Poster No: 2

KATHOLIEKE UNIVERSITEIT LEUVEN

HYDRAULICS LABORATORY

Heterogeneous Flocculation Combining the Biological and Mineralogical Populations in a Marine and Coastal Environment

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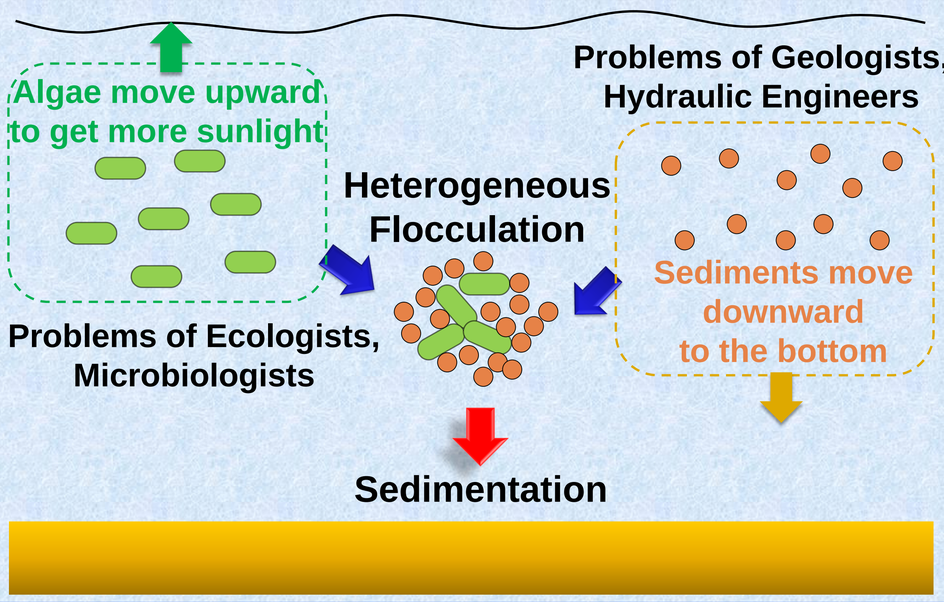
1 Heterogeneous Flocculation

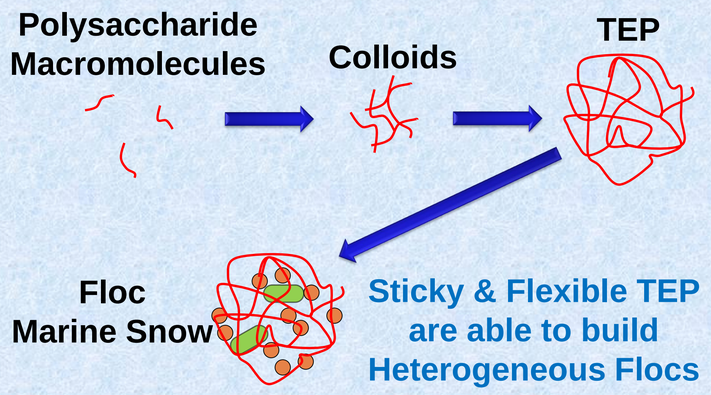
Flocculation:
is a reversible floc-size growth and decay process, due to particle aggregation and breakage.

Heterogeneous Flocculation:
is flocculation combining heterogeneous fractions of the biological and mineralogical populations into a bio-mineral floc, thereby bridging the biological and mineralogical worlds.



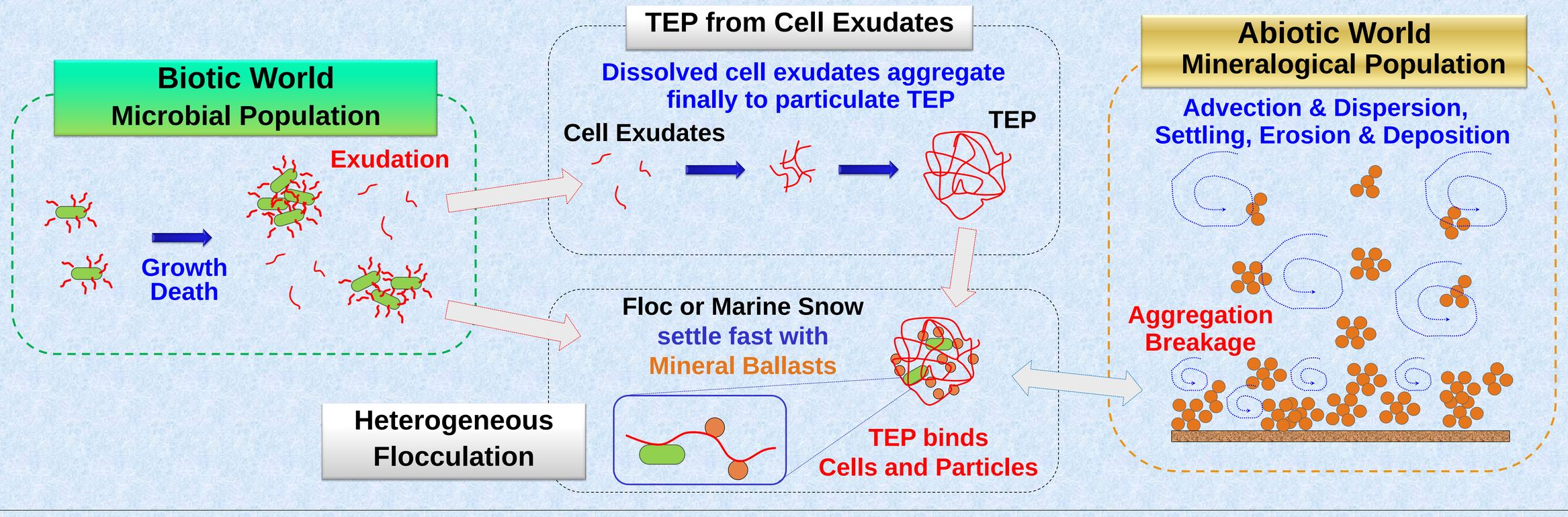
2 Transparent Exopolymer Particles (TEP)

TEP is an organic particles formed by aggregation of polysaccharides excreted by microorganisms (Alldredge et al., 1993).



3 Conceptual Model: TEP-Mediated Heterogeneous Flocculation

TEP combines the Biological and Mineralogical Populations into a Heterogeneous Floc.



4 Mathematical Model: Initiative Strategy

Ecological Modeling

Microbial Growth and Death: Phytoplankton, Zooplankton, Heterotrophic Bacteria, etc.
Nutrient Flux: N, P, Si, Fe, etc.
Carbon Flux: CO_2, Dissolved and Particulate Organic s, etc.

e.g. SWAMCO (Lancelot, 2000)

TEP Formation

Polymerization & Aggregation: Self-Assembling Polymerization, Cluster-Cluster Aggregation
e.g. Engel et al. (2004)

Combining Three Model Compartments

Cohesive Sediment Transport & Flocculation

Transport: Advection, Dispersion, Sedimentation, Erosion, Deposition, Fluid-Sediment Interaction, etc.
e.g. FENST, COHERENS (Toorman, 2002)

Flocculation: Floc-Size Growth and Decay by Aggregation and Breakage
e.g. TCPBE (Lee et al., 2011)

5 Multi-disciplinary Collaboration Required

Ecological Engineer	Microbiologists	Hydraulic Engineer	Process Engineer	Marine Geologist
Developing Ecological Models of Microbial Population Dynamics	Physiology of Microbial Species, e.g. Finding EPS-Producing Species	Large-scale Simulation of Sediment Transport and Ecological Models	Developing Biological and Physicochemical Process Models	Mineralogical and Geomorphological Investigation

This is me … **and more …**

References

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