

ARPAE
Agenzia regionale per la prevenzione, l'ambiente e l'energia
dell'Emilia - Romagna

* * *

Atti amministrativi

Determinazione dirigenziale	n. DET-2019-847	del 23/10/2019
Oggetto	Struttura Idro-Meteo-Clima. Approvazione del Memorandum of Agreement per il Community Model SHYFEM.	
Proposta	n. PDTD-2019-868	del 23/10/2019
Struttura adottante	Struttura Idro-Meteo-Clima	
Dirigente adottante	Paccagnella Tiziana	
Struttura proponente	Struttura Idro-Meteo-Clima	
Dirigente proponente	Dott.ssa Paccagnella Tiziana	
Responsabile del procedimento	Paccagnella Tiziana	

Questo giorno 23 (ventitre) ottobre 2019 presso la sede di Viale Silvani, 6 in Bologna, il Direttore della Struttura Idro-Meteo-Clima, Dott.ssa Paccagnella Tiziana, ai sensi del Regolamento Arpae per l'adozione degli atti di gestione delle risorse dell'Agenzia, approvato con D.D.G. n. 109 del 31/10/2019 e dell'art. 4, comma 2 del D.Lgs. 30 marzo 2001, n. 165 determina quanto segue.

Oggetto: Struttura Idro-Meteo-Clima. Approvazione del Memorandum of Agreement per il Community Model SHYFEM.

VISTI:

- la L.R. 19 aprile 1995, n. 44 e s.m.i. che istituisce l’Agenzia Regionale per la Prevenzione e l’Ambiente (ARPA) e riorganizza le strutture preposte ai controlli ambientali ed alla prevenzione collettiva;
- l’art.5 della legge citata L.R. 44/1995 che, al comma 2, prevede che “Per l’adempimento delle proprie funzioni, attività e compiti, ARPA può definire accordi o convenzioni con Aziende ed Enti pubblici, operanti nei settori suolo, acque, aria, ambiente”;
- l’art. 15 della L. 7 agosto 1990, n. 241, ai sensi del quale le Pubbliche Amministrazioni possono concludere tra loro accordi per disciplinare lo svolgimento in collaborazione di attività di interesse comune;
- la L.R. 30 luglio 2015 n. 13 “Riforma del sistema di governo regionale e locale e disposizioni su città metropolitana di Bologna, province, comuni e loro unioni” che, all’articolo 16 rinomina questo ente “Agenzia regionale per la prevenzione, l’ambiente e l’energia dell’Emilia-Romagna” (acronimo Arpae) estendendone le competenze.

PREMESSO:

- che, tra le attività della Struttura Idro-Meteo-Clima vi sono:
 - la realizzazione delle previsioni meteorologiche, di stato del mare e oceanografiche nel Mar Adriatico e di aree costiere regionali ad alta risoluzione;
 - l’esecuzione di simulazioni numeriche e previsioni oceanografiche e di stato del mare quotidiane per le attività di Centro Funzionale di Protezione Civile e per il supporto regionale alla pianificazione dello spazio costiero e marittimo;
 - lo sviluppo di un modello idrodinamico (basato sul modello a elementi finiti SHYFEM) della Sacca di Goro per conto delle Regione Emilia-Romagna e del Comune di Goro;
- questa Struttura, inoltre, dispone di risorse specializzate in numerica, parallelizzazione e processi operativi;
- che in ambito internazionale si vuol far diventare il modello SHYFEM, già in uso presso la Struttura Idro-Meteo-Clima, un Community Model per garantirne il funzionamento, lo sviluppo continuo e sostenibile come modello all'avanguardia adatto sia alla ricerca che alle applicazioni operative;
- che le strutture che hanno proposto la stesura di questo Memorandum od Agreement (in seguito

chiamati Partner) sono:

- CNR – Consiglio Nazionale delle Ricerche, Italy
 - OGS – Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Italy
 - CMCC – Centro Euro-Mediterraneo sui Cambiamenti Climatici, Italy
 - DIFA-UNIBO – Department of Physics and Astronomy, Alma Mater Studiorum - Università di Bologna, Italy
 - CINECA – Italy
 - ARPAE – Agenzia regionale per la prevenzione, l'ambiente e l'energia dell'Emilia-Romagna, Italy
 - KU – Klaipeda University, Marine Research Institute, Lithuania
 - IU – Istanbul University, Faculty of Aquatic Sciences, Turkey
- che il codice di riferimento SHYFEM sarà reso disponibile come software libero sotto la licenza GNU (General Public License), allo scopo di attrarre attori che possano a loro volta contribuire allo sviluppo del Codice.

CONSIDERATO:

- che la collaborazione fra Arpa-e-SIMC e gli altri Partner è strategica per continuare la collaborazione e lo sviluppo del modello già utilizzato per numerose prodotti della Struttura e sul quale si ritiene saranno basate numerose catene operative marino-costiere in futuro;

RITENUTO:

- opportuno approvare il Memorandum of Agreement per il Community Model SHYFEM, il cui schema si allega sub A) al presente atto quale parte integrante e sostanziale;

PRECISATO:

- che tale Memorandum of Agreement non ha una durata prefissata e non comporta costi se non le spese di personale necessarie per l'attività di sviluppo del modello;

SU PROPOSTA:

- della dott.ssa Tiziana Paccagnella, Responsabile della Struttura Idro-Meteo-Clima, la quale, ai sensi del regolamento per l'adozione degli atti di gestione delle risorse dell'Agenzia approvato con D. D. G. n. 130 del 21/12/2018, ha espresso parere favorevole in merito alla regolarità amministrativa e tecnica del presente atto;

DATO ATTO:

- che si è provveduto a nominare responsabile del procedimento la dott.ssa Tiziana Paccagnella;

DETERMINA

1. di approvare il Memorandum of Agreement per il Community Model SHYFEM che si allega sub A) al presente atto quale parte integrante e sostanziale, per continuare la collaborazione e lo sviluppo del modello numerico previsionale SHYFEM;
2. di dare atto, che il Memorandum of Agreement non ha una durata prefissata e decorre dal momento della sottoscrizione da parte di tutti i Partner;
3. di dare atto che dalla presente sottoscrizione non deriverà alcun onere per Arpae.

Allegato A): SHYFEM Community Model (SHYFEM) Memorandum of Agreement

LA RESPONSABILE DELLA
STRUTTURA IDRO-METEO-CLIMA

F.to Dott.ssa Tiziana Paccagnella

SHYFEM Community Model
(SHYFEM)
Memorandum of Agreement

Table of Contents

1. Purpose	3
2. Definitions	3
3. Implementation	4
4. Management and Coordination	4
5. Intellectual Property Rights	7
6. Confidentiality	8
7. Partners	8
8. Term and Amendments	10
9. Final Provisions	11
10. ANNEXES	12

SHYFEM Community Model
(SHYFEM)
Memorandum of Agreement

By and among

- CNR – Consiglio Nazionale delle Ricerche, Italy
- OGS – Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS, Italy
- CMCC – Centro Euro-Mediterraneo sui Cambiamenti Climatici, Italy
- DIFA-UNIBO – Department of Physics and Astronomy, Alma Mater Studiorum - Università di Bologna, Italy
- CINECA – Italy
- ARPAE – Agenzia regionale per la prevenzione, l'ambiente e l'energia dell'Emilia-Romagna, Italy
- KU – Klaipeda University, Marine Research Institute, Lithuania
- IU – Istanbul University, Faculty of Aquatic Sciences, Turkey

Preamble

Having

- **CNR** developed the first numerical model based on finite element approach, so-called SHYFEM, contributing to the development of several numerical modules as the particle tracking module, the 3D wave-current interaction module, the 2D coupling procedure with ecological models, with contribution from the others institutions. CNR developed also a MPI version on nodes of the model. CNR has more than thirty years of developments, having long-term projects and activities using SHYFEM and its coming developments;
- **OGS** contributed to the development of SHYFEM, started and led the development of ecological applications within SHYFEM, contributed to the development of several numerical modules, including post-processing, water quality, pollution and ecological modelling modules, contributed to the development a parallel OMP version of SHYFEM;
- **CMCC** developed a MPI version of SHYFEM, numerical module components (such as interactive air-sea fluxes and lateral open boundary conditions) and production-level pre- and post- processing tools for operational forecasting;
- **DIFA-UNIBO** developed a relocatable version of SHYFEM within the Structured and Unstructured Relocatable model for Forecasting (SURF) platform, which is embedded in a virtual machine working on Linux software platform.
- **CINECA** contributed to the bug fixing and to the refactoring of the SHYFEM code starting from version 7.1.10. Moreover, it has done an

intranode optimization of the code, and in particular has contributed to OpenMP parallelization.

- **ARPAE** supported and is interested in the development of SHYFEM for coastal oceanography and operational forecast;
- **KU** developed the ecological model AquaBC and integrated it into SHYFEM.
- **IU** co-developed and has coupled a drainage basin model (SWAT) to SHYFEM

Endeavoring to bring the SHYFEM code into operation and ensure its continued, sustainable development as a well-organized, state-of-the-art model code suitable for both research and operational applications.

Ensuring to keep the SHYFEM reference code (“Reference Code”) freely available under the GNU General Public License, with the aim of attracting a critical mass of scientists to use and contribute to the continued development of the Reference Code.

1. Purpose

The purpose of this agreement (“Agreement”) is to define key aspects of the collaboration, including:

- i. each Partner’s activities related to SHYFEM development;
- ii. intellectual property rights;
- iii. rules of exploitation of code for research and commercial uses.

2. Definitions

For the purpose of this Agreement, the terms defined herein shall have the respective meanings ascribed to them, and the terms below shall have following meanings:

Access Rights means license and user rights to Background Information or Foreground Information.

Background Information means SHYFEM model, SHYFEM-version-8.0, the components of which are specified in Annex 1.

Foreground information means the first release of the community model SHYFEM, version SHYFEM-CMv1.0 and the subsequent releases.

Reference Code refers to the most recent, and stable version released after SHYFEM-CMv1.0.

The **Work Plan** describes the activities that each Partner within the Agreement will carry out.

The **Strategic Plan** contains the vision of the model code development.

3. Implementation

3.1. Work Plan

The first Work Plan will be defined and approved at the first Steering Committee meeting of the MoA.

The Steering Committee shall update the Work Plan every two years and amend the Work Plan accordingly.

Each Partner agrees to devote sufficient resources and expertise to enable the Work Plan to be implemented in a competent and timely manner in line with recognized best practices for such work.

3.2. Partner Undertakings

To ensure mutual benefits from the collaboration, each Partner agrees to:

- i) make consensus-based decisions on the Agreement priorities, strategic and technical choices;
- ii) promote an open and transparent relationship among the Partners;
- iii) recognize and understand the objectives, needs, capabilities responsibilities and constraints of the other Partners in implementing the Agreement;
- iv) ensure disputes are identified and resolved as soon as practicable;
- v) work collaboratively on SHYFEM source code development;
- vi) make the latest developments readily available to the System Team for implementation in the SHYFEM source code;
- vii) develop joint fundraising activities to finance the SHYFEM source code development

3.3. Financial Arrangements

Each Partner shall bear the cost of carrying out its own activities under the Work Plan.

4. Management and Coordination

4.1. SHYFEM Steering Committee

4.1.1. Role

The SHYFEM Steering Committee will:

- produce the Strategic Plan for a three year period;
- approve the work plan;
- evaluate the progress reports;

- resolve possible disputes within the consortium;
- nominate the chairperson of the Steering Committee for a 2 year term;
- review/amend any Annex to this Agreement;
- approve new Parties to this Agreement;
- appoint the Scientific Leader for a five-year term;
- appoint the Project Manager for a three-year term.

4.1.2. Composition

The SHYFEM Steering Committee is composed of one representative for each partner organization and the Scientific Leader.

4.1.3. Chairperson

The chairperson of the SHYFEM Steering Committee is a member of the Steering Committee. Every 2 years the chair will rotate to another Consortium Member for the term of the Agreement.

The chairperson sets the agenda for the meetings of the SHYFEM Steering Committee, chairs meetings of the SHYFEM Steering Committee and makes sure that the decisions taken by the SHYFEM Steering Committee have been implemented.

4.1.4. Meetings

Steering Committee meetings will be held regularly, at least once a year. The Project Manager will be also invited to the meeting of the Steering Committee.

4.1.5. Voting

One vote for each partner organization, represented by the persons of the Steering Committee.

4.2. SHYFEM System Team

4.2.1. Responsibilities

The SHYFEM System Team members are responsible for developing the SHYFEM source code. The System Team members will be defined by each Partner. The SHYFEM System Team shall carry out the Work Plan, which includes:

- i) releasing the official SHYFEM Reference Code approximately every year;
- ii) writing and updating the User Guide and other documentation related to the source code;
- iii) making available and updating the User Case Test Code for the SHYFEM versions;
- iv) carrying out the actions defined in the Work Plan;
- v) maintaining and updating the SHYFEM web site.

Neither the SHYFEM System Team nor any Partner will be required to provide any type of support to external users, unless otherwise agreed among the Partners.

4.2.2. Composition

The SHYFEM System Team shall be composed of the scientific and technical experts of the partner organizations and external scientists. The initial composition is set forth in Annex 2 and it may be modified during the System Team meetings. The composition of the System Team will change according to the tasks of the Work Plan and will be amended by the Steering Committee.

4.2.3. Coordination

The SHYFEM System Team shall be coordinated by the SHYFEM Scientific Leader.

4.2.4. Meetings

Meetings will be held regularly, as decided by the System Team.

4.3. Scientific Leader

The SHYFEM **Scientific Leader** will:

- i) contribute to define scientific and technical priorities for development of the SHYFEM source code;
- ii) ensure timely and appropriate reviews of proposed contributions to the SHYFEM source code;
- iii) supervise and coordinate, with the help of the Project Manager, the activities of the System Team and the incorporation of code changes into the source code;
- iv) coordinate inputs according to the annual Work Plan for SHYFEM System Team encouraging constructive team working.

The initial SHYFEM Scientific Leader is identified in Annex 2.

4.4. SHYFEM Project manager

The SHYFEM **Project Manager** will be responsible for:

- i) writing the yearly report for the Steering Committee;
- ii) coordinating the writing of the Work Plan;
- iii) monitoring the progress against plans and reporting exceptions to the Scientific Leader and the Steering Committee;
- iv) organizing the annual meetings of the System Team and the Steering Committee;
- v) monitoring the incorporation of code changes for the release of the Reference Code.

The initial SHYFEM Project Manager is identified in Annex 2.

5. Intellectual Property Rights

5.1. Background information

Background Information is identified and listed in Annex 1.

Background Information is under the GNU General Public License (GPL).

Each Partner shall retain ownership of its Background Information and related IPR while implementing the Work Plan, including any modified or adapted versions. No provision of this Agreement shall be constructed as transferring IPR from one Partner to another.

5.2. Foreground information

The Foreground Information shall be co-owned by the Partners. The copyright of each contribution to the Foreground Information belongs to the authors. The rights of use are regulated by the GPL.

The Steering Committee Chairperson shall be responsible for applying, obtaining, and maintaining the IPR protection related to the Foreground Information.

The Foreground Information (Reference Code) is made freely available without restrictions through the SHYFEM web site.

5.3. Third Party Contributions

The copyright of each contribution from any third party belongs to the authors. The Partners shall ensure that any third party that makes a contribution to SHYFEM for use in the further development has granted the GPL.

The Partners shall ensure that any such software is subjected to an agreed quality control process and work standards prior to integration into the SHYFEM Reference Code.

5.4. Public Licenses

The Partners agree to make the Reference Code available under the GNU General Public License (GPL).

The authors of new code may wish to make the code available under the GNU Lesser General Public License (LGPL). In this case, this decision will have to be amended by the Steering Committee.

5.5. Acknowledgements and Publications

Partners shall acknowledge use of the SHYFEM in all publications and communications, using the name "SHYFEM".

6. Confidentiality

The Parties may disclose to each other Confidential Information under this Agreement, which the disclosing Party deems confidential (hereafter referred to as “Confidential Information”).

Each Party shall not disclose any Confidential Information to any third party and shall use the same degree of care as it uses to protect its own confidential information. Each Party shall prevent the unauthorized use, dissemination or publication of the Confidential Information, and shall not use the Confidential Information for any purpose other than the purposes of this Agreement.

7. Partners

7.1. Additional Partners

A new Partner may be brought into the Agreement by unanimous vote of the Steering Committee, effective as from the date of its signature of the Agreement. The request should be submitted to the steering committee by an official written letter explaining the motivations and the potential contribution.

All new Partners shall commit to contributing resources and activities to carry out the Work Plan, as agreed among all Partners.

Any new Partner may take part in discussions of the Work Plan up to six months before it commits resources to the SHYFEM System Team.

Any new Partner shall be granted Access rights to the Background and Foreground Information on the same conditions as the other Partners. The new Partner will have co-ownership of the code developed from SHYFEM from the date of signature.

7.2. Removal and Withdrawal

Without prejudice to any other rights or remedies open to the Partners, the Steering Committee may, by unanimous vote, excluding that of the concerned Partner, and by written notice, remove from the Agreement any Partner that:

- i) is in material breach of any of the terms of this Agreement and, where the breach is capable of remedy, the Partner fails to remedy such breach within 30 days of receipts of written notice specifying the breach and demanding the remedy;
- ii) is deemed incompetent, commits repeated acts of misconduct or a single act of gross negligence; or
- iii) ceases to operate.

Any Partner may withdraw from participation in the Agreement by providing the other Partners at least three months’ written notice, by registered mail with acknowledgement of receipt, indicating the reasons for withdrawal.

The notice above required shall indicate the effective date of the removal or withdrawal, within the time frames stipulated therein.

7.3. Consequences of Removal or Withdrawal

Any Partner that withdraws or is removed from this Agreement agrees to treat all Confidential Information, in accordance with the requirements set forth in article 6, for a period of six (6) years from the date of withdrawal or removal, and further agrees not to apply for any patent or other proprietary right over any information, subject to its own information, it may have obtained in connection with its participation in the Agreement.

Any Partner that withdraws or is removed from the Agreement shall automatically relinquish the co-ownership of any future IPR with respect to the Foreground Information that is developed under this Agreement after the date of withdrawal or exclusion.

The remaining Partners shall retain ownership of their Background and Foreground IPR and their Access Rights to the Background Information of the withdrawing or removed Partner.

Any Partner that withdraws or is removed from the Agreement shall honor its financial commitments up to the effective date of its withdrawal or exclusion.

7.4. No Liability

No Partner shall be liable to any other Partner for damages related to a failure to perform, or to an error in performance, of its obligations under this Agreement.

The Partners shall ensure that all licenses granted under article 5 contain an express disclaimer of liability vis-à-vis all downstream users.

7.5. No Warranties

The Partners agree that SHYFEM shall be provided free of any warranty as to its performance, accuracy, quality or fitness for a particular purpose.

7.6. No Partnership

The relationship among the Partners is and shall remain exclusively that of a collaboration among independent institutions and nothing contained in this Agreement shall be construed as creating any partnership, joint venture, agency or other legal relationship among the Partners.

No Partner shall make or give any contract, representation, warranty, undertaking or other commitment on behalf of another Partner, unless expressly authorized in writing to do so.

7.7. No Assignment

No Partner shall assign or otherwise transfer, in whole or in part, any of its rights or obligations under this Agreement without the unanimous consent of the other Partners.

7.8. Ability to Perform

Each Partner shall take appropriate measures to ensure that it is able to grant Access Rights and otherwise fulfill its obligations under this Agreement, including *vis-à-vis* its staff, agents or subcontractors.

7.9. Employees

The employees of any Partner may perform work under this Agreement on the premises of another Partner only with the permission of both Partners. Employees working at another Partner's institution must conform to the rules and procedures of that institution.

Each Partner shall be responsible for the remuneration of its staff and non-staff personnel working on the Agreement, including all taxes, contributions and other obligations required by law.

Each Partner is responsible for ensuring that its employees have adequate insurance coverage as required by law.

8. Term and Amendments

8.1. Term and Termination

This Agreement shall become effective upon its signature by all Partners, and shall have a duration of five (5) years unless earlier terminated by unanimous agreement of the Partners. Within thirty [30] days of termination, this Agreement may be renewed by written agreement among all or any number of the Partners.

The provisions of this Agreement concerning liability, confidentiality, intellectual property rights and publication shall survive the termination of this Agreement or of any Partner's participation, to the extent needed to enable the Partners to pursue the rights and remedies provided for herein and subject to any applicable time limits provided under this Agreement (see article 6) or prevailing legislation.

For the avoidance of doubt, the termination or withdrawal of any Partner shall not affect its rights or obligations incurred prior to the date of the termination.

8.2. Amendments

Amendments or changes to this Agreement shall be valid only if made in writing and approved by all of the Partners, with the exception of Annex 2, which may be amended by written notice of the Chairperson to the Partners after the Steering Committee approval

8.3. Severability

Should any provision of this Agreement be deemed or become invalid, whether in whole or in part, the Partners shall agree on a valid substitution that most closely fulfils the original purpose. If no such substitution is practicable, the invalid provision shall be severed from the Agreement. The

remaining provisions of the Agreement shall not be affected by any such severance or substitution.

8.4. Entire Agreement

This Agreement, including the annexes hereto, constitutes the entire agreement among the Partners in respect of the Agreement, and supersedes all previous negotiations, commitments and documents related to the collaboration.

Notwithstanding the foregoing, the Partners may conclude ancillary contracts necessary to carry out the provisions of this Agreement.

9. Final Provisions

9.1. Language

This Agreement is drawn up in the English language. All documents, communications and meetings related to implementing this Agreement shall be in English.

9.2. Applicable Law

This Agreement shall be construed according to and governed by the laws of the Italian Republic.

9.3. Settlement of Disputes

The Partners agree that all disputes or differences arising from this Agreement will be amicably resolved by the Steering Committee. All disputes that cannot be amicably resolved shall be submitted before the decision of the Court of Rome, Italy.

10. ANNEXES

10.1. ANNEX 1: Background Information Technical specifications

The finite element program SHYFEM is a program package that can be used to resolve the hydrodynamic equations in lagoons, seas, estuaries and lakes. The program uses finite elements for the resolution of the hydrodynamic equations. These finite elements, together with an effective semi-implicit time resolution algorithm, makes this program especially suitable for applications in areas with a complicated geometry and bathymetry.

The program SHYFEM resolves the oceanographic primitive equations and can use both a two- and a three-dimensional formulation, depending on the user's needs. Finite elements are well adapted to problems dealing with complex bathymetric situations and geometries. The finite element method has an advantage over other methods (e.g., finite differences) because it allows more flexibility with its subdivision of the system in triangles varying in form and size. This flexibility can be used also in situations where it is not desired to have uniform resolution of the whole basin, but where a focus in resolution is needed only in some parts of the area.

It is possible to simulate shallow water flats, i.e., tidal marshes that in a tidal cycle may be covered with water during high tide and then fall dry during ebb tide. This phenomenon is handled by the model in a mass conserving way.

A part from the hydrodynamic core, SHYFEM consists of a variety of modules that solve certain problems. The most prominent modules that are contained in SHYFEM are:

- scalar advection and diffusion of temperature, salinity, conservative tracer or similar
- sediment transport with different formulations, both for cohesive and non-cohesive sediments
- Lagrangian particle tracking in 3D with custom particle properties
- water quality and ecological modules for description of biogeochemical cycling, oxygen dynamics, bacterial diffusion and survival in 2D and 3D settings, and related modules for coupling with transport processes, boundary conditions, and I/O
- bio-optical module for light attenuation along the water column
- a suite of transport scale measures, including residence time, confinement, age and a module for online water renewal time computation for marginal seas
- identification of sub-basins pertaining different point-sources ("colors")
- pollution fate and transport
- turbulence closure schemes (k-eps) for the vertical viscosity and diffusivity
- air-sea interaction and heat flux routines
- tidal potential computation

- a module for non-hydrostatic flow computations
- parallelization using OMP and MPI with domain decomposition on nodes

Moreover, SHYFEM contains also code to pre-process input files from NetCDF formats, post-processing routines to convert to various formats, and plotting routines for the graphical rendering of results.

The distribution consists of source code files that contain information on authorship, revision log, and authors that have contributed to the writing of the files. This information constitutes the proof of copyright of the software up to SHYFEM version 8.0, which will be released before the signing of this agreement.

For all code and modules not mentioned in this annex, the authoritative source for the background information is SHYFEM version 8.0

10.2. ANNEX 2: Names proposed for Steering Committee, Scientific Leader, Project Manager and Members of SHYFEM System Team

Initial Members of the Steering Committee:

for CNR: Christian Ferrarin

for CMCC: Giovanni Aloisio

for DIFA-UNIBO: Nadia Pinardi

for INOGS: Donata Canu

for CINECA: Carlo Cavazzoni

for ARPAE: Andrea Valentini

for KU: Petras Zemlys

for IU: Ali Ertürk

Initial SHYFEM Scientific Leader:

Georg Umgiesser, CNR

Initial SHYFEM Project Manager:

Ivan Federico, CMCC

Initial Members of the System Team:

for CNR: Marco Bajo, Debora Bellafiore, Andrea Cucco, Francesca De Pascalis, Christian Ferrarin, Michol Ghezzeo, Francesco Maicu, William McKiver

for CMCC: Ivano Barletta, Italo Epicoco, Ivan Federico, Giorgio Micaletto, Silvia Mocavero, Fabio Montagna, Giorgia Verri

for DIFA-UNIBO: Marco Zavatarelli, Luca Giacomelli

for INOGS: Leslie Aveyuta, Giorgio Bolzon, Celia Laurent, Cosimo Solidoro

for CINECA: Eric Pascolo

for ARPAE: Jacopo Alessandri, Lidia Bressan

for KU: Jovita Mezine, Natalja Čerkasova, Rasa Idzelyte

for IU: Gökhan Cüceloglu, Burak Karnaroglu