Conference Digital Twins @WUR: Bringing Digital Twins to Life
Session ‘Digital Twin for living environment & biodiversity: State of the art’
14 December 2022

Wadden Sea
Long-Term Ecosystem Research

Katja Philippart (Waddenacademie, NIOZ & UU)
Rick Hoeksema (RWS Noord-Nederland)
long-term dynamics phytoplankton

(50 years in 2023)

NIOZ jetty series (ca. 40 times/year)

Started by Gerhard Cadée (NIOZ) in 1974 inspired by results of the ‘International Biological Programme’ cruises in 1970-'71

Handed over to Katja Philippart in 2004

© Martin Stock
Long-term trends and shifts

Chlorophyll-a (mg m⁻³)  Pelagic production (gC m⁻² y⁻¹)

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Long-term trends and shifts

Planktonic primary production in the western Dutch Wadden Sea

Pelagic production (gC m⁻² y⁻¹)
Biomass macrozoobenthos (gAFDW m⁻²)

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Mean seasonal signals of the combined freshwater discharge (m^3/s) of the larger freshwater entrance points into the trilateral Wadden Sea (1978-2018)

OSPAR ICG-EMO riverine database
(Sonja van Leeuwen, NIOZ)
building scenario’s using digital twins

LTER LIFE proposal
Marcel Visser (NIOO)
14:00-16:00
building scenario’s using digital twins

LTER LIFE proposal
Marcel Visser (NIOO)
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Scenario’s

Digital Twin
(a.o. based upon abiotic and biotic data)

Ecosystem

different freshwater inputs

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Pelagic production

(gC m⁻² y⁻¹)

Strong annual and seasonal variability
Strong spatial variability
Phytoplankton

Chlorophyll-a (mg m$^{-3}$)
7 May 2020

combined satellite information
Microphytobenthos

sum of chlorophyll-a & phaeophytin (mg m\(^{-2}\))

information from satellites & hyperspectral sensors (3 campaigns)
Macrozoobenthos

Biomass (gAFDW m\(^{-2}\))

Species richness (#species sample\(^{-1}\))

Information from satellite (S2: B, G, R, NIR) & machine learning (from 462 field observations to 1,534,889 pixel values)
Outlook

Ecosystem

abiotic & biotic field observations

Data products

Digital Twin

Tool for Wadden Sea Long-term Ecosystem Research
Outlook

Ecosystem

abiotic & biotic field observations

data products

Digital Twin

Tool for Wadden Sea Long-term Ecosystem Research

Thank you!