NOOS Project:
River runoff data for operational ocean forecasting.

Main objective

Make river runoff data – observed and predicted fresh water flux and nutrient/contaminant loads – available to NOOS partners for use in ocean hindcasting and forecasting, and assess the benefits derived.

Sub goals

1. Make observations of river volume flux available to partners in near-real-time.
2. Make high quality historical data sets of observed fluxes and loadings available to partners for hindcast studies.
3. Assess the availability and applicability of prognostic river runoff data and make recommendations for further effort.
4. Develop best practices for applying river runoff data in coastal ocean forecasting.

Rationale for the project

The NOOS association has a focus on coastal ocean prediction at high resolution in order to serve the public and users with detailed information where the demand is highest. In addition, numerical prediction of ocean bio-geochemistry is a growing activity. In both cases, the effect of freshwater inputs from rivers and land in general is believed to be increasingly important.

There are three issues to be addressed: 1) accessing and making use of freshwater flux and nutrient/contaminant concentration observations, both real-time and historical; 2) estimating prognostic freshwater and nutrient/contaminant inputs for forecasting; and 3) assessing the sensitivity of hydrodynamic and bio-geochemical models to freshwater and nutrient/contaminant inputs, with respect to both analyses and forecasts. Historically, these issues have been difficult to address because observations usually have a non-oceanographic focus and are organizationally fragmented. The same can be said of hydrological models.

Project description

Task 1: Near-real-time river runoff observations

Aim: Make observations of river volume flux and nutrient/contaminant loads available to partners in near-real-time.

Subtask 1.1: River data inventory

Compile a list of rivers for which there are data available (including time period, sampling frequency, real-time, data quality, ease of acquisition, etc.) and a list of rivers for which data are desired. Identify significant gaps / problems.

Subtask 1.2: Near-real-time observation system

Establish a sustainable system for obtaining and exchanging near-real-time volume flux observations from the major rivers influencing the NOOS area of operations. Include nutrient and

contaminant loadings as available. Implementation starts with the most readily available and builds from there. Suggested approach: agree on file format and exchange data files via ftp-boxes (as in existing water level exchange). Consider also recommendations from EuroGOOS WGDQME.

Subtask 1.3: Baltic exchange

Assess best practices for estimating real-time water exchange between the Baltic and North Seas. Propose a benchmark method.

Subtask 1.4: Runoff estimation

Assess best practices for estimating total fresh water runoff (observed rivers plus non-observed rivers plus diffuse runoff) from available observations. Propose a benchmark method.

Task 2: Hindcast observation set

Aim: Assemble a set of high quality observations of river volume flux and nutrient/contaminant loads suitable for hindcast simulations and make it available to partners .

Subtask 2.1: River data inventory

Similar to inventory in Task 1, but for archived data. This may be a different set of rivers. A major focus is on identifying rivers where there are good nutrient/contaminant load data.

Subtask 2.2: Hindcast period

Identify a common hindcast period. Consider availability and quality of data, interesting events in the period, range of interannual variability, etc.

Subtask 2.3: Assemble data set

Assemble volume flux data of high accuracy from available archives for the agreed period. The sampling frequency should be daily (means) or higher.

Subtask 2.4: Assess utility

Sensitivity, validation and comparison experiments to aid in improving forecast modeling. [*needs to be more closely defined when the project group takes form*].

Task 3: Prognostic data

Aim: Make prognostic freshwater runoff and nutrient/contaminant load data available to partners in near-real-time.

Subtask 3.1: Overview

Assemble an overview of available and potential prognostic data sources for freshwater runoff that would be suitable for the needs of short- to medium-range forecasting. Prognostic hydrological models are the main focus, but other methods (parametric) may be of interest.

Subtask 3.2: Assessment

Assess adequacy of existing data sources and recommend way forward for acquisition, data exchange or development (e.g., hydrological modeling).

Subtask 3.3: Nutrient and contaminant load estimation

Assess best practices for estimating prognostic nutrient and contaminant loads, specifically nutrients, in freshwater runoff. Propose a benchmark method.

Subtask 3.4: Production/exchange system

Establish a sustainable system for producing/obtaining and exchanging prognostic data for use in operational forecasting. [*Contingent on favorable assessment of benefit.*]

Task 4: Modeling and forecasting practices

Aim: Build common base for best practices in applying freshwater runoff data in coastal ocean forecasting.

Subtask 4.1: Modeling methods

Describe methods in use for applying river volume fluxes and nutrient/contaminant loads in numerical models (hydrodynamic, ecosystem). Include methods used to apply observed or estimated river input in operational forecasting. Include qualitative assessment of advantages and shortcomings of the methods in use. Compile an overview from descriptions by individual partners.

Subtask 4.2: Baltic OBC

For North Sea models: Compile a description of currently used methods for specifying the hydrodynamic and bio-geo-chemical boundary conditions to the Baltic Sea.

Schedule

Task	*2005*		*2006*		*2007*		*2008*	
1 NRT river observations								
1.1 River data inventory	X	X	X	X	-	-	-	-
1.2 NRT obs system			X	X	X			
1.3 Baltic exchange				X	X			
1.4 Total runoff estimation				X	X			
2 Hindcast observation set								
2.1 River inventory	X	X	X	X	-	-	-	-
2.2 Hindcast period			X	X				
2.3 Data set assembly				X	X	X		
2.4 Assess utility					X	X	X	
3 Prognostic data								
3.1 Overview			X	X				
3.2 Assessment				X				
3.3 Contaminant load estimation					X	X	X	
3.4 Production/exchange system					X	X	X	-
4 Modeling methods								
4.1 Modeling methods			X	X	X	X	X	X
4.2 Baltic OBC			X	X	X			