Annex 1. List of members and other contact persons

A1.1 Members of the Steering Committee

Chairperson of the Steering Committee
Dr Simona Masina,
Institute: CMCC
E-mail: simona.masina@cmcc.it
Address: Viale Aldo Moro 44, 40127 Bologna, Italy
Tel: +39 051 3782620 Fax: +39 051 3782654

Other members:
Prof. Nadia Pinardi
Institute: UNIBO DIPFIS
E-mail: nadia.pinardi@unibo.it
Address: Viale Aldo Moro 44, 40127 Bologna, Italy
Tel. +39 051 3782633 Fax +39 051 3782654

Dr. Cosimo Solidoro
Institute: OGS
E-mail: csolidoro@ogs.trieste.it
Address: Borgo Grotta Gigante 42/C, 34010, Sgonico (TS), Italy
Tel. +39 040 2140 315 Fax +39 040 2140 266

A1.2 BFM Scientific Leader and BFM System Team Coordinator:

BFM Scientific Leader
Dr. Marco Zavatarelli,
Institute: UNIBO DIPFIS
E-mail: marco.zavatarelli@unibo.it
Address: Viale Berti Pichat 6/2, 40127, Bologna, Italy
Tel. +39 051 2095060 Fax +39 051 249644

BFM System Team Coordinator
Dr. Marcello Vichi
Institute: CMCC
E-mail: marcello.vichi@cmcc.it
Address: Viale Aldo Moro 44, 40127 Bologna. Italy
Tel: +39 051 3782631 Fax: +39 051 3782654

A1.3 Members of the BFM System Team

Representative

Name	Institution	PM (over 3 years)
Marco Zavatarelli	UNIBO DIPFIS	4
Marcello Vichi	CMCC	4
Paolo Lazzari	OGS	6

Other members

Name (role)	Institution	PM (over 3 years)
Emanuela Clementi	UNIBO DIPFIS	3
Luca Giacomelli	UNIBO DIPFIS	1
Gelsomina Mattia	UNIBO DIPFIS	3
Nadia Pinardi	UNIBO DIPFIS	1
Simona Masina	CMCC	1
William McKiver	CMCC	3
Tomas Lovato	CMCC	3
Italo Epicoco	CMCC	2
Silvia Mocavero	CMCC	2
Alessandro Crise	OGS	1
Cosimo Solidoro	OGS	1
Giorgio Bolzon	OGS	3
Gianpiero Cossarini	OGS	3
Simone Libralato	OGS	3

Annex 2. Components of the BFM System

Components of the BFM System

Name	*Description*
A2.1 BFM Core (STANDALONE)	Zero-dimensional version with biological reactions
A2.2 BFM-POM (BFM_POM1D)	One-dimensional coupling with the Princeton Ocean Model
A2.3 BFM-POM (BFM_POM3D)	Three-dimensional coupling with the Princeton Ocean Model
A2.4 BFM-NEMO (BFM_NEMO)	Three-dimensional coupling with the NEMO ocean model
A2.5 BFM-OPATM (BFM_OPATM8_1)	Three-dimensional coupling with the ocean transport model based on OPA 8.1

A2.1 BFM core (STANDALONE)

- Source code of the BFM written in FORTRAN90 including the scripts to generate the model structural files from a specialized meta-language.
- Source codes of the subroutines for time-marching and numerical integration of the STANDALONE configuration
- Technical report describing the structure of the core code and a simple STANDALONE example.

A2.2 Components of the one-dimensional coupled system BFM-POM (BFM_POM1D)

- FORTRAN77 one-dimensional Princeton Ocean Model (POM-1D), with main code modified with built in coupling with BFM (through subroutine calls).
- POM-BFM coupling interface formed by FORTRAN90 routines and modules (pom_ini_bfm.f90, ModuleService.f90 and fixed-format files pom_ia_bfm.f, pom_to_bfm.f, pom_bfm.f) .
- UNIX/LINUX Makefile and script to compile and execute the model.
- Standard configuration (vertical discretization, initial conditions, monthly varying forcing functions) of the coupled system for three locations in the Adriatic Sea under perpetual year forcing functions. These are provided for illustrative purposes enabling one to verify that the code flow is correct.
- Post processing tools built on MATLAB to plot and analyse model output.

- Scientific papers of model coupling applications.

A2.3 components of the three-dimensional coupled system BFM-POM (BFM_POM3D)

- FORTRAN77 three-dimensional Princeton Ocean General Circulation Model (POM-3D), with main code modified with built in (subroutines calls) coupling with BFM and upgraded with:
    - Surface flux interactive computation from atmospheric data and model predicted SST
    - Open boundary conditions computation for off-line nesting with larger domain three dimensional general circulation model.
    - MUSCL advection scheme for tracers
- POM-BFM coupling interface formed by FORTRAN90 routines and modules (pom_ini_bfm.f90, ModuleService.f90 and fixed-format files pom_ia_bfm.f, pom_to_bfm.f, pom_bfm.f) .
- UNIX/LINUX Makefile and script to compile end execute the model.
- Standard configuration (model grid, initial conditions, 6hrs varying atmospheric data for surface forcing functions computation) of the coupled system for the Adriatic Sea. These are provided for illustrative purposes enabling one to verify that the code flow is correct. This code is optimized for NEC SX architectures.
- Post processing tools built on MATLAB to plot and analyse model output.
- Documentation (user manual) for model coupling.

A2.4 components of the coupled system BFM-NEMO (BFM_NEMO)

- Source code of the coupling routines between the BFM and NEMO version 2_3 written in FORTRAN90. The code includes new features that are not in the original coupling of NEMO with other biogeochemical models:
    - Routine to read and apply open boundary conditions
    - Routine to initialise the model with analytically prescribed vertical profiles of all the components or from external files.
- Namelists and script to run the model in one-dimensional configuration using the facitilities activated by the configuration macros key_cfg1d.
- Documentation of the technical coupling, modifications to the original NEMO code and description of the subroutines used.

A2.5 components of the coupled system BFM-OPATM (BFM_OPATM8_1)

- Source code of the coupling routines between the BFM and OPATM version 8.1 written in FORTRAN90;

    - Standard configuration (model grid, initial conditions, 1 month varying OGCM forcings). These are provided for illustrative purposes enabling one to verify that the code flow is correct. This code is optimized for parallel architectures;

- Documentation of the technical coupling, modifications to the original OPATM-BFM code and description of the subroutines used.

Annex 3. Background excluded

CMCC
The global ocean version of the BFM model coupled with OPA8.2 (hereafter referred as PELAGOS), represented the original version of the BFM code. This code and the version that is part of the CMCC Earth System Model is not part of this agreement.

OGS
The Mediterranean Sea version of the BFM model coupled with OPA8.1 (hereafter referred as OPATM-BFM) is part of the OGS Operational System Model and is not part of this agreement.

DIPFIS
The 1D version of the POM coupled with a preliminary BFM code is not part of this agreement.

Annex 4. Work Plan

Action topics are divided in maintenance and consolidation of the BFM System components by

a) Code maintenance and distribution

b) Code efficiency and portability

c) Maintenance, upgrade and addition of examples and configurations

and scientific improvements and/or implementation of new features.

The actions are organized in tables, one for each specific objective, containing a priority code, a description of the activity, and a priority code defined as:

0 Urgent: 0-6 months
1 Short-term: 0-12 months
2 Intermediate: 12-24 months
3 Long-term: 24-36 months

In the framework of the work plan, the following glossary is used for software maintenance:

- *Revision*: Equivalent to version.
- *Version*: Any change in form of the software that is stored in a revision control system. A revision is technically the state at a point in time of the entire tree in the repository.
- *Release*: a version of the software that has met a defined quality level and can be distributed publicly. Software releases are defined as:
    - *Alpha*: initial public release of a partially stable revision that has been tested on a selected set of architectures. It does not require thorough testing with all the examples.
    - *Beta*: public release of a revision that is stable on the designated architectures and tested with the planned examples.

Work plan for 2011-2013

The initial work plan is focused on the set up of the BFM System and the tools for its distribution and maintenance.

Web Tools and Revision Control System (RCS) **Duration: 3; Responsible:**	
Priority	**Description**
0	Choice and implementation of the RCS (currently SVN), location of the server and access protocols
1	Reorganization of the current CMCC BFM web site (download section, user registration, etc.)

Core Package (STANDALONE) **Duration: 12; Responsible: M. Vichi**	
Priority	**Description**
0	Analysis of the standard BFM STANDALONE structure and parameterizations. Definition of tasks, workload sharing and time schedule. Preparation of the alpha release.
1	Definition and set-up of standard examples (pelagic shallow system, laboratory culture, mesocosm, etc.) for the alpha release
1	Documentation of the alpha release
1	Test of the alpha release in the STANDALONE examples
1	Publication of the alpha release of BFM STANDALONE
2	Revision of feedbacks. Publication of the beta release of BFM STANDALONE.

BFM_POM1D **Duration: 24; Responsible: M. Zavatarelli**	
Priority	**Description**
1	Preparation of the technical documentation and standard examples
1	Release of BFM_POM1D (alpha release)
2	Optimization of the current FORTRAN code for F90 compilation
2	Addition of more examples (including paleoceanography)
3	Switch to POM F90
3	Upgrade to the latest BFM release

BFM_POM3D **Duration: 24; Responsible: M. Zavatarelli**	
Priority	**Description**
1	Preparation of the technical documentation and standard examples
1	Release of BFM_POM3D (alpha release)
2	Optimization of the current FORTRAN code for F90 compilation
2	Addition of more examples
3	Switch to POM F90 and parallelization
3	Upgrade to the latest BFM release

BFM_NEMO **Duration: 24; Responsible: M. Vichi**	
Priority	**Description**
1	Testing of the global ocean climatological implementation (alpha version)
1	Preparation of the technical documentation and standard examples
1	Release of BFM-NEMO (alpha version)
2	Implementation of academic case studies (gyre, upwelling, etc.)
2/3	Addition of the Mediterranean configuration
3	Revision of feedbacks. Beta Release of BFM_NEMO
3	Upgrade of BFM_NEMO updated with the most recent NEMO version

BFM_OPATM **Duration: 24; Responsible:P. Lazzari**	
Priority	**Description**
1	Testing of the OPATM-BFM implementation (alpha version)
1	Preparation of the technical documentation and standard examples
1	Release of the OPATM-BFM (alpha version)
2	Revision of feedbacks. Beta Release of OPATM-BFM
3	Upgrade of OPATM-BFM with the most recent BFM standalone version

New Features to be developed		
Priority	**Description**	
2	Coupling with GOTM	
2	Benthic System	
2	Sea ice biology	
3	Coupling with SHYFEM	
3	Integration with food web ecological models	

Annex 5

ACCESSION FORM

of a new Party to BFM Consortium Agreement

[NAME OF THE NEW PARTY]

hereby consents to become a Party to the BFM Agreement identified above and accepts all the rights and obligations of a Party starting *[date]*.

[The chairperson]

hereby certifies that the Steering Committee has unanimously accepted in the meeting held on *[date]* the accession of *[the name of the new Party]* to the Consortium starting *[date]*.

This Accession document has been done in 2 originals to be duly signed by the undersigned authorised representatives.

[Date and Place]

[INSERT NAME OF THE NEW PARTY]
Signature(s)

Name(s)

Title(s)

[Date and Place]

[INSERT NAME OF THE Chairperson]
Signature(s)
Name(s)
Title(s)