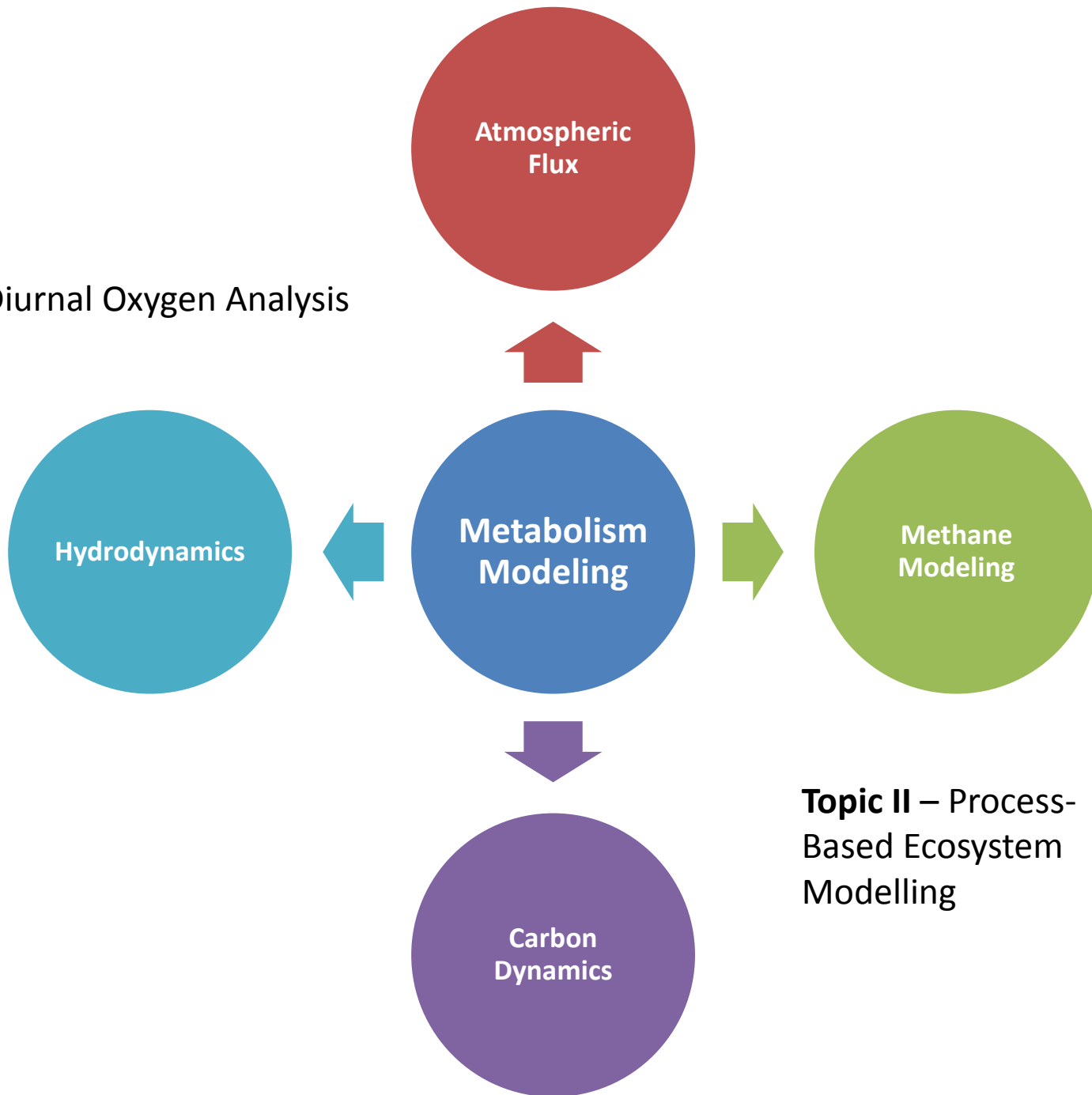


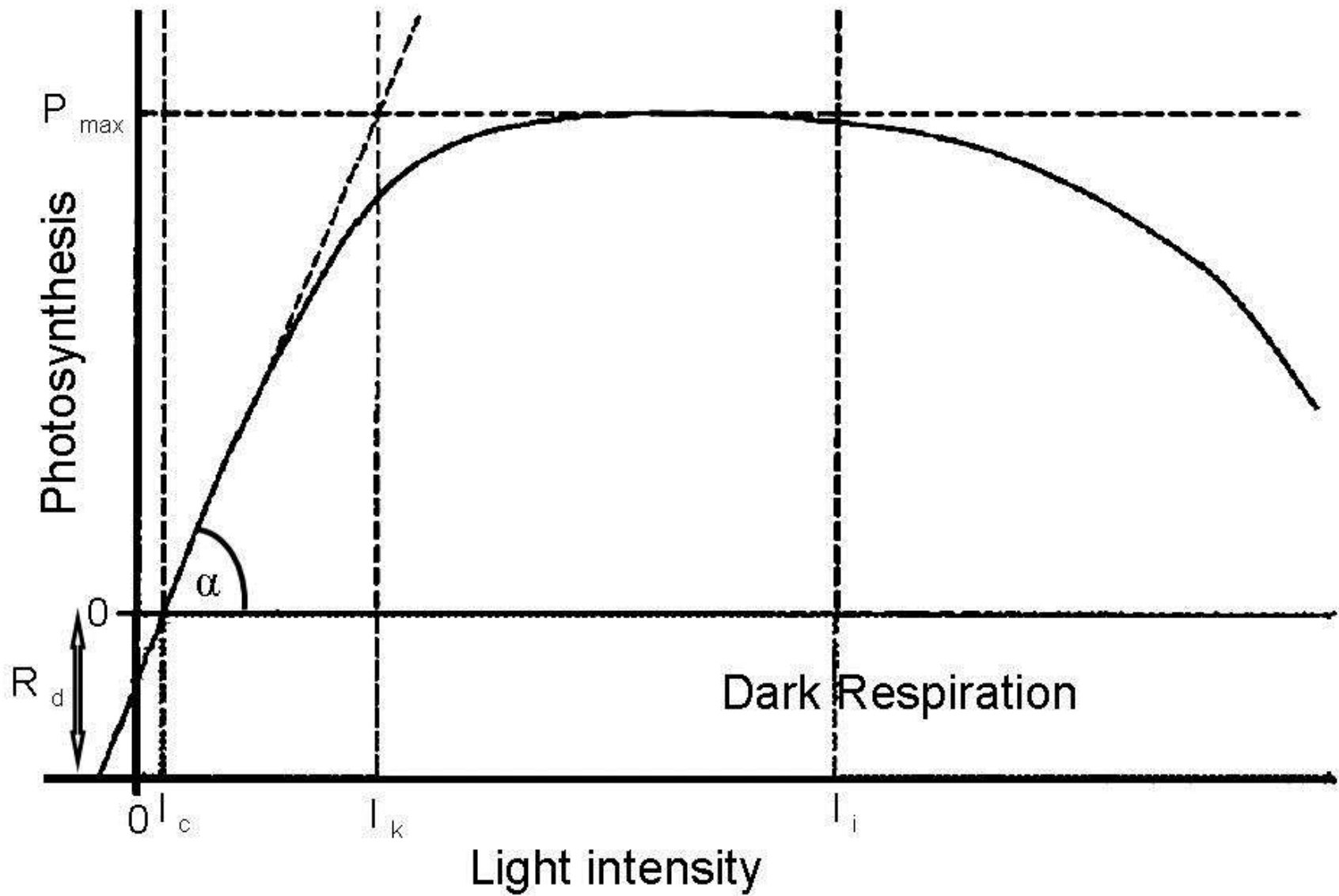
Lake Metabolism II - Modelling

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Topic I – Diurnal Oxygen Analysis



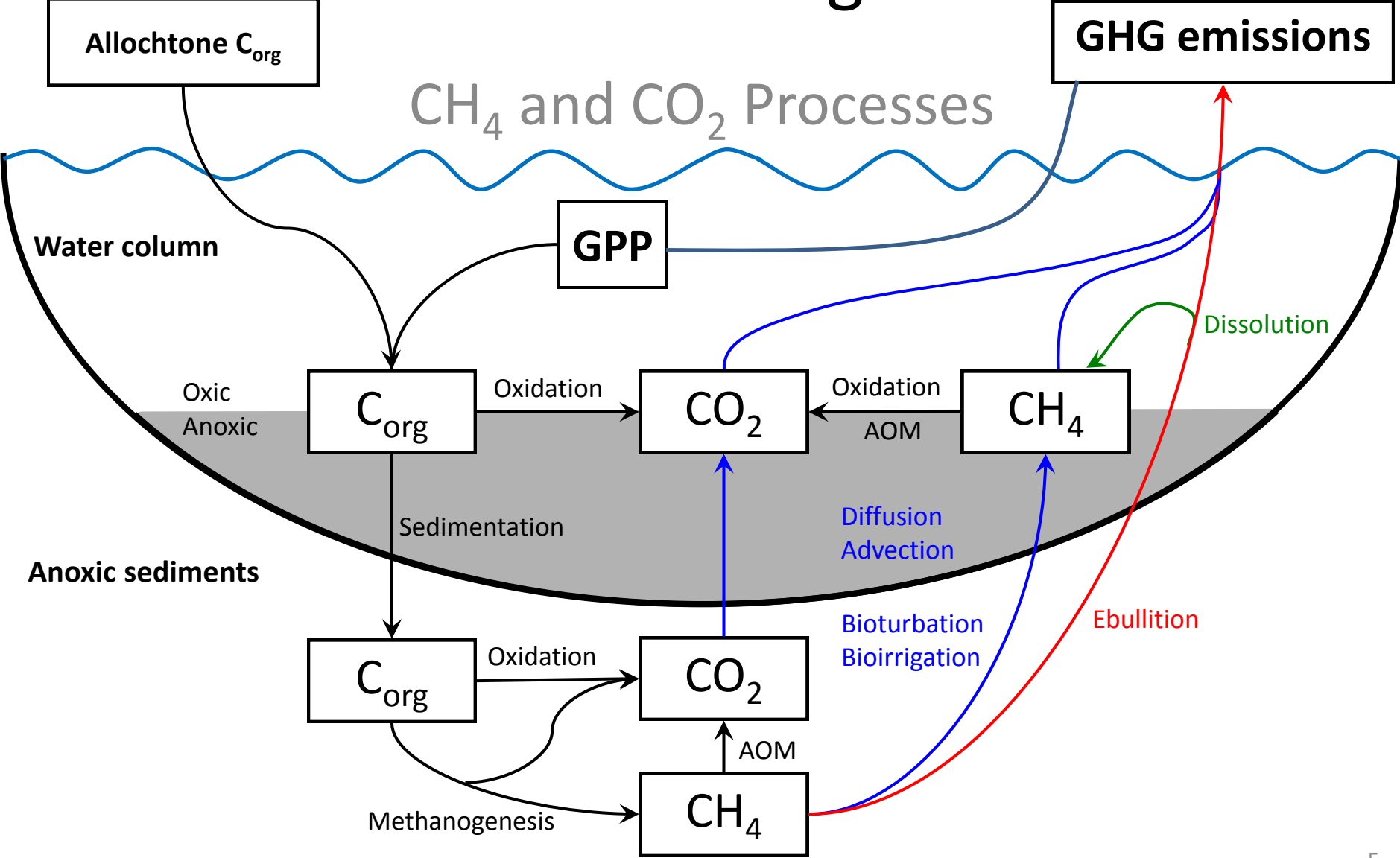
Topic II – Process-Based Ecosystem Modelling



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- Include Methane, Oxygen, and CO₂ dynamics;
- How much complexity should be there?
- Which processes we should use?
- Sediment diagenesis (microbial redox reactions);
- GLM-FABM/MyLake (1D Vertical physical processes), IPH-ECO (3D hydrodynamics)

Topic II – Process-Based Ecosystem Modelling



	Pool	Symbol	Source	Sink
1	Labile POC – CNP: 120:20:1	POC-a	Phytoplankton growth	Hydrolysis, Photolysis
2	Semi-labile POC - CNP: 100:12:1	POC-b	Allochthonous	Hydrolysis, Photolysis
3	Labile DOC	DOC-a	Allochthonous, exudates, hydrolysis, photolysis,	Respiration, Fermentation, Photolysis
4	Semi-labile DOC	DOC-b	Photolysis	Hydrogenotrophy, photolysis
5	Dissolved inorganic carbon	CO _{2(aq)}	Methane oxidation, AOM, dissolution	Hydrogenotrophy, ebulition, precipitation
6	Methane	CH _{4(aq)}	Fermentation, Hydrogenotrophy, Dissolution	Methane oxidation, AOM, ebullition

	Particulate organic carbon
1	POC-a,b $\xrightarrow{\text{hydrolysis}}$ DOC-a,b
2	POC-a,b $\xrightarrow{\text{photolysis}}$ DOC-a,b + CO ₂
3	Macrophytes $\xrightarrow{\text{exudates}}$ DOC-a
4	CO ₂ $\xrightarrow{\text{plankton growth}}$ POC-a
	Dissolved organic carbon
4	DOC-a,b + O ₂ $\xrightarrow{\text{oxic respiration}}$ CO ₂
5	DOC-a,b + TEAs $\xrightarrow{\text{DOC oxidation}}$ CO ₂
6	DOC-a,b $\xrightarrow{\text{photolysis}}$ CO ₂

	Inorganic carbon equilibrium
7	H ₂ CO ₃ $\xrightarrow{\text{ebullition}}$ CO _{2(g)}
8	CO _{2(g)} $\xrightarrow{\text{protonation}}$ H ₂ CO ₃ , HCO ₃ ⁻ , CO ₃ ²⁻
9	HCO ₃ ⁻ $\xleftrightarrow{\text{prec.-diss.}}$ FeCO _{3(s)} , CaCO _{3(s)}
	Methane
10	DOC-a $\xrightarrow{\text{Acetate fermentation}}$ CH _{4(aq)} + CO ₂
11	DOC-b + CO ₂ $\xrightarrow{\text{Hydrogenotrophy}}$ CH _{4(aq)}
12	CH _{4(aq)} + O ₂ $\xrightarrow{\text{aerobic meth oxid.}}$ CO ₂
13	CH _{4(aq)} + TEAs $\xrightarrow{\text{AOM}}$ CO ₂
14	CH _{4(aq)} $\xrightarrow{\text{ebullition}}$ CH _{4(g)}