

## Enabling Particle Tracking in Operational Forecasting

FEWS International User Days 2020

Kun Yan, Martin Verlaan, Bas Stengs, Tom Bogaard, Onno van den Akker, Bart Adriaanse

# Motivation

- Applications
  - Oil spill
  - Search & rescue
  - Ocean cleaning
  - Water quality/Ecological
- Particle Tracking has got potential
- Question:
  - Can we make it an Operational Forecasting Tool?



Flight MH370 debris tracking Oct 2014



The container ship MSC Zoe lost more than 340 containers near the Wadden Islands January 2019.

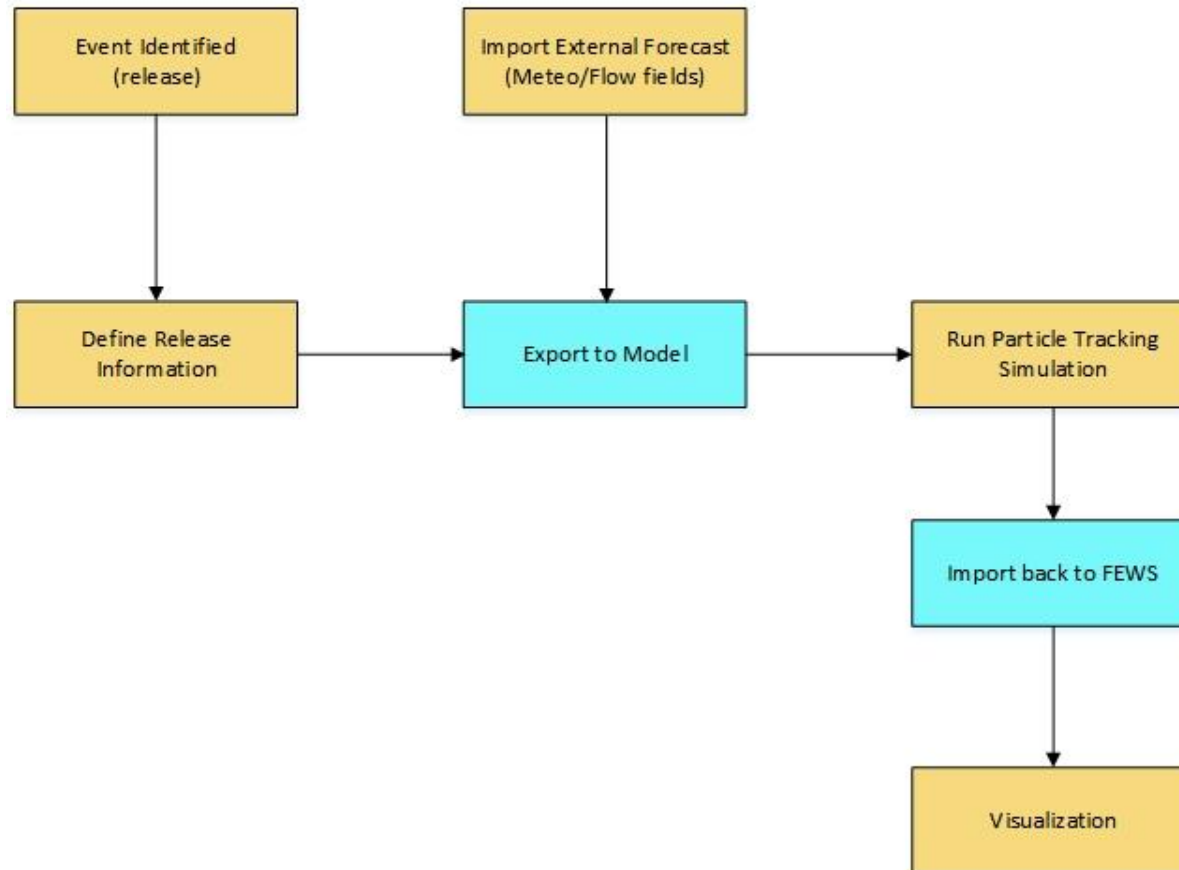
# Concept

- Objective:

A demo particle tracking application based on a particle tracking model and integrated in Delft-FEWS allowing interaction with users.

- Needs release information
- User Interaction is the Key

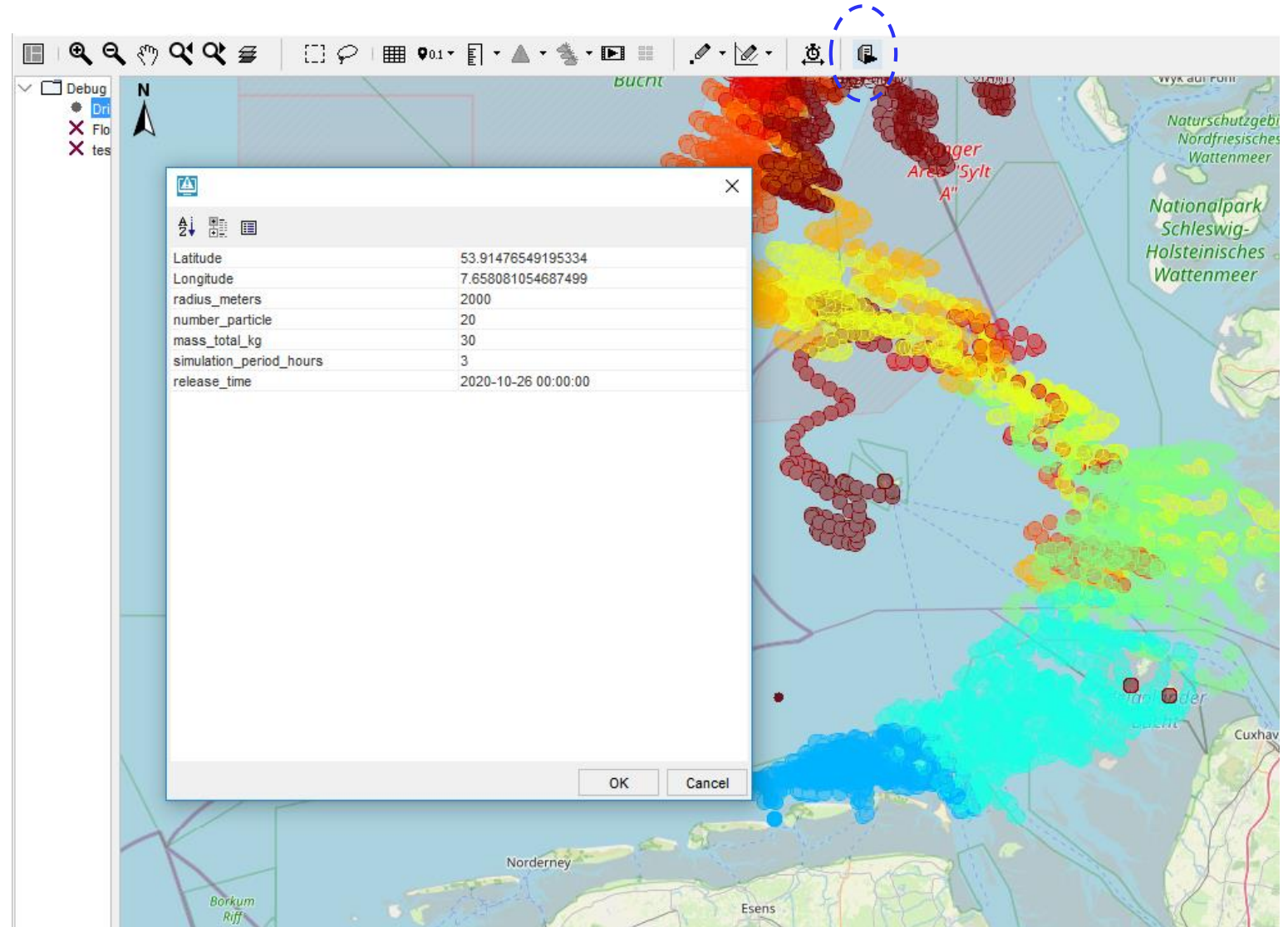
## Particle Tracking in FEWS



# Enabling User interaction

- Specifying Release information in **Spatial Display**
  - Location of release
  - Number of particles
  - Mass total
  - Radius
  - Time of release
  - and more...
- Run forecast workflow
  - Pass numbers to a template file (.csv)
  - Export to particle tracking model
    - Adapters for format conversion

Run workflow from Spatial Display



# Enabling User Interaction – Method Two

- Define Release Attributes as Modifier
  - Define release attributes
  - Apply the modifier
  - Export release (location) attributes
  - Run simulation
- Define multiple releases

The screenshot shows the 'Particle Tracking Demo - German Bight (Stand alone)' software interface. The main window displays a 'Node: Run Particle Model' configuration. A table lists the model's properties:

Mod type	Name	Summary	Locations	Start
Release Att...	Release Attributes	Radius=40.0	location_1	--

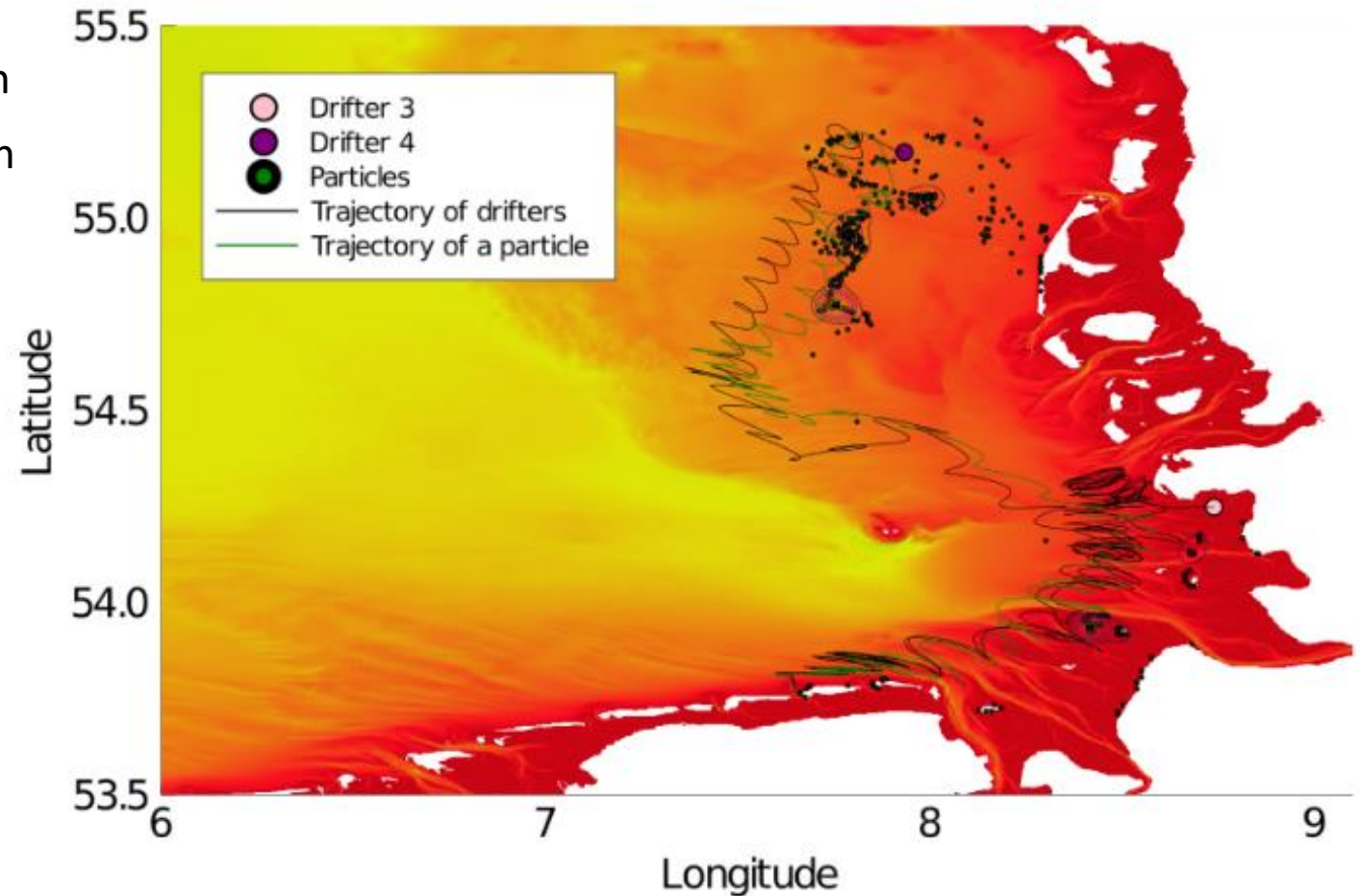
Below this table, there are buttons for 'Create mod' and 'Release Attributes'. The 'Modifier Properties: Release Attributes' section shows the 'Name' set to 'Release Attributes'. A 'Particle Release Attributes' table is also visible:

location	X	Y	Number_particle	Mass_total	Radius
location_1	6.7	55.0	30.0	200.0	40.0
location_2	6.5	54.0	1.0	100.0	10.0

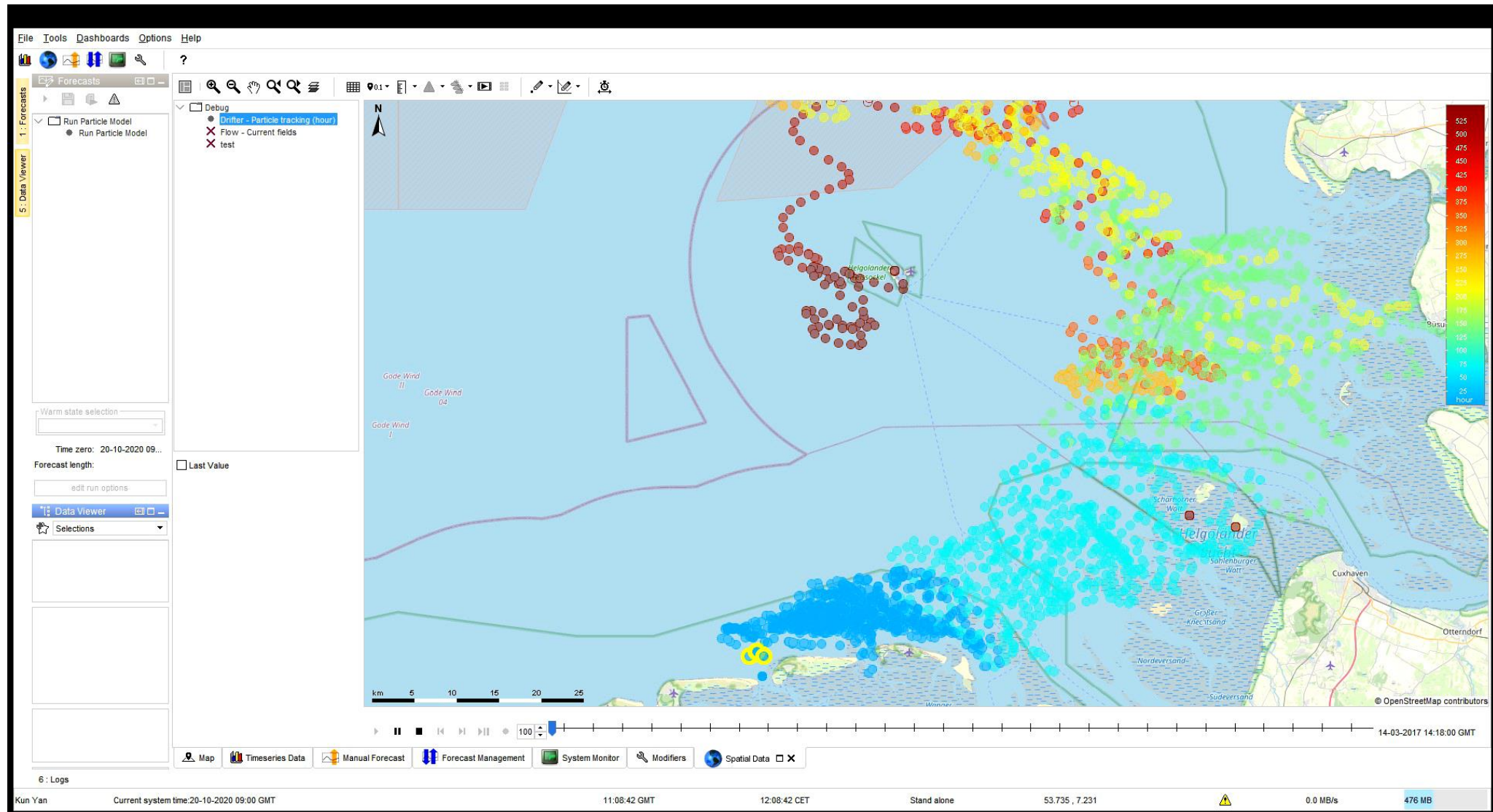
The interface also includes a 'Forecasts' panel on the left with a tree view containing 'Run Particle Model' and a sub-item 'Run Particle Model' which is checked. At the bottom, there is a 'Data Viewer' panel with a 'Selections' dropdown and a 'Warm state selection' dropdown. The bottom status bar contains icons for 'Map', 'Timeseries Data', 'Spatial Data', 'Manual Forecast', and 'Forecast Management'.

# Test Case

- Location: German Bight (North Sea)
- Based on Surface currents of a 3D hydrodynamic model
- Allow users to define release information
- Visualization simulated particle tracks with measurements



# Demo results



# Questions and feedback

 [www.deltares.nl](http://www.deltares.nl)

 [@deltares](https://twitter.com/deltares)

 [linkedin.com/company/deltares](https://www.linkedin.com/company/deltares)

 [Kun.Yan@deltares.nl](mailto:Kun.Yan@deltares.nl)

 [@deltares](https://www.instagram.com/deltares)

 [facebook.com/deltaresNL](https://www.facebook.com/deltaresNL)

