Hypoxia monitoring in aquatic ecosystems: a short introduction to target sites, scientific approach and first results (7 FP EU-project HYPOX)

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It is an alarming finding that hypoxic (low oxygen) conditions in aquatic systems increase worldwide in number, duration and spatial extent as a consequence of eutrophication and global warming. Nevertheless, activities to monitor oxygen dynamics at appropriate temporal and spatial scales in sensitive ecosystems are still largely missing. The EU project HYPOX (www.hypox.net) is set out in order to better understand hypoxia causes and consequences and to foster oxygen monitoring capacities and knowhow as a first step towards a global hypoxia observation system. Several target ecosystems in coastal and open seas as well as in land locked water bodies were selected for monitoring. These cover a broad range of settings (e.g., hydrography, biological activity, oxygenation, anthropogenic impact) and differ in their sensitivity towards change. The selected sites include semi-enclosed basins with permanent anoxia (Black Sea, Baltic Sea), seasonally or locally anoxic land-locked systems (fjords, sea lochs, lagoons, lakes) and also oxygen-rich open ocean systems with high sensitivity to global warming (Arctic). The presented work will introduce the characteristics of the selected sites, give an overview of the scientific approach taken by the HYPOX project and highlight some results. The main steps taken include (1) the selection of appropriate monitoring approaches (parameters, strategy, technology) based on the analysis of legacy data, (2) setup and implementation of oxygen observatories and conducting of supplementary field campaigns, (3) development and use of conceptual and numerical models and data assimilation tools to generalize findings and to predict future hypoxia developments and ecosystem responses. The HYPOX project uses GEOSS standards ("Global Earth Observation System of Systems") with respect to interoperability, metadata documentation, and data accessibility.