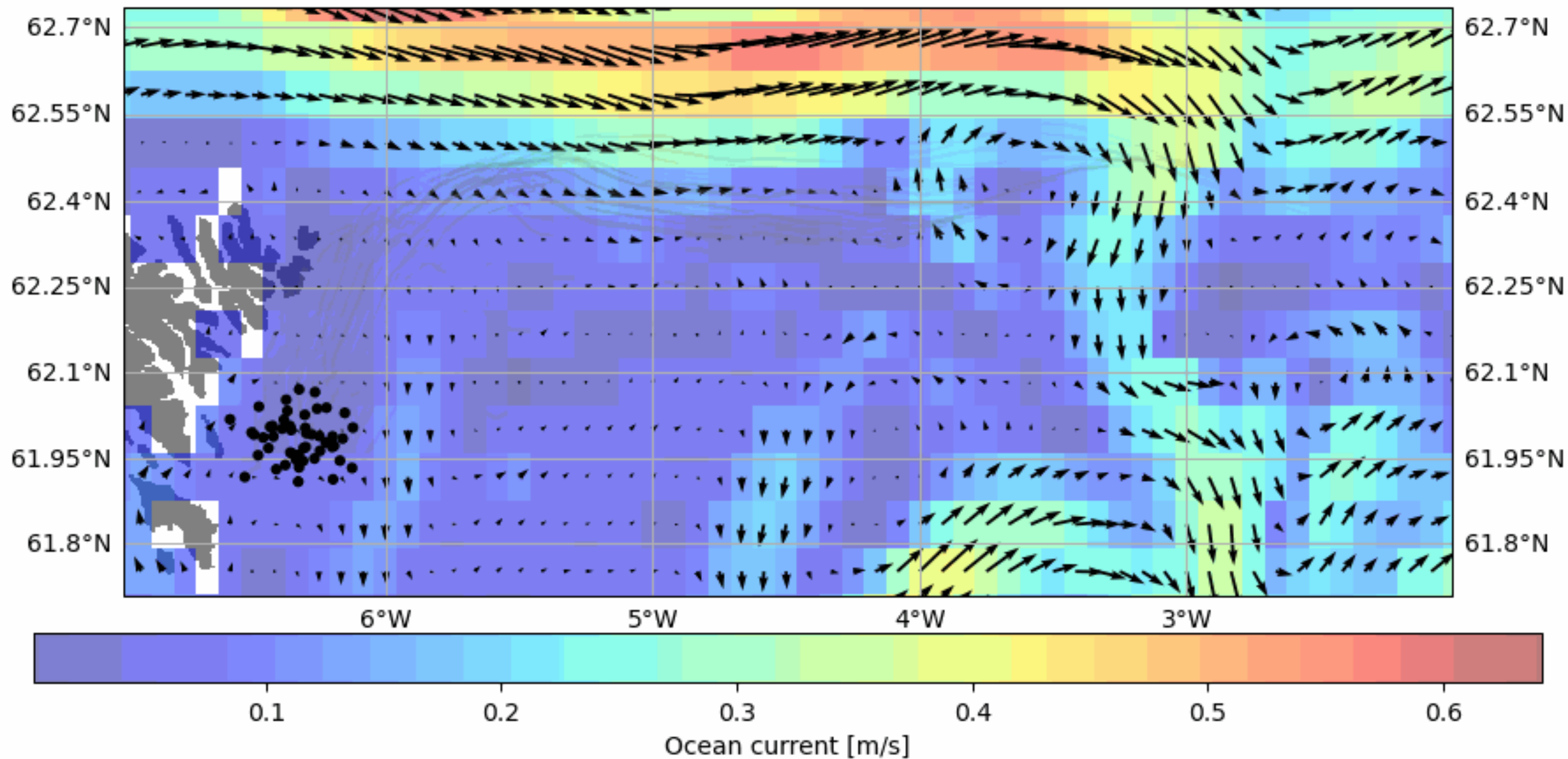
Lateral: Mercator Ocean GLO12

- 9 daga forsøgn
- Uml 8.3 km upploysing
 - Tað sum er í gratis versiónini 😊

(Lellouche et al., 2021)



FMHAT-forecast 8.3km resolution
2024-11-04 13:07:24 UTC



ADepoPlan

Accessible deposition modelling tools for improved environmental planning
sep 2023 – des 2025

Samstarvspartar:

Verkætlanin ADepoPlan er fíggað av:



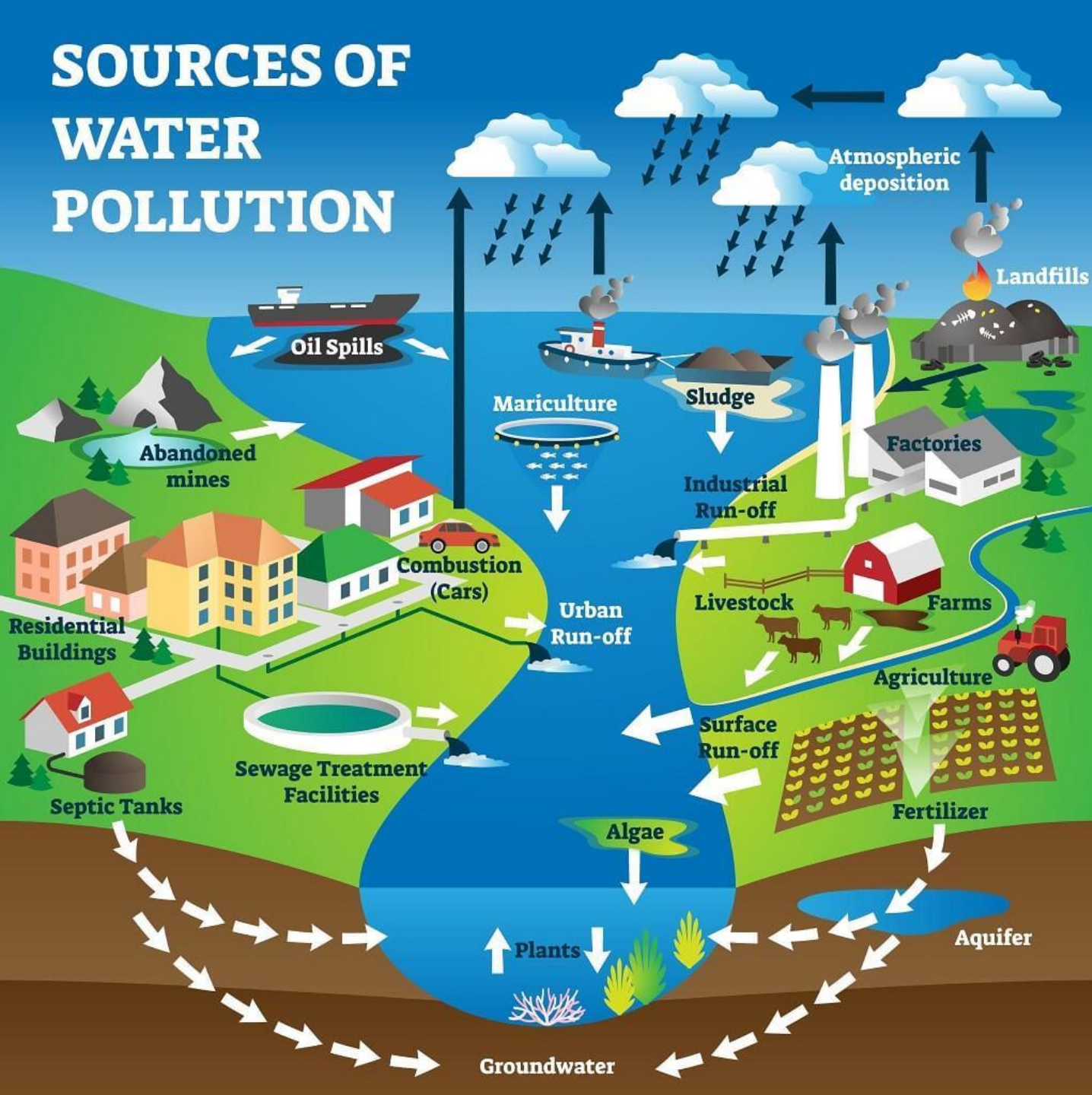
Vikmar



HIDDENFJORD
RAISED IN THE WILD

UMHVØRVISMÁLARÁÐIÐ
Ministry of Environment

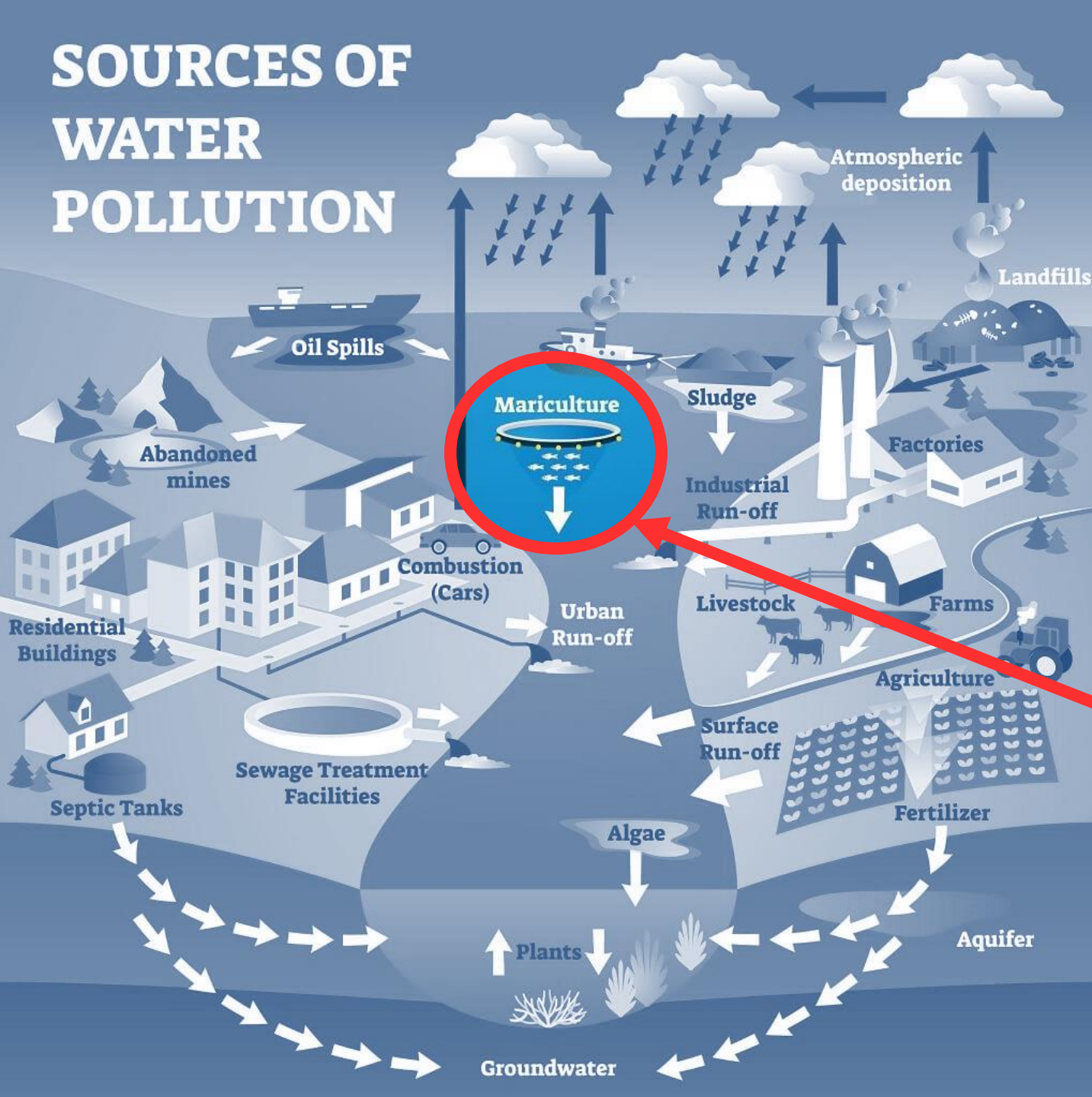
SOURCES OF WATER POLLUTION



Nógvar
dálkingarkeldur



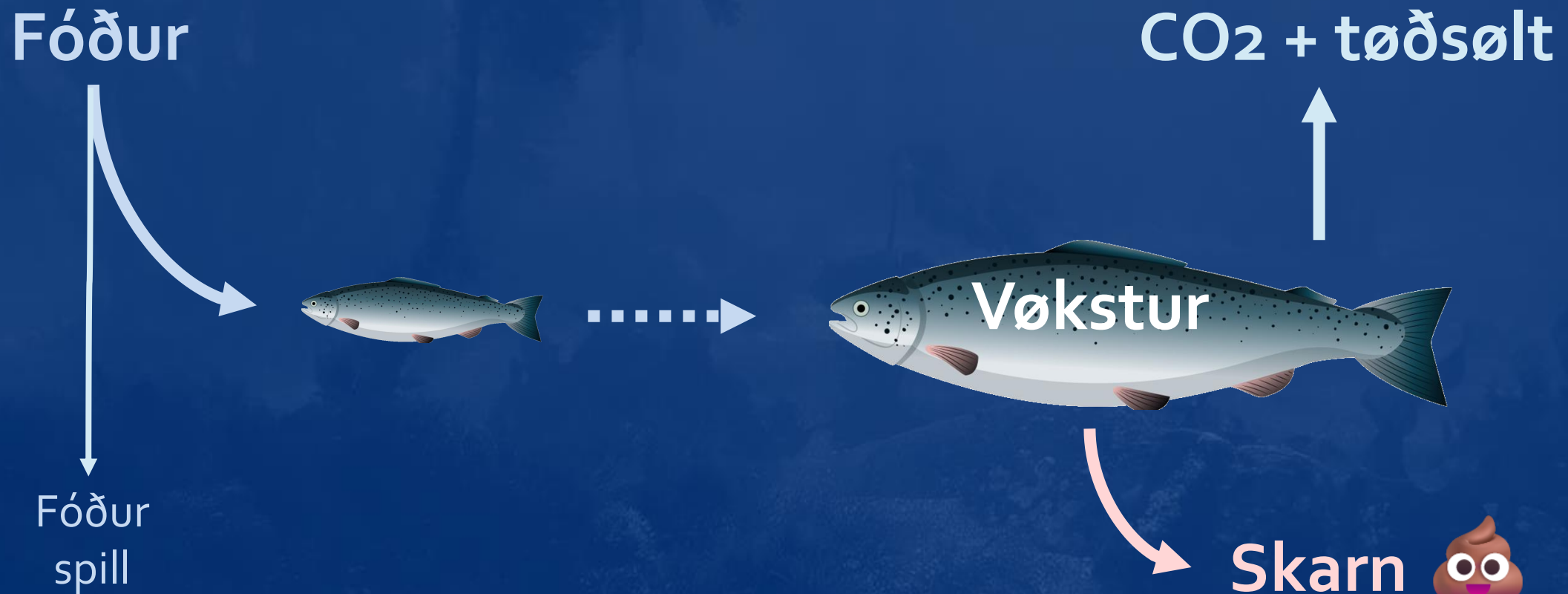
SOURCES OF WATER POLLUTION



Nógvar
dálkingarkeldur

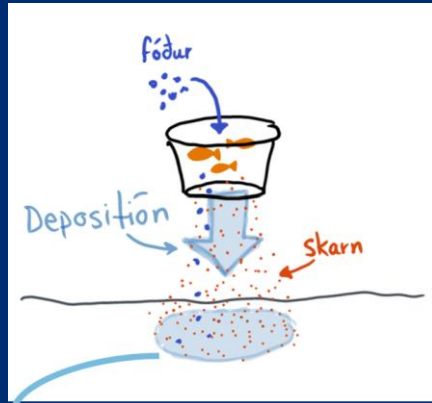
Laksaaling 🍌

Massa balansu modellir

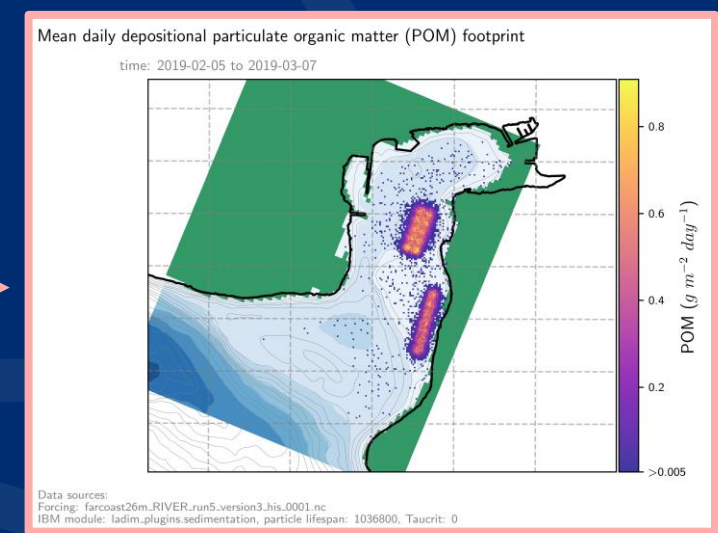
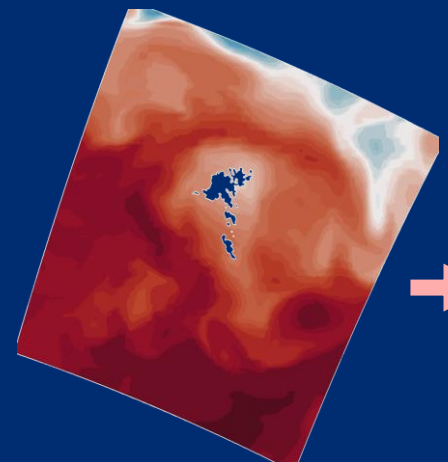
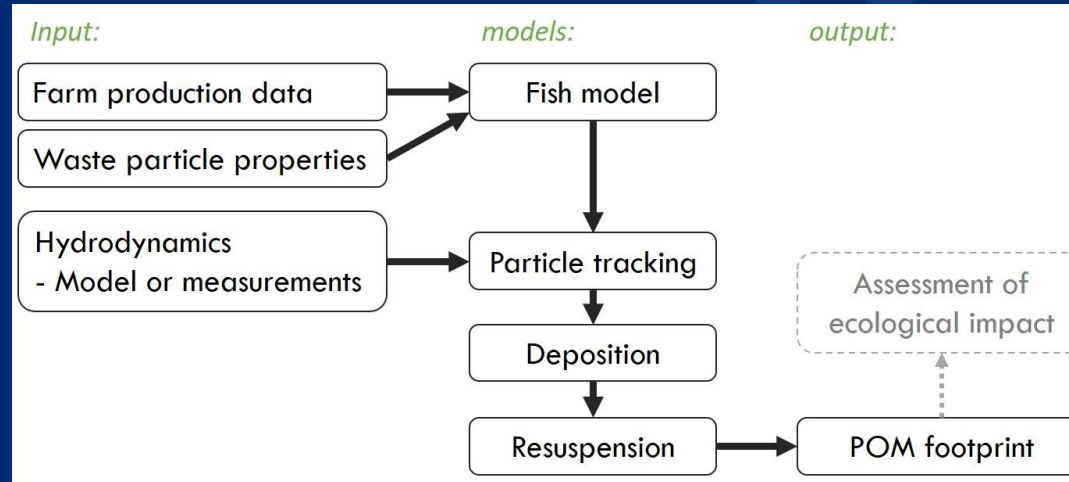


ADepoPlan → modelling, validation and accessibility

Accessible deposition modelling tools for improved environmental planning



Particulate Organic Matter (POM) footprint



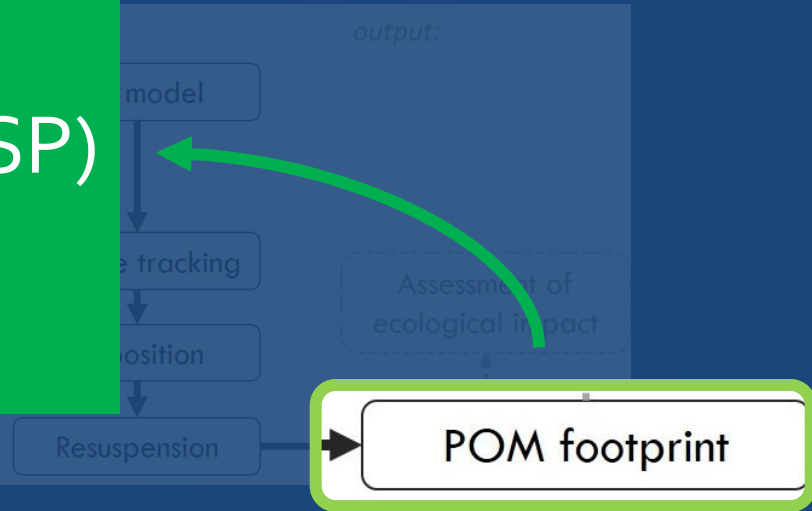
ADepoPlan → modelling, validation and accessibility

Accessible deposition modelling tools for improved environmental planning

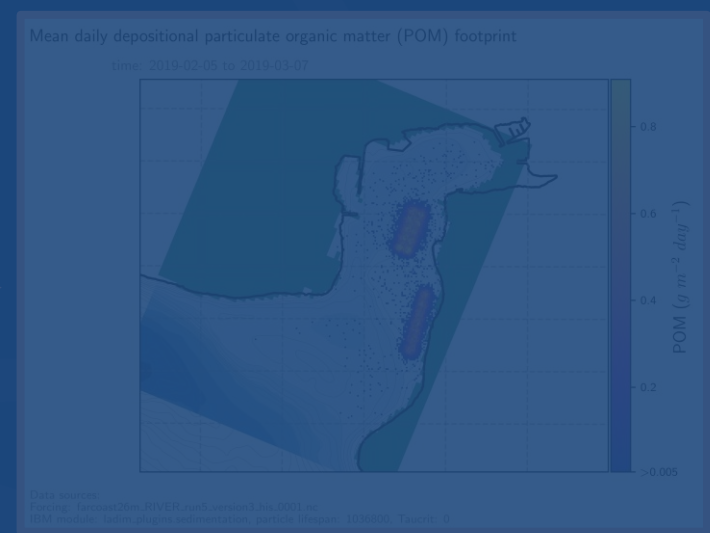
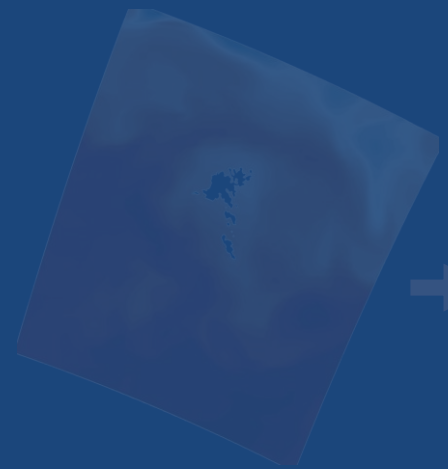
Kennir man POM footprintið

- Betri umhvervisráðlegging (MSP)
- Betri sýnistøkuætlan
- Betri eftiransing

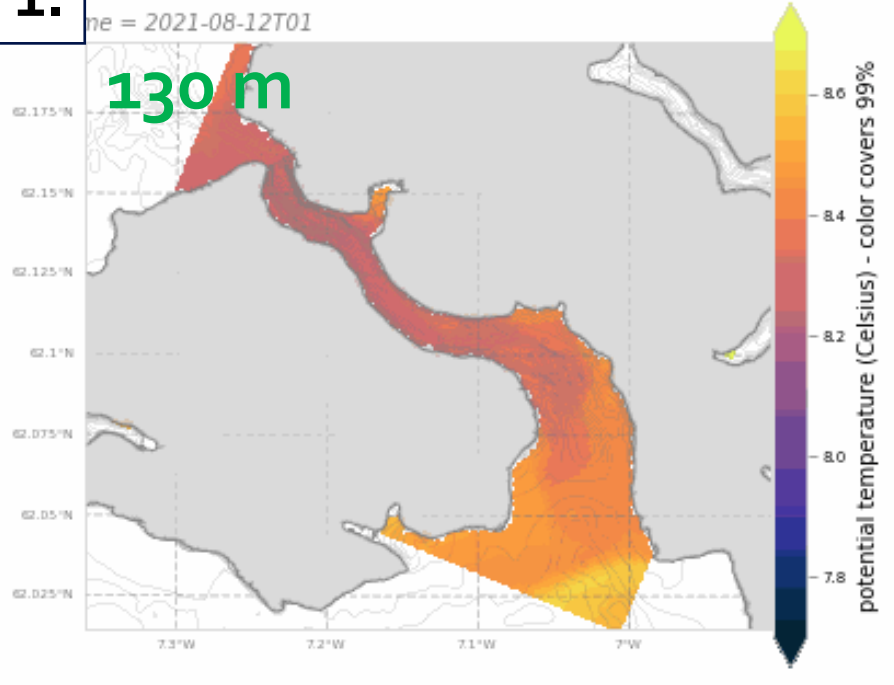
Particulate Organic Matter (POM) footprint



POM footprint

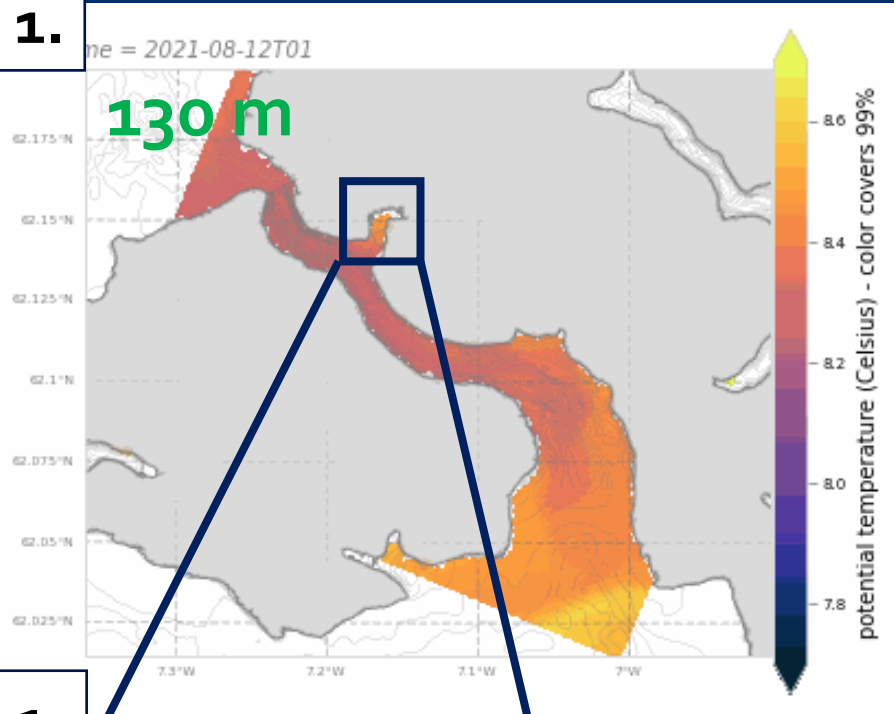


1.

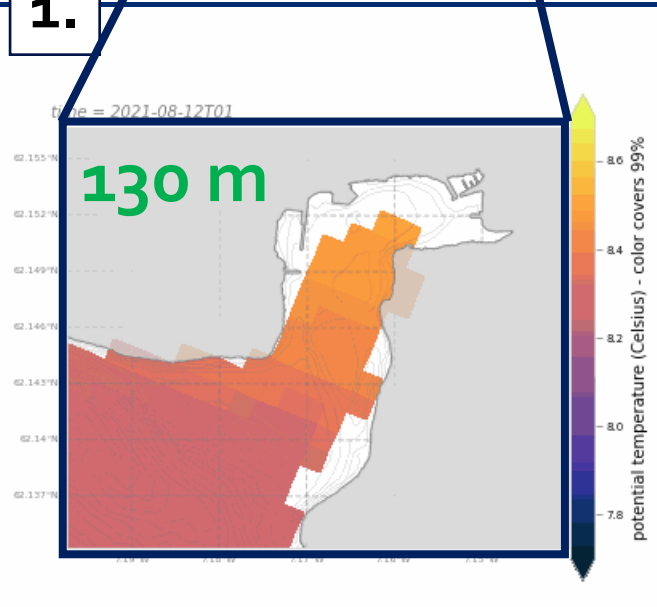


FarCoast V2 til ADepoPlan
- *gongdin higartil...*

1.

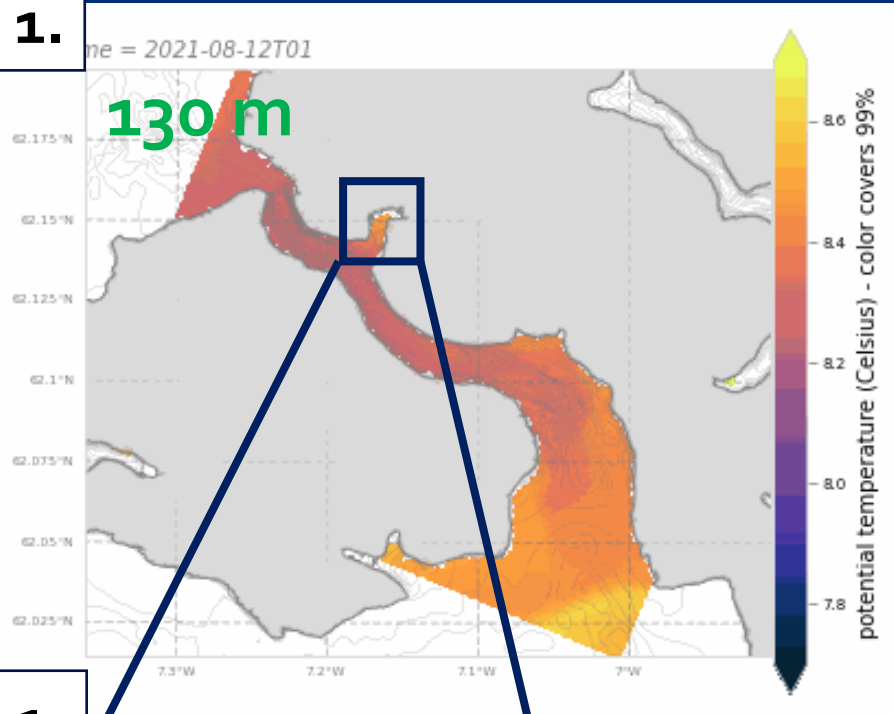


1.

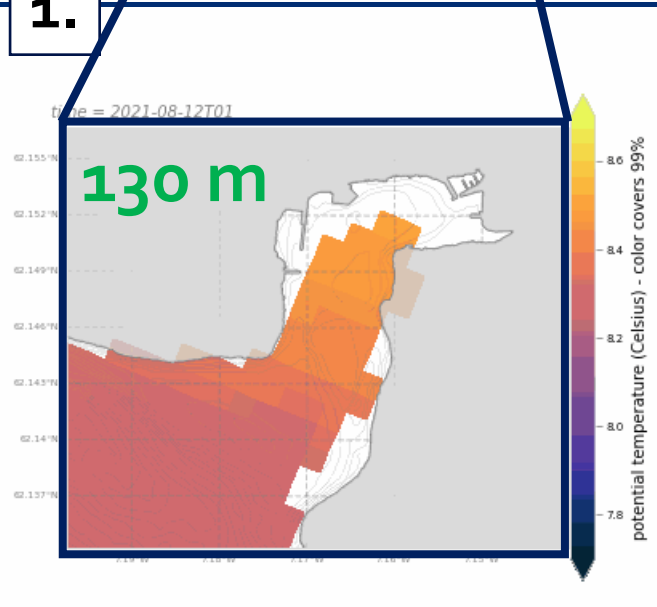


FarCoast V2 til ADepoPlan
- *gongdin higartil...*

1.

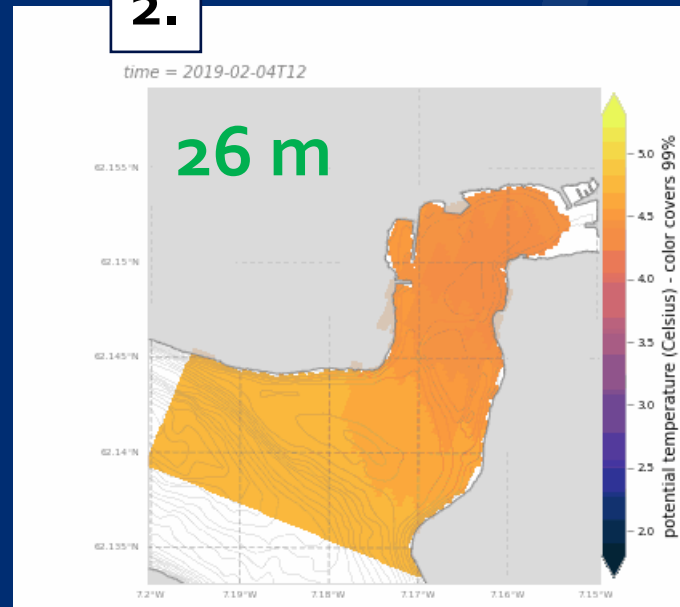


1.

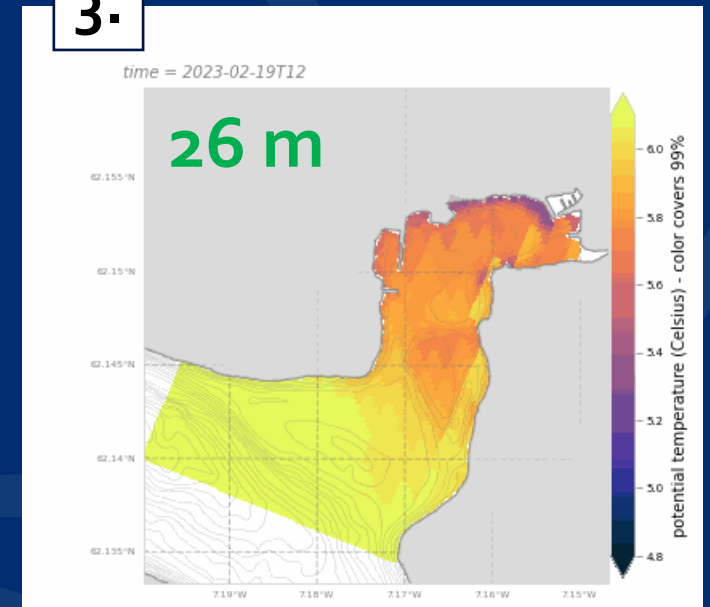


FarCoast V2 til ADepoPlan - *gongdin higartil...*

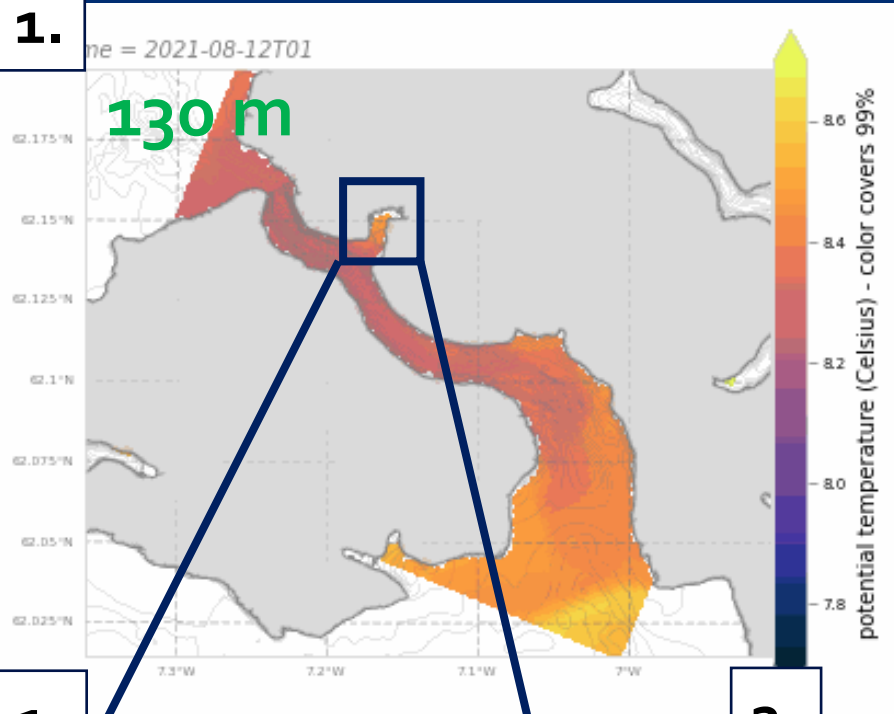
2.



3.

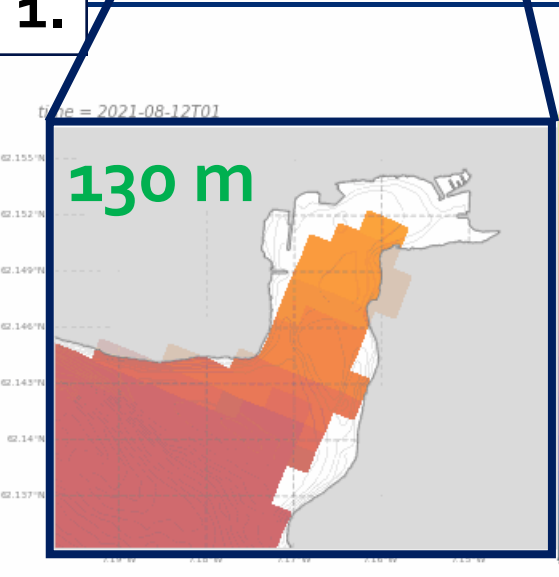


1.

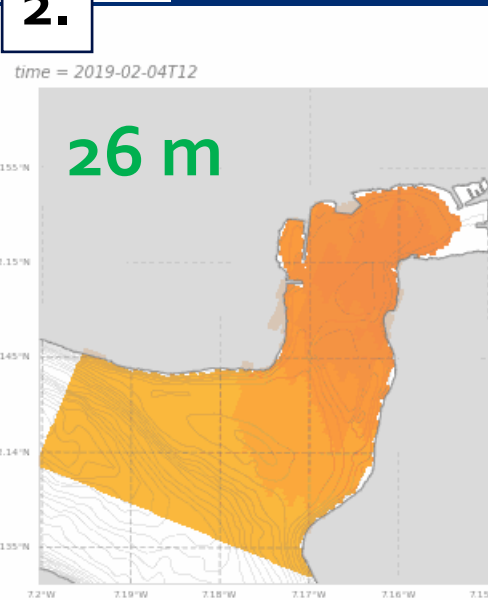


FarCoast V2 til ADepoPlan - gongdin higartil...

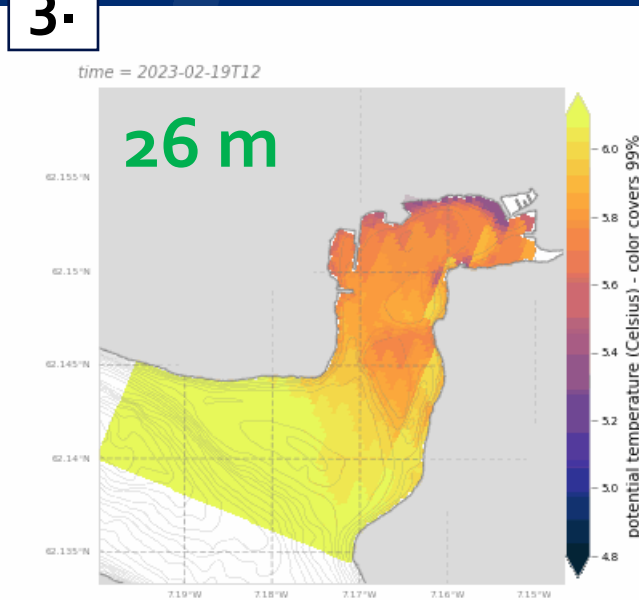
1.



2.



3.



4.

Koyra fyri 2 ár
á 26 m

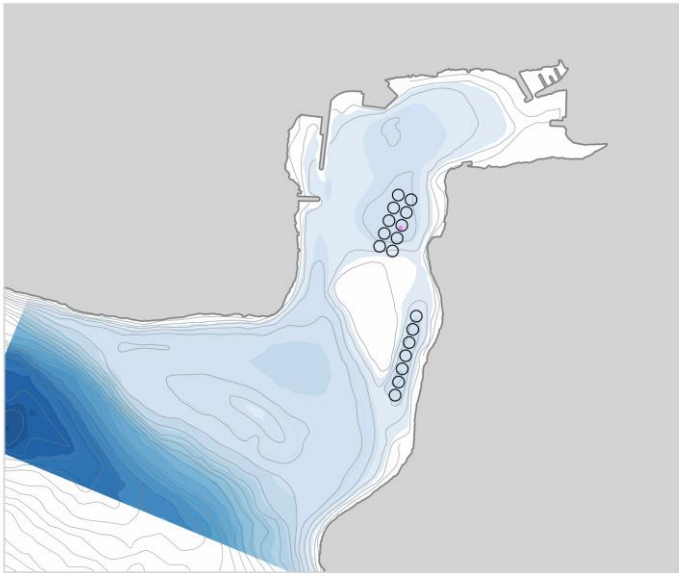
Resuspensión

eingin

"standard"

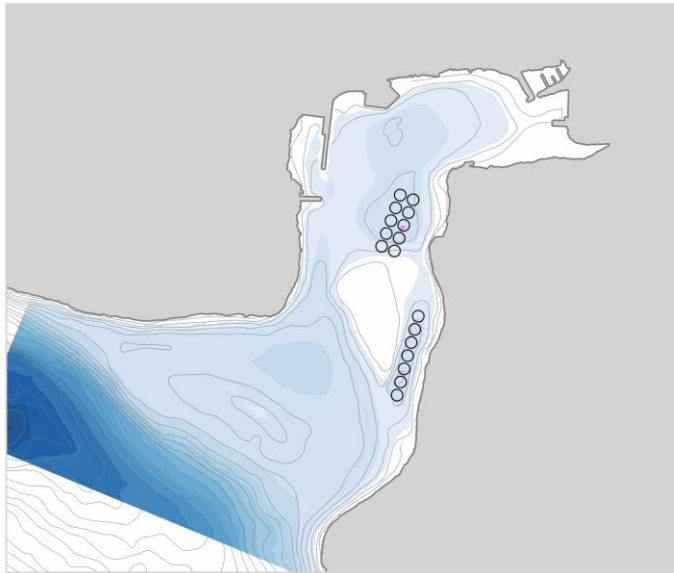
alt

2019-02-05 T00



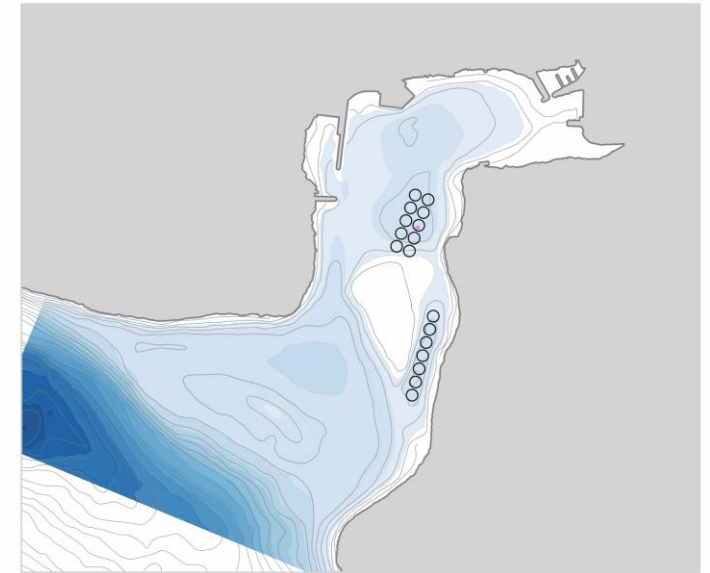
Model setup:
Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 1000
Model timestep: 60 s, output: 24 h

2019-02-05 T00



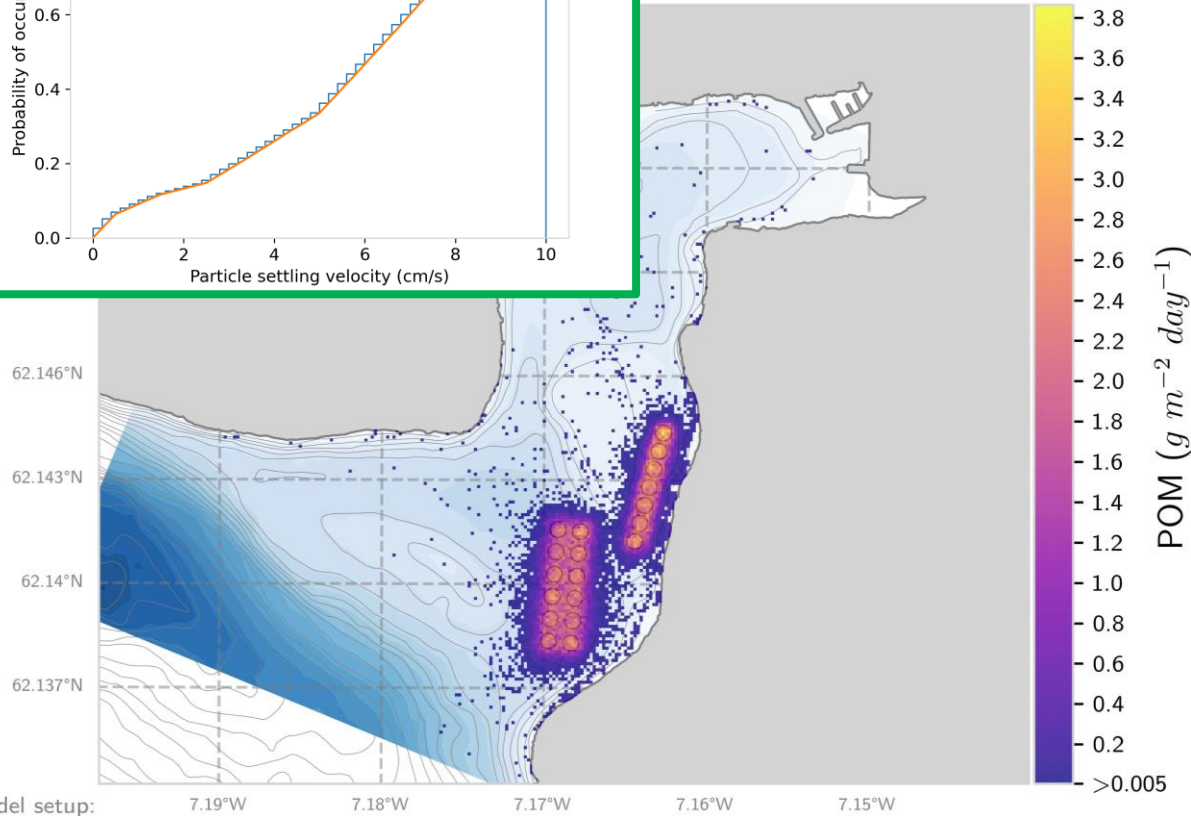
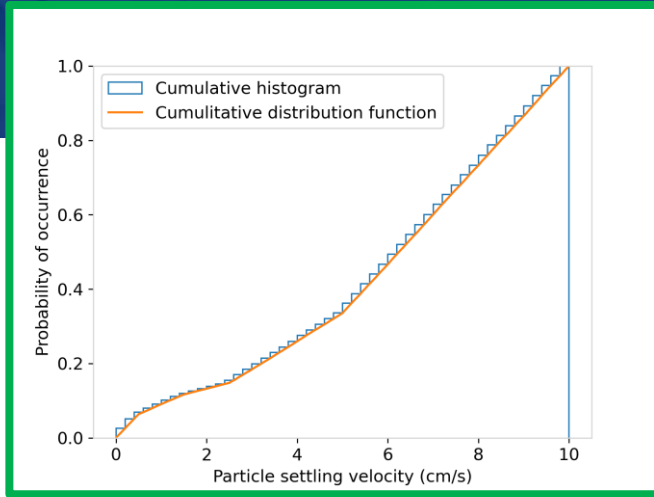
LADiM model setup:
Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 0.018
Model timestep: 60 s, output: 24 h

2019-02-05 T00

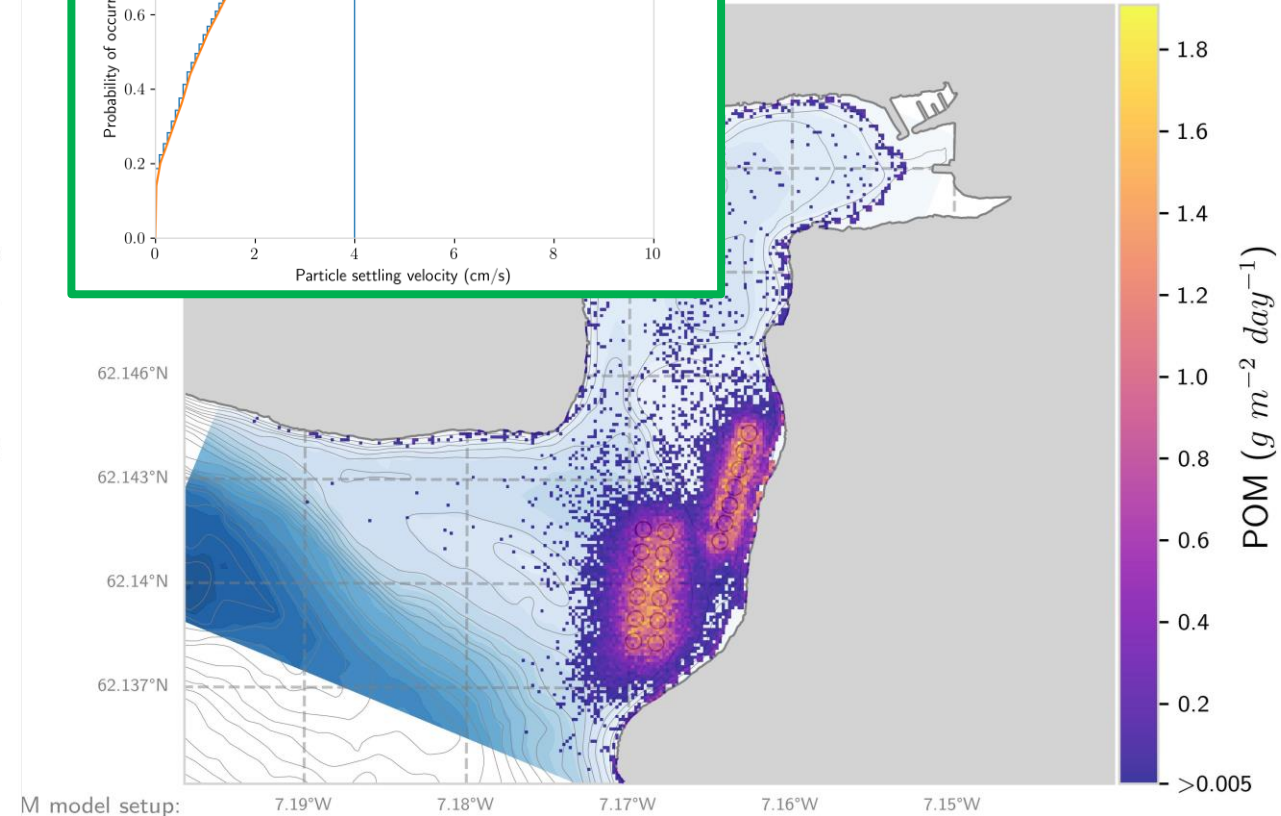
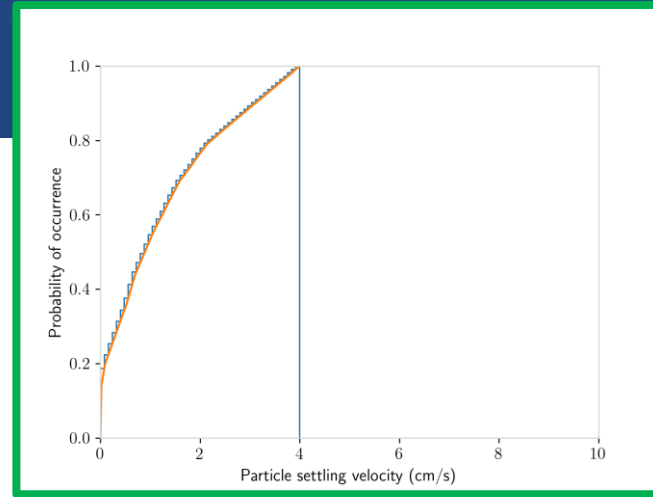


LADiM model setup:
Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 0
Model timestep: 60 s, output: 24 h

Bitlabýti - søkkiferð (cm s^{-1}) - *mean daily deposition*



Bannister et al., 2016

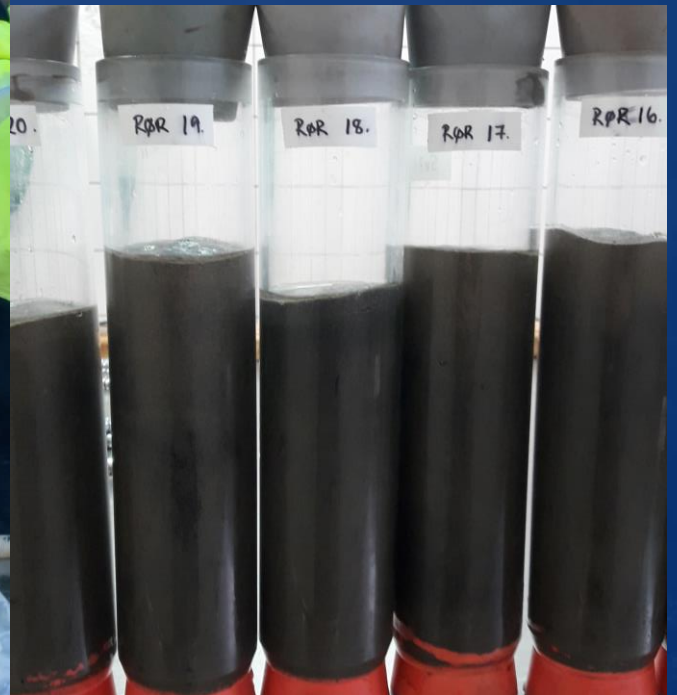


Naudé et al., 2024

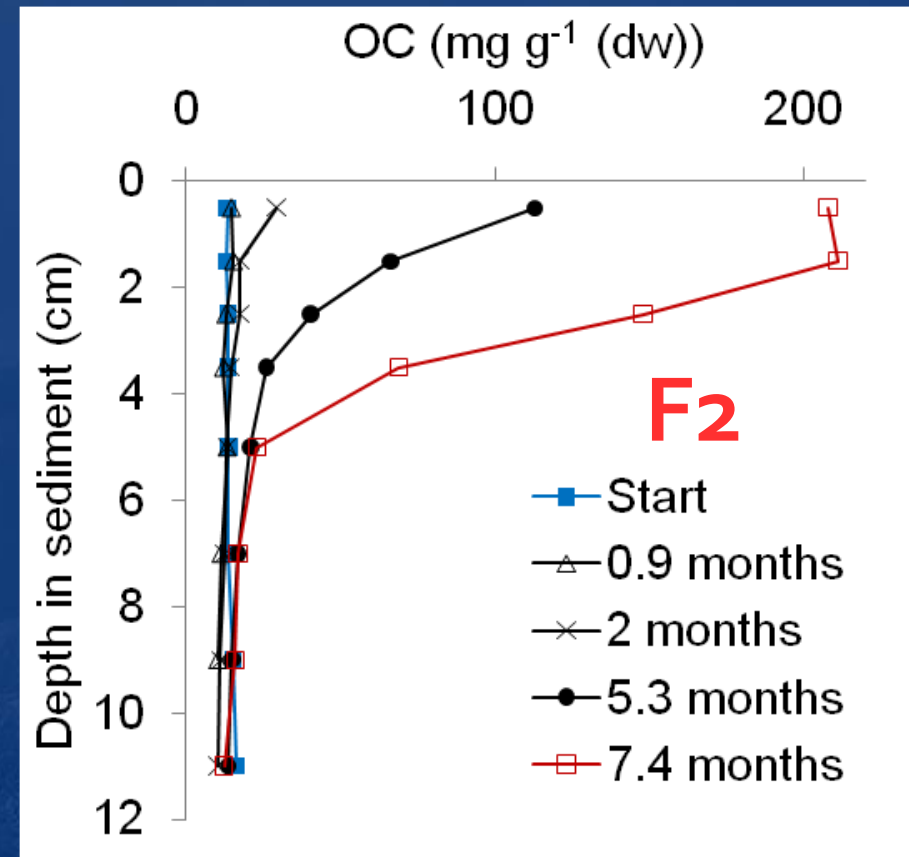
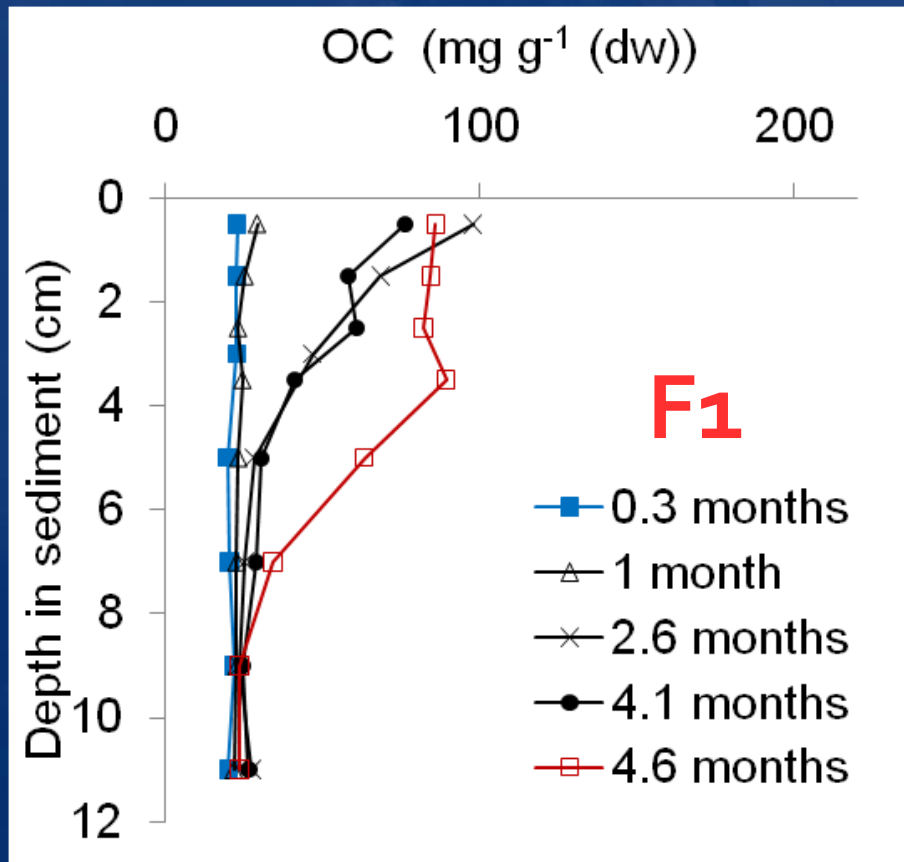
Hvussu samsvarar?

Validation studies

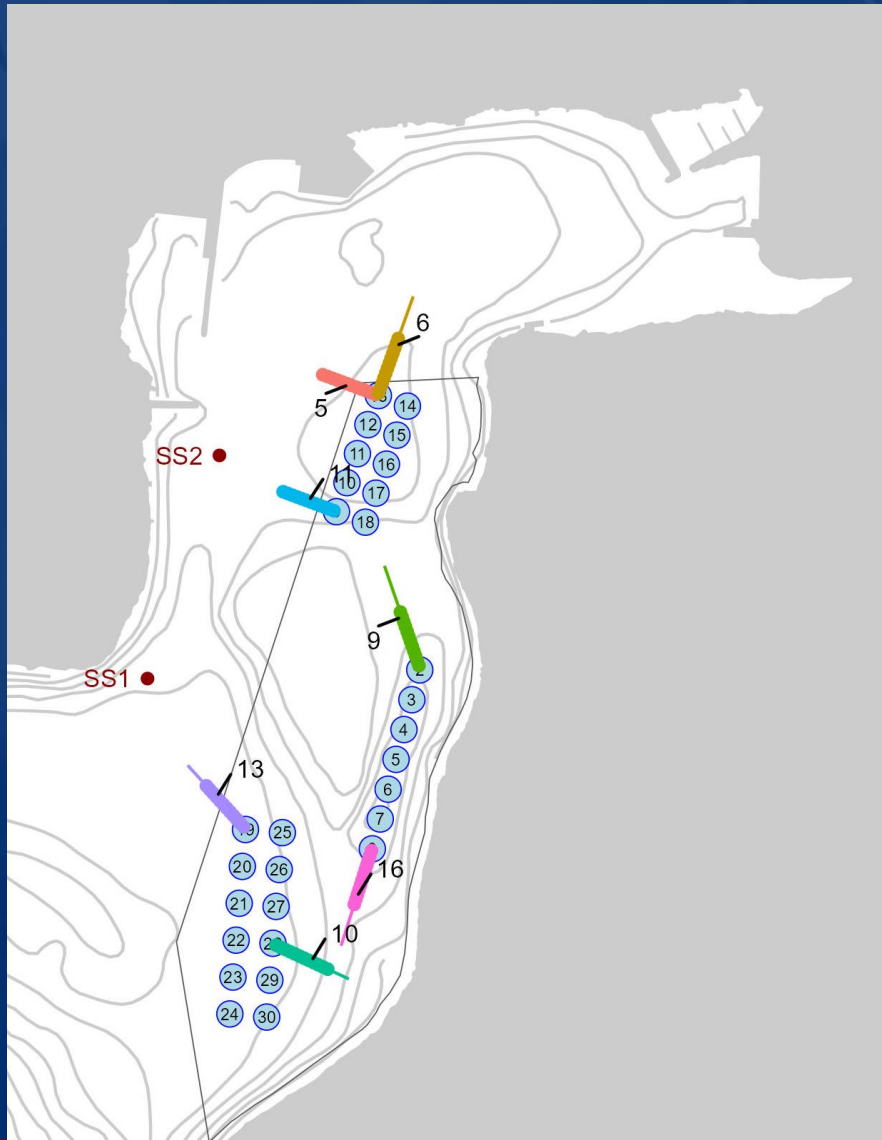
Sediment kjarnir



Organic Carbon in sediment

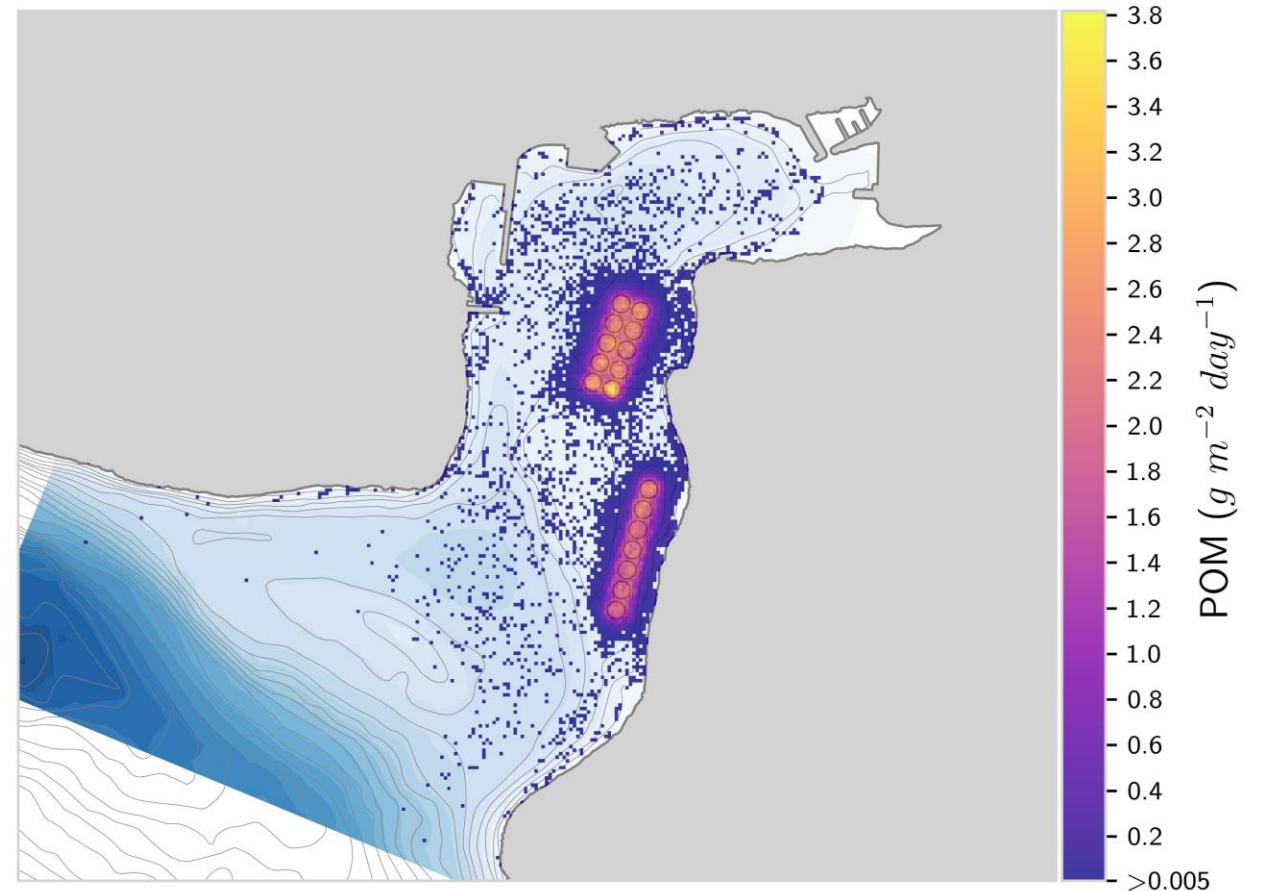


ADepoPlan Sýnistøka



Mean daily depositional particulate organic matter (POM) footprint

time: 2019-02-05 to 2019-03-07



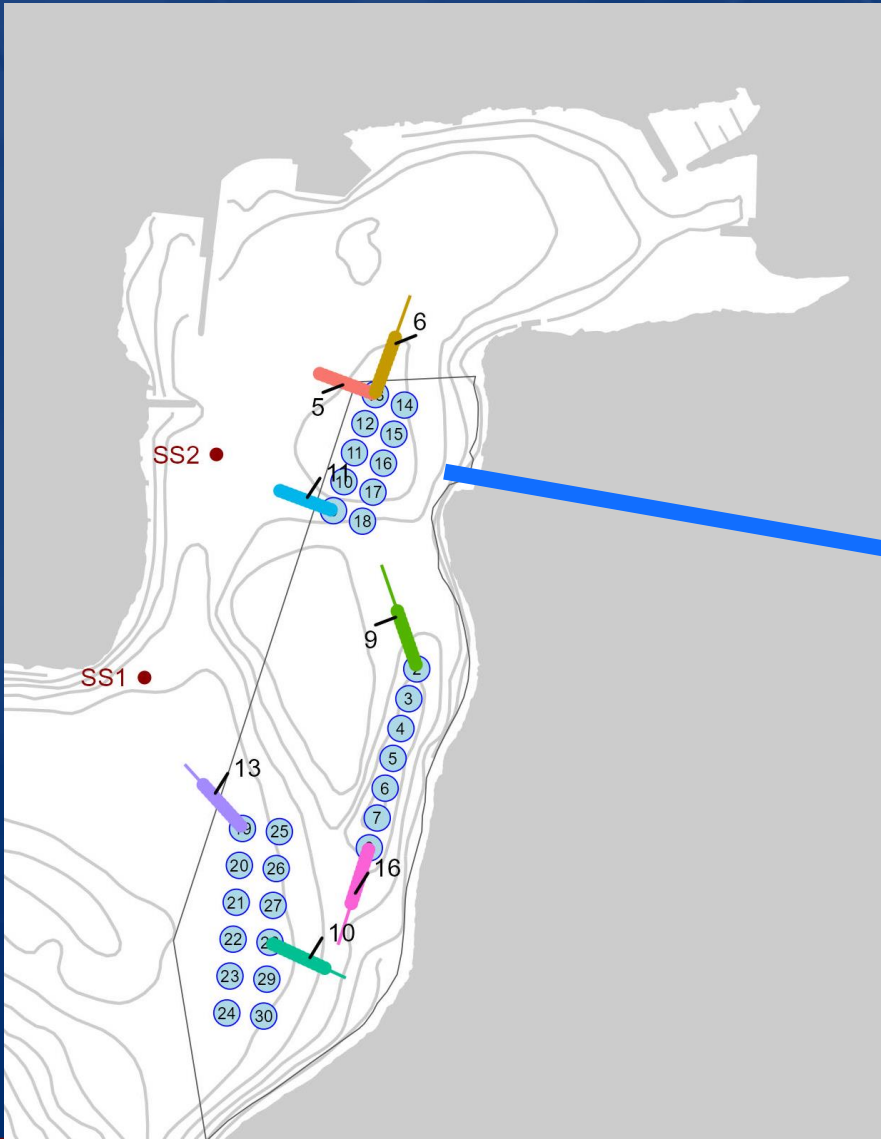
LADiM model setup:

Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc

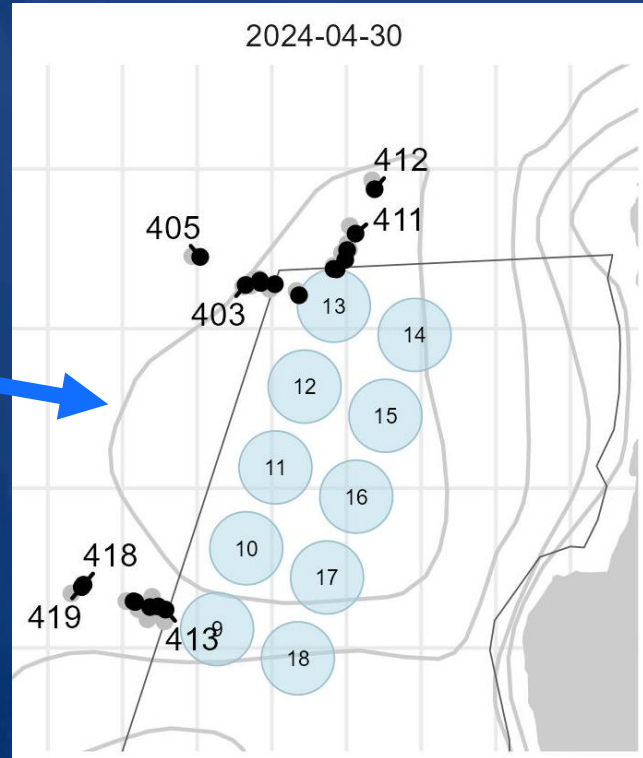
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 0.018

Model timestep: 60 s, output: 24 h

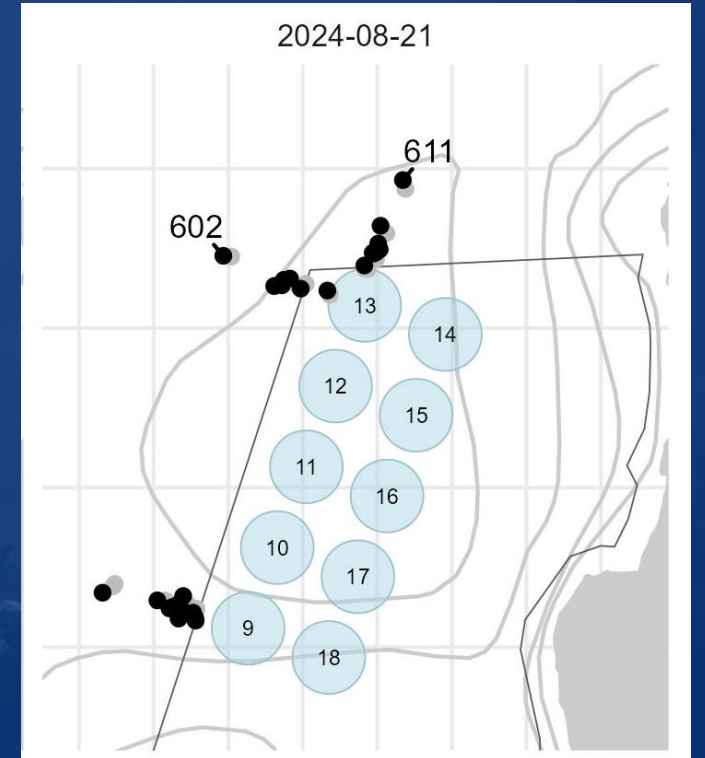
A DepoPlan Sýnistøka



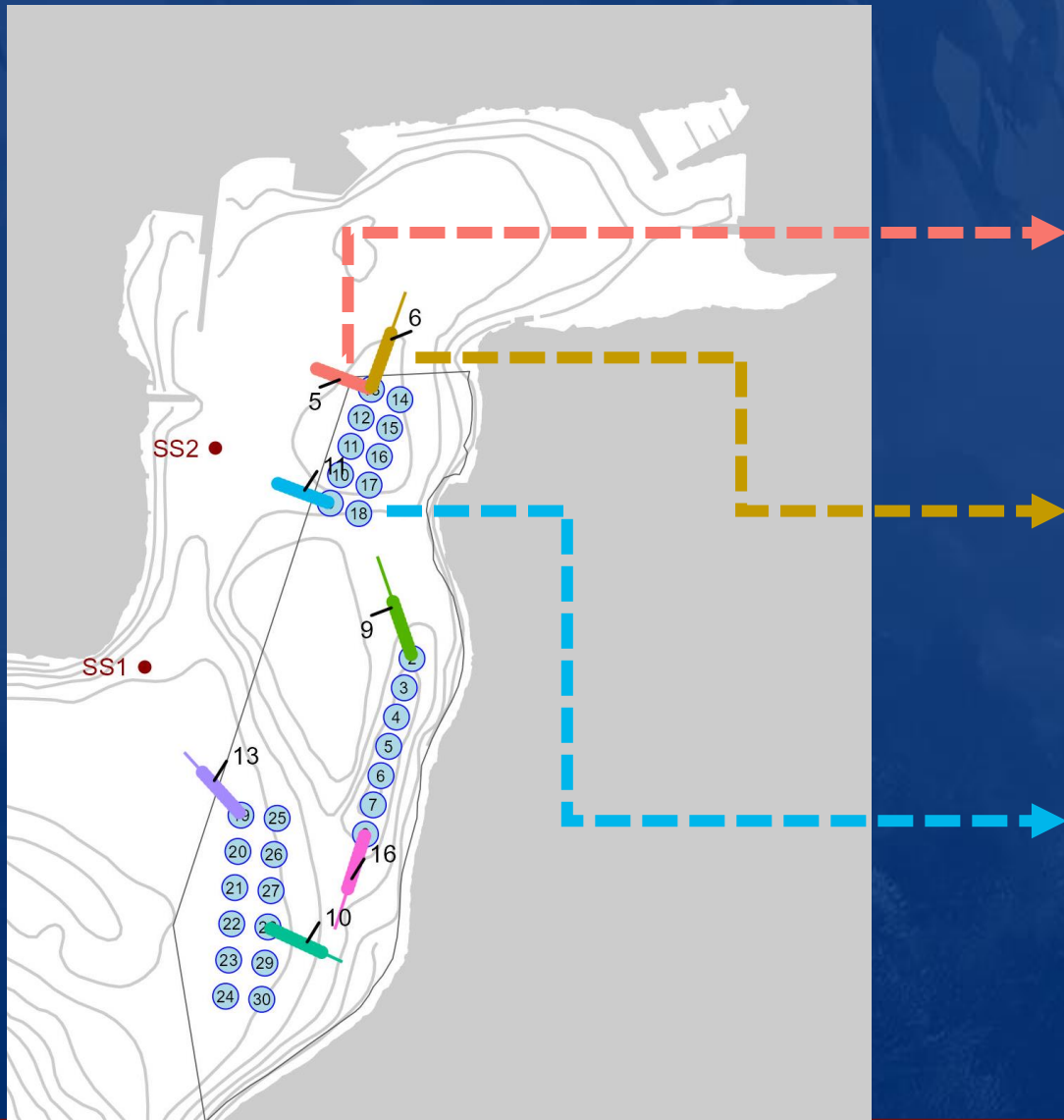
Áðrenn fiskur varð settur út



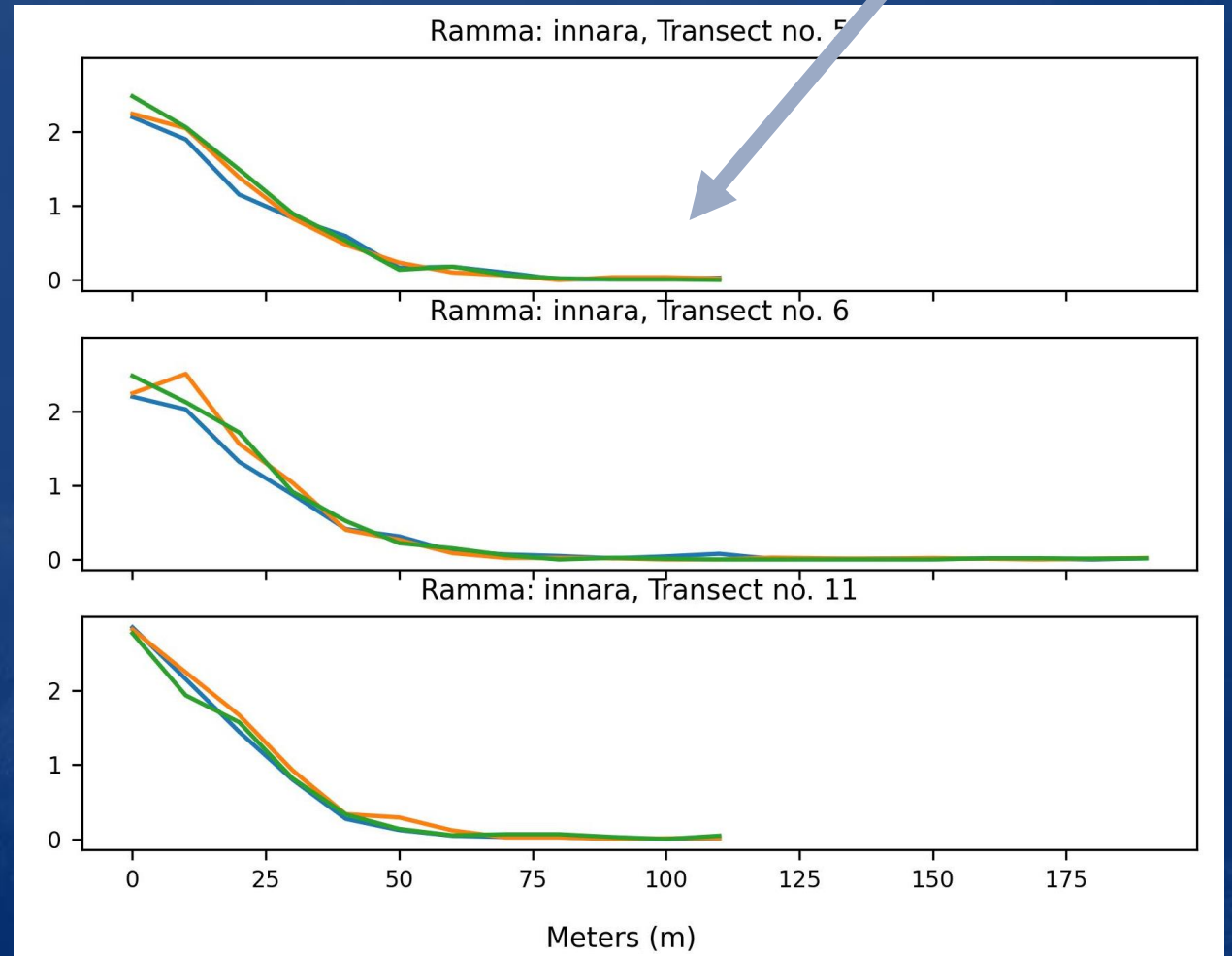
Størsta biomassa



A DepoPlan Sýnistøka



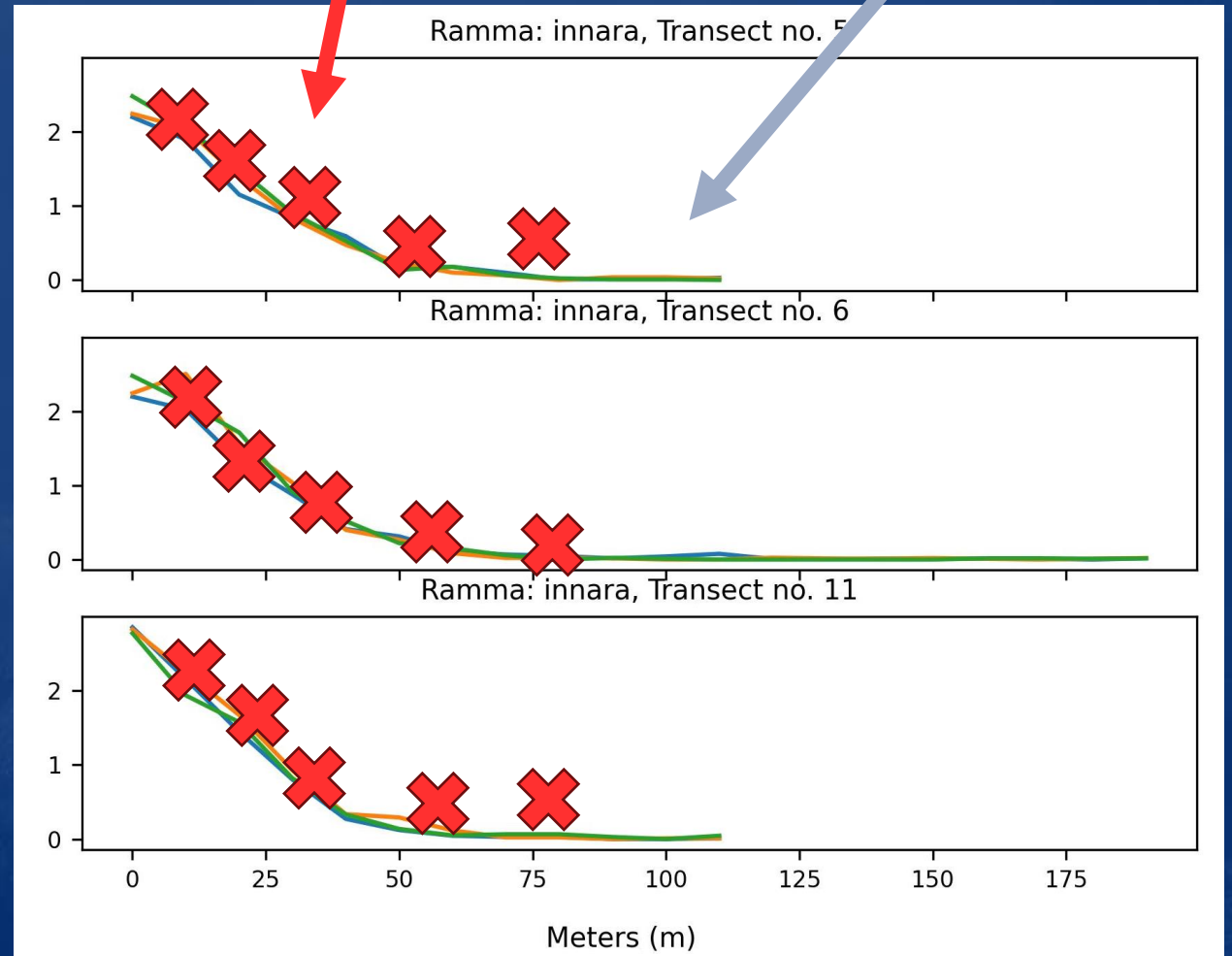
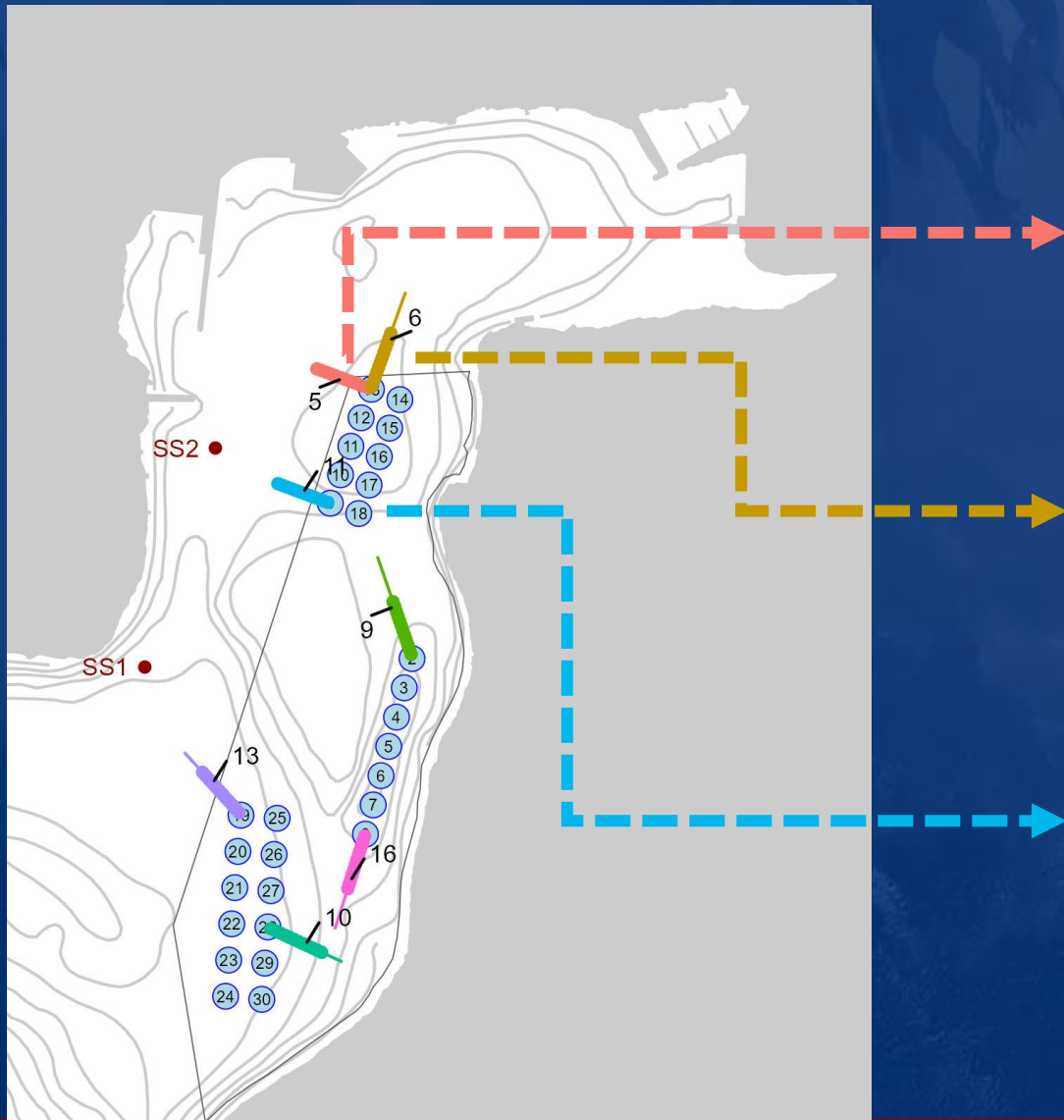
Model úrslit



A DepoPlan Sýnistøka

Mátingar úrslit
klár í 2025

Model úrslit



Samantumtøka

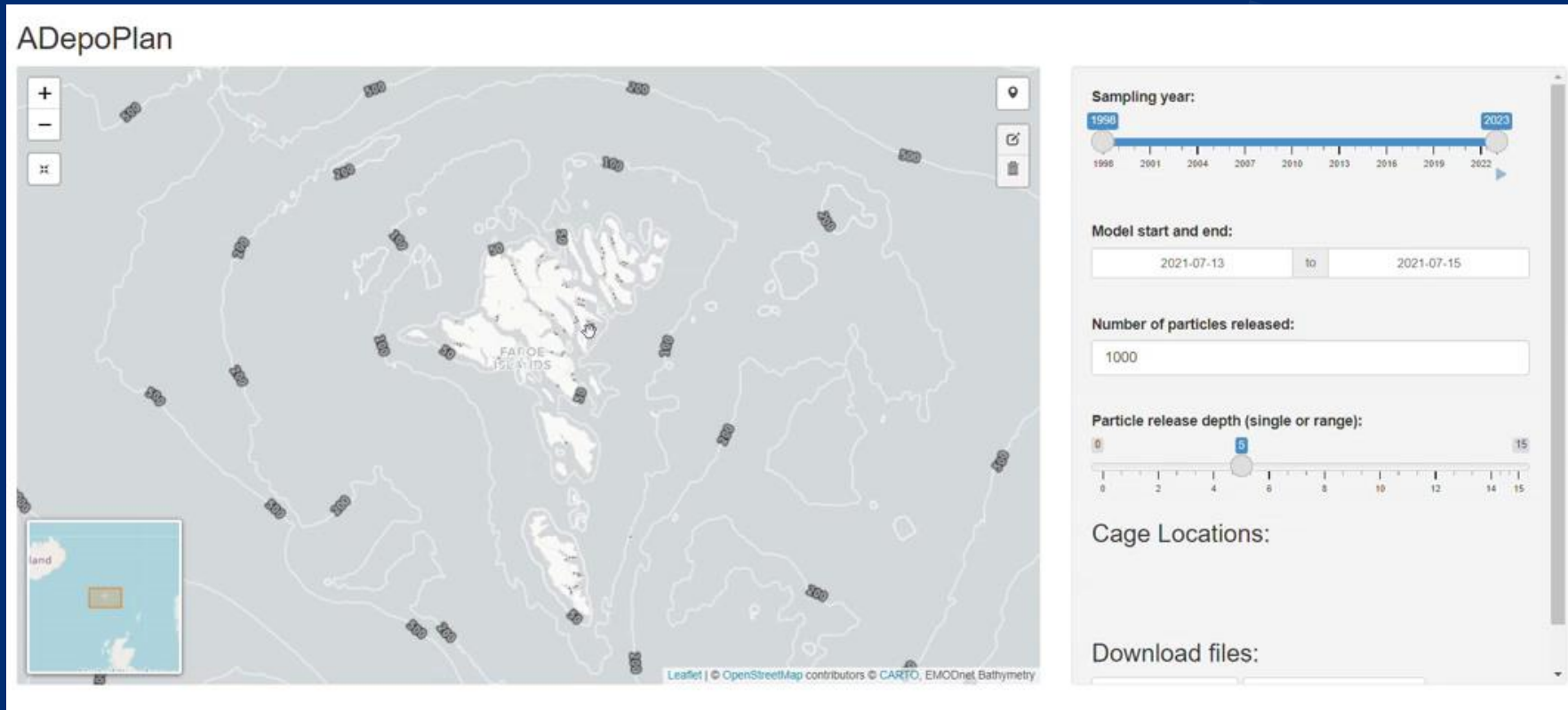
- FarCoast er eitt ógvuliga hent arbeiðsamboð!
- ADepoPlan
 - *Hvar endar so lorturin?* → *Spyr meg aftur í næsta ár*
 - Næstu stig ...
 - Validering
 - Menning av brúkaravinarligari app → so øll kunnu myndla botnfall
 - *útgivin open-source tá verkætlanin er liðug*



Soo... stuttlig

Takk fyri meg 😊

Pre-pre-prototype



Verkætlanin ADepoPlan er fíggað av:



UMHVØRVISMÁLARÁÐIÐ
Ministry of Environment