

ECO57: μ PLANET- microPlastic Long-range transport Assessment aNd Estimation Tools

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Motivation

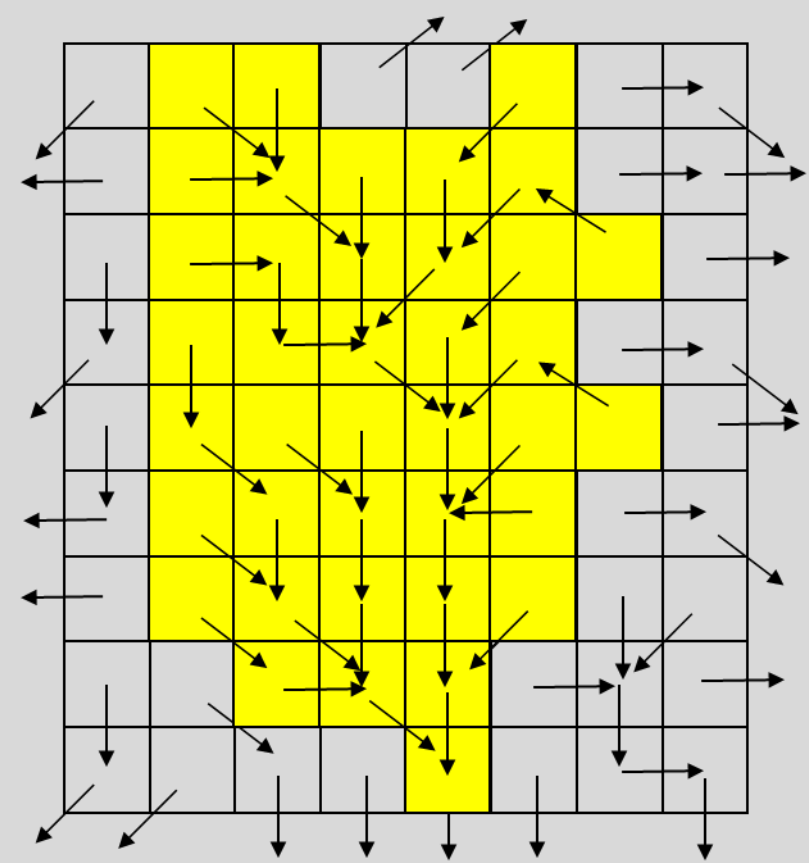
- Microplastic Particles (MPs) detected across the globe
- Increasing concern about role of MPs as vectors for long-range environmental transport (LRET) of plastic additive chemicals
- Need for improved mechanistic understanding of processes influencing LRET of MPs, especially in terrestrial riverine and coastal environments, and evaluate importance of LRET relative to local sources

Objectives

- Refined parameterization of μ BETR Global model (ECO48), including coastal zone processes and air
- Development and application of riverine to ocean transport models to enable characterization and quantification of terrestrial sources as inputs to the global environment
- Evaluate the feasibility of applying a LRET metric for screening and prioritization of MPs
- Integrate open-access tools & models within LRI cluster

WP2: Mobility of MPs in rivers

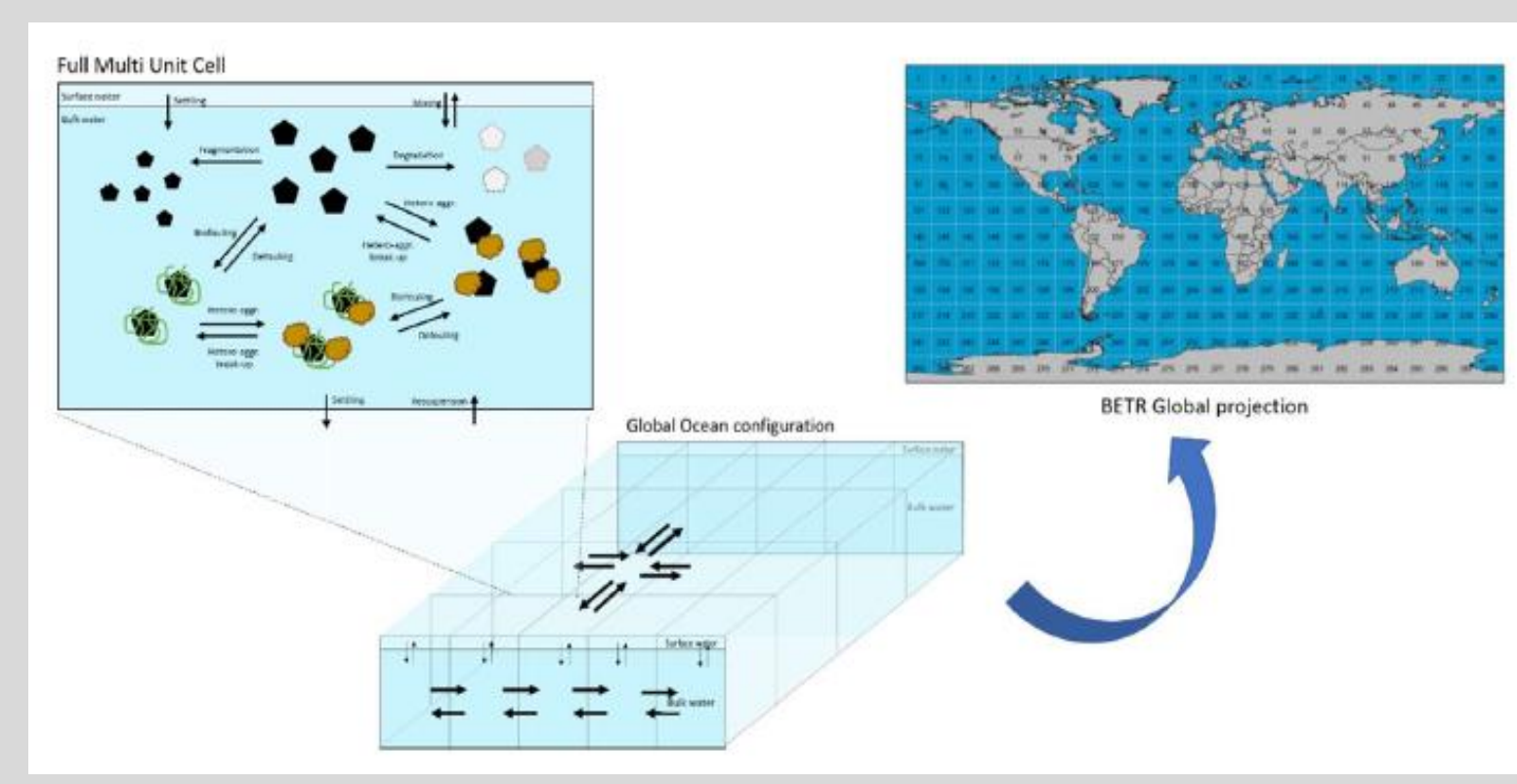
- Application of a high-resolution **riverine network model to evaluate the transport** of MPs to the coast
- Investigation of transfer efficiency towards coastal zones and potential influence of **trapping zones** (e.g. bends, floodplains, etc.)
- Influence of **episodic (high intensity) events** (e.g. storm events, etc.)
- **Emissions** scaled to population density and corrected for country-specific waste management level



WP1: μ BETR Global model adaptations

Planned updates:

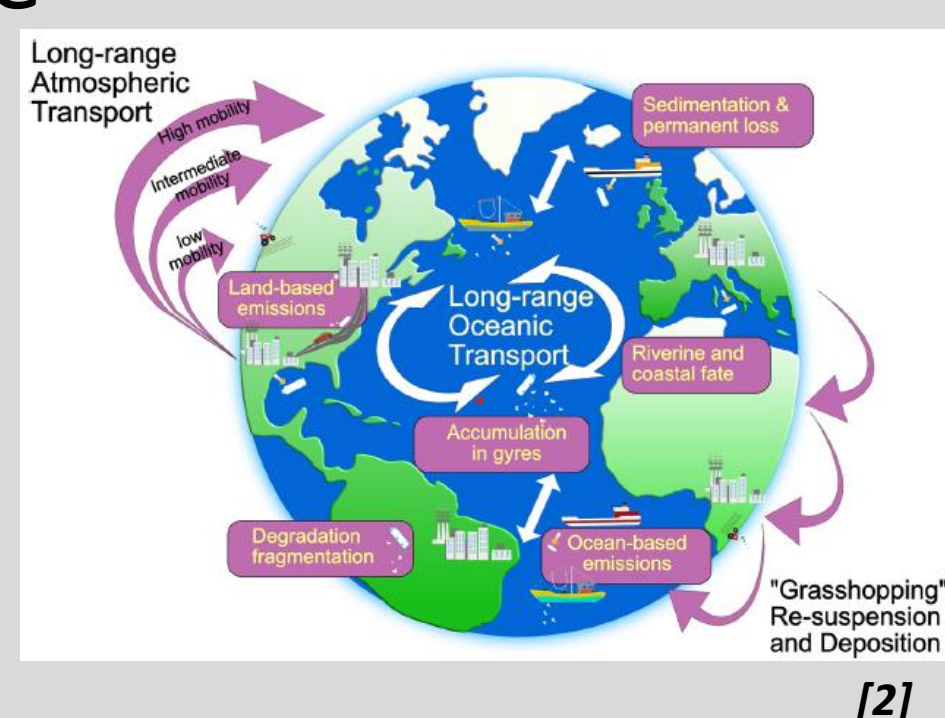
- Inclusion of environmental fate processes to describe the **exchange of MPs between air, soil and water**
- Improve handling of riverine transport processes (\rightarrow **WP2**)
- Improve description of fate and transport in coastal-zone systems (\rightarrow **WP3**)
- Development and application of differentiated emissions



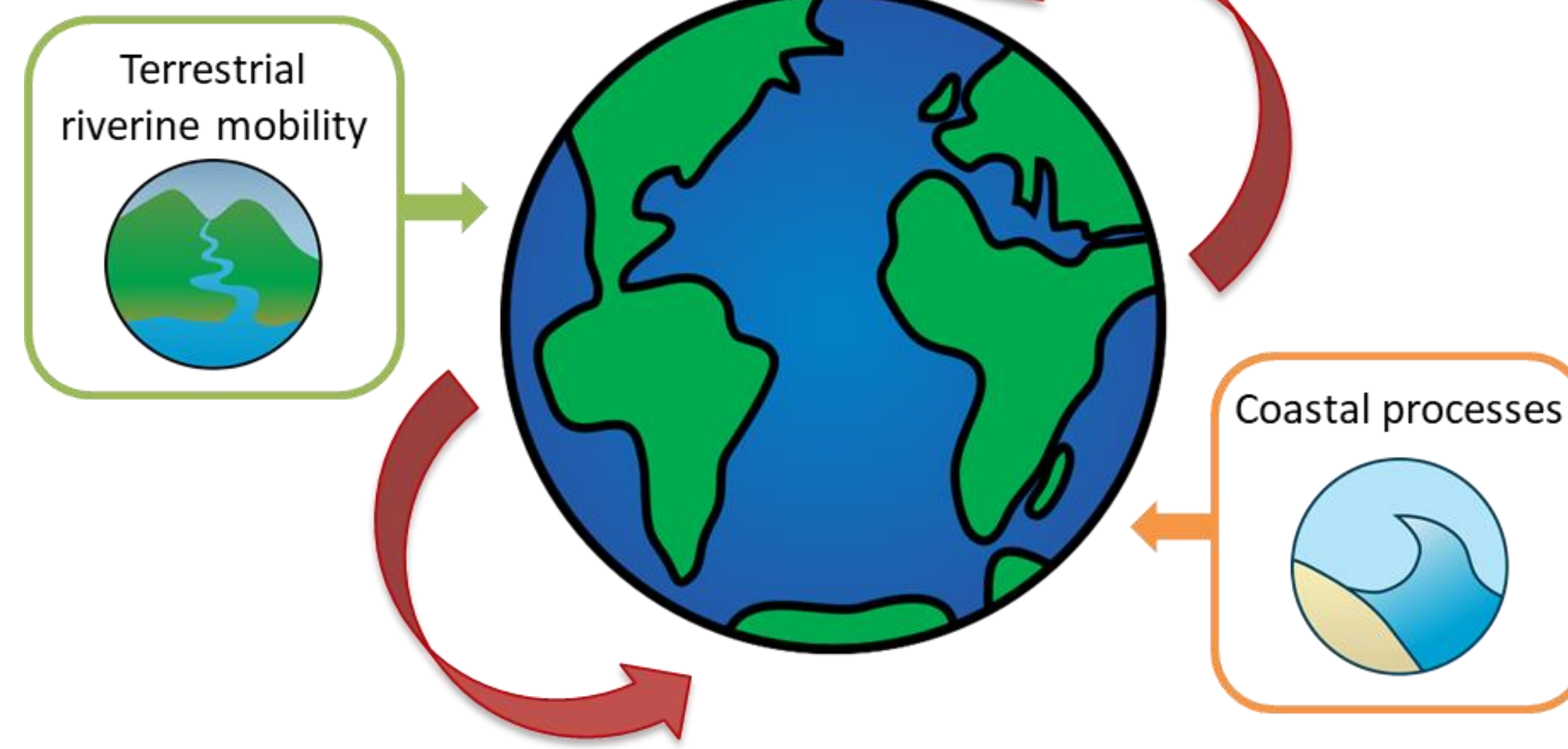
Global version of Full-Multi MP-specific environmental fate & transport model (developed in LRI ECO 48) [1]

WP4: LRET metric for MPs

- Development of LRET metrics and an evaluation of their feasibility for **screening and prioritizing the LRET potential of MPs** analogous to the characteristic travel distance (CTD) used for organic chemicals
- Evaluate the influence of physicochemical properties for MPs relative to variability in fate and transport processes



μ PLANET



WP5: Scenario analysis & recommendations

- LRET of representative MPs with updated μ BETR Global model
- Scenario analysis to investigate e.g. importance of emissions routes
- Conventional vs. microplastic-facilitated LRET of plastic additives

WP3: Parameterization of coastal zone processes

- Refinement to the μ BETR Global coastal zone grid cells to include:
 - **Beaching and sedimentation**
 - **Tidal influences** on particle fate
 - Lateral **sediment flows**
- Evaluate the relative importance that strengthening descriptors of coastal zone represents, such as potential time lag between release of plastic to coast and appearance in open ocean

Expected results

- Improved understanding of LRET of MPs and their relative role in the LRET of plastic additive chemicals
- Prioritization of MPs with respect to their LRET

Deliverables

- **Open-source code** (and documentation) of updated **μ BETR Global model & LRET metric**
- Publications and conference presentations

