

Memorandum of Agreement
for the
Operation and Continued Development of
MEDSLIK-II
(OCD-MEDSLIK-II)

BY AND AMONG:

The Istituto Nazionale di Geofisica e Vulcanologia, hereinafter referred to as "INGV", with its registered office at Via Di Vigna Murata 605, 00143 Roma - Italy - represented by its President Prof. Carlo Doglioni, **AND**

The Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici, hereinafter referred to as "CMCC", with its registered office at Via Augusto Imperatore 16, 73100 Lecce - Italy - represented by its President Dr. Antonio Navarra, **AND**

The Consiglio Nazionale delle Ricerche-Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino, hereinafter referred to as "CNR-IAS", with its registered office at via De Marini n.6 - 16148 Genova (GE) - Italy - represented by its Director Dr. Mario Sprovieri, **AND**

The Joint Research and Development Centre ORION, hereinafter referred to as "ORION", with its registered office at 15 Pente Pigadia Street, 1076 Nicosia - Cyprus - represented by its Director Dr. Evis Drousiotis, **AND**

The Department of Physics and Astronomy at Alma Mater Studiorum University of Bologna, hereinafter referred to as "UNIBO-DIFA", with its registered office at Viale Berti Pichat 6/2 40127 Bologna - Italy - represented by its Director Prof. Nicola Semprini Cesari, **AND**

Department of Civil, Chemical, Environmental, and Materials Engineering at University of Bologna, hereinafter referred to as "UNIBO-DICAM", with its registered office at Viale Risorgimento, 2 40136 Bologna - Italy - represented by its Director Prof. Alberto Montanari, **AND**

The Numerical Analysis, Computational Fluid Dynamics and Scientific Computing Group at the Institute of Applied & Computational Mathematics, hereinafter referred to as "FORTH-IACM", with its registered office at Nikolaou Plastira 100, Vassilika Vouton, GR 700 13 Heraklion, Crete - Greece - represented by its Director Prof. Charalambos G. Makridakis, **AND**

The METOcean Dynamic Solutions Pty Ltd, hereinafter referred to as "METHODS", with its registered office at Brisbane/Darwin - Australia - represented by its Director Dr. Oleg Makarynskyy, **AND**

The Ocean Physics and Modeling Group at Division of Environmental Physics at University of Athens, hereinafter referred to as "NKUA-OPAM", with its registered office at University Campus, BUILD PHYS-5 Athens 15784, - Greece - represented by Prof. Sarantis Sofianos, **AND**

The Laboratory of Maritime Engineering & Maritime Works at Division of Hydraulics and Environmental Engineering at School of Civil Engineering at Aristotle University of Thessaloniki, hereinafter referred to as "LMEMW-AUTH", with its registered office at Panepistimioupoli, Thessaloniki CR 54124, - Greece - represented by Prof. Theophanis V. Karambas, **AND**

each of the foregoing a "Partner", collectively "Partners".

Preamble

Having developed several versions of an oil spill model system named MEDSLIK-II or the "System", based on its precursor oil spill model MEDSLIK (Lardner and Zodiatis 1998; Lardner et al. 2006; Zodiatis et al. 2005, 2008);

Having participated, for most of the partners, to the previous version of the agreement on MEDSLIK-II called "Memorandum of Agreement for the Operation and Continued Development of MEDSLIK-II (OCD-MEDSLIK-II)";

Endeavouring to bring the System into operation and ensure its continued, sustainable development as a well-organized, state-of-the-art oil-spill model code suitable for both research and operational work;

Wishing to make the MEDSLIK-II code ("Code") freely available under the GNU free public license, with the aim of attracting a critical mass of scientists to use and contribute to the continued development of the Code;

The Partners hereby agree as follows:

Chapter 1. Purpose

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

- i) each Partner's annual commitment of resources and activities;
- ii) the management and coordination of the MEDSLIK-II System Team provided in Chapter 4.2; and
- iii) intellectual property rights.

Chapter 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.

Agreement means this Agreement and its annexes, as may be amended from time to time.

Background Information means the Code, owned by CMCC and INGV, and other information owned by any Partner prior to signing this Agreement that is necessary to its implementation. The Background Information is identified in Annex 3.

Contribution means any addition, modification, correction, translation or adaptation provided by any person and integrated into the Code.

Documentation means manuals, papers and other written documents approved by the MEDSLIK-II System Team to describe the MEDSLIK-II system.

External Module means any Module that does not belong at any time to MEDSLIK-II Code.

Foreground Information means the Intellectual Property created as a direct result from the work undertaken by one or several Partners in the development of the Software under this Agreement,

Intellectual Property Rights or IPR means the proprietary rights to exploit a creation, and includes trademarks, patents, copyrights (including copyright in software), industrial designs, and other legal protection, whether or not eligible for registration in a given country.

MEDSLIK-II System means MEDSLIK-II Code and subsequent releases, the components of which are specified in Annex 1.

MEDSLIK-II Scientific Leader means the person described in Chapter 4.3 and identified in Annex 2.

MEDSLIK-II System Team or System Team means the team described in Chapter 4.2 and identified in Annex 2.

Module means any component of the Code that has an independent logical or functional consistency.

Partner means a signatory to this Agreement.

Code means the MEDSLIK-II System Software system comprehensive of a source code, scripts, input files, output visualization software and test case input files maintained updated and distributed by the MEDSLIK-II System Team through the MEDSLIK-II server and web pages specified in Annex 1.

Software means all or any part of the MEDSLIK-II code.

Source Code means the set of instructions, in commonly legible form, intended to be executed by a computer to achieve a stated purpose, together with its scripts and input files.

Steering Committee means the committee described in Chapter 4.1.

System means MEDSLIK-II.

System Team Coordinator means the person described in Chapter 4.3 and identified in Annex 2.

Test Cases means input files, scripts and model results that configure MEDSLIK-II code in a preset manner and that could be used to check if the Code works properly.

Work-Plan means the annual plan of work defined under Chapter 3.1 below.

Chapter 3. Implementation

3.1 Work Plan

The Work Plan describing each Partner's role in the Agreement is set forth in a separated document named "Work Plan" and approved by Steering Committee. The first version of the Work Plan will be approved by the Steering Committee at its first meeting.

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.

The Steering Committee shall update the Work Plan annually and amend the “Work Plan” accordingly.

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 MEDSLIK-II Code development;
- vi) make the latest developments readily available to the System Team for implementation in the MEDSLIK-II Source Code; and
- vii) work toward improving the collaboration on oil spill modeling research within Europe and internationally.

3.3 Financial Arrangements

3.3.1 Each Partner shall contribute to the Work Plan at least the equivalent of 6 months of staff time (as defined by the rules of the Partner concerned) annually.

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

Chapter 4. Management and Coordination

4.1 Steering Committee

4.1.1 Role. The Steering Committee is the Agreement's decision-making and arbitration body. It shall determine:

- i) the strategic direction of the Agreement;
- ii) the MEDSLIK-II Scientific Leader and MEDSLIK-II System Team Coordinator chosen from the System Team;
- iii) the Work-Plan for each year and the subsequent amendment;
- iv) the contributions of each Partner to the Work Plan;
- v) any modifications needed to this Agreement;
- vi) whether to include any new Partners;
- vii) whether to remove any Partner in accordance with Chapter 7.2; and
- viii) the settlement of disputes.

4.1.2 Composition

The Steering Committee shall be composed of one representative nominated by each Partner, the initial composition is identified in Annex 2 and may be modified in accordance with Chapter 8.2.

The MEDSLIK-II Scientific Leader and the MEDSLIK-II System Team Coordinator shall also attend Steering Committee meetings and have voting rights.

4.1.3 Chairperson

The Chairperson of the Steering Committee (Chairperson) shall be elected by the Steering Committee at its first meeting. Each Partner may serve as Chairperson for a three-year term on a rotating basis. The Chairperson may give one year's advance notice of his/her intention to step down, in which case the Steering Committee shall elect a new Chairperson at its next meeting. The Chairperson shall set the agenda for and lead Steering Committee meetings, and shall ensure that the decisions taken therein are implemented.

4.1.4 Meetings

The Steering Committee shall meet at least once each year, and shall hold extraordinary meetings at the request of any Partner or of the MEDSLIK-II System Team Coordinator. The Chairperson shall give each of the Partners at least thirty (30) calendar days written advance notice of annual meetings and fifteen (15)

calendar days notice of extraordinary meetings. Should a Partner wish to propose any item for the agenda, it shall provide the other Partners written notice thereof at least seven (7) calendar days prior to the meeting date. The Chairperson shall draft the minutes of each meeting to formalize in writing all decisions taken and shall dispatch them to all Partners within fifteen (15) calendar days of the meeting's conclusion. If no Partner objects to the minutes within 15 days of receipt, the minutes shall be considered accepted. Any such objection shall be made in writing to the Chairperson.

4.1.5 Voting

All members of the Steering Committee shall be eligible to vote on the matters listed in Chapter 4.1.1 above. All decisions of the Steering Committee shall be taken by unanimous vote.

4.2 MEDSLIK-II System Team

4.2.1 Responsibilities

The MEDSLIK-II System Team is responsible for developing and maintaining the MEDSLIK-II Code versions, their documentation and their distribution through the MEDSLIK-II web server specified in Annex 1 for its subsequent releases.

The MEDSLIK-II System Team shall carry out the Work Plan, which may include:

- i) incorporating all new scientific and technical developments into MEDSLIK-II System;
- ii) reorganizing code to improve its readability, orthogonality or structure;
- iii) maintaining the on-line documentation;
- iv) overseeing the configuration of the available versions of MEDSLIK-II;
- v) testing and releasing new versions;
- vi) releasing Test Cases to work with the code released at any given time;
- vii) making MEDSLIK-II readily available to Partners and the scientific community;
- viii) providing assistance to new users;
- ix) providing logistical support for user meetings;
- x) assisting scientific development in areas of high priority.

4.2.2 Neither the MEDSLIK-II System Team nor any Partner will be required to provide any of the following types of support unless otherwise agreed among the Partners:

- i) application of the System to specific cases for service purposes;
- ii) tuning the parameters of models for specific cases;
- iii) on-demand responses following operational System failures;
- iv) operational support to oil spill emergencies;
- v) configuration of MEDSLIK-II System for specific areas, such as defining specific grid locations or bathymetry, hydrodynamic ocean model integration; or
- vi) other forms of support not expressly contemplated in this Agreement.

4.2.3 Composition

The MEDSLIK-II System Team shall comprise Partner scientists and technicians, with at least one representative per Partner. The initial composition is set forth in Annex 2, as may be modified in accordance with Chapter 8.2.

4.2.4 Coordination

The MEDSLIK-II System Team shall be coordinated by a MEDSLIK-II System Team Coordinator.

4.3 MEDSLIK-II Scientific Leader and System Team Coordinator

4.3.1 Selection

At its first meeting, the Steering Committee shall elect a MEDSLIK-II Scientific Leader and a MEDSLIK-II System Team Coordinator to three-year terms, renewable once. Either may step down with one year's advance notice to the Chairperson, in which case the Steering Committee shall select the successor at its next meeting. The members of the Steering Committee are set forth in Annex 2, as may be modified in accordance with Chapter 8.2.

4.3.2 Responsibilities

The MEDSLIK-II Scientific Leader and the MEDSLIK-II System Team Coordinator shall jointly:

- i) develop the scientific and technological knowledge within the MEDSLIK-II System Team;

- ii) establish scientific and technical priorities for development of the MEDSLIK-II code;
- iii) ensure the timely and appropriate reviews of proposed contributions to the MEDSLIK-II code;
- iv) promote the Agreement and seek opportunities for funding.

4.4 User Meetings

A meeting of MEDSLIK-II System users shall be held on a regular basis to discuss relevant issues and collect feedback jointly with the Steering Committee meeting.

Chapter 5. Intellectual Property Rights

5.1 Background Information

5.1.1 The Partners have identified and listed in Annex 3 the Background Information that is relevant to this Agreement.

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

5.1.3 The Partners shall grant to each other, royalty-free license, free of charge, to install, use, further develop and copy the Background Information for the exclusive purpose of executing the Work Plan.

5.1.4 The IPR to any modified or adapted Background Information owned by any Partner shall remain the exclusive property of such Partner.

5.2 Foreground Information

5.2.1 The IPR to all Foreground Information shall be co-owned by the Partners.

5.2.2 The Steering Committee Chairperson shall be responsible for applying for, obtaining and maintaining the IPR protection related to the Foreground Information. Any associated costs shall be shared equitably among the Partners.

5.2.3 Partners distributing code relating to MEDSLIK-II System shall only distribute recent versions that can be interfaced with the most updated version of the Code that is exclusively made available through the MEDSLIK-II web site.

5.3 Third Party Contributions

5.3.1 The Partners shall ensure that any third party that makes a contribution to MEDSLIK-II for use in the further development of the System has granted the Partners an irrevocable license, free of charge, to install, use, further develop, copy, distribute and store the contribution.

5.3.2 The Partners shall ensure that any such software is subjected to an agreed quality control process and work standards prior to integration into the MEDSLIK-II System.

5.4 Public Licenses

The Partners agree to make the e Code available under an appropriate public license that allows users to install, use, further develop, sub-license, copy and distribute the Code. MEDSLIK-II code is freely available under the GNU free public license. Among other things, the license shall:

- i) require any user who wishes to further distribute the MEDSLIK-II Code, including the source code, to include the same public license as part of the distribution package; and
- ii) expressly exclude:
 - a) any warranty as to the accuracy, soundness or fitness of the Software for any purpose;
 - b) liability of the licensors or authors for any use or misuse of the Software; and
 - c) patentability of the Software.

5.5. Acknowledgements and Publications

5.5.1 Partners shall acknowledge use of the System in all publications and communications, using the name "MEDSLIK-II System," together with the website specified in Annex 1.

5.5.2 Any proposed publication or communication by one of the Partners, in connection with all or part of the Agreement is required to be submitted to the other Partners at least one month in advance. To this end, a brief description and the subject of the proposed publication or communication shall be submitted to the other Partners together with a copy of the proposed text or visual representation. Any Partner may express an objection to the communication's publication if, in its opinion, the communication carries a reasonable risk of harm, in particular regarding industrial property protection. In case of objection, the publication in question shall be delayed while an agreement is reached. If no Partner objects to the proposed communication within one month of receipt of notice, the consent of all shall be presumed.

However, no Partner may withhold its consent to publication or communication for longer than six (6) calendar months from the date the notice was received.

Chapter 6. Confidentiality

6.1 For the duration of the Agreement and for a period of six (6) years thereafter, the Partners shall treat as confidential any information which is so designated by the disclosing Partner, as evidenced by an appropriate stamp, legend or any other notice in writing, or when communicated as confidential at the time of disclosure, as confirmed in writing by the disclosing Partner within thirty (30) days of disclosure.

6.2 Any Partner receiving confidential information shall not:

- i) use it for any purpose other than implementing this Agreement, and then only to the extent necessary;
- ii) disclose it to a third party; or
- iii) copy, duplicate or otherwise reproduce it, in whole or in part;

unless expressly authorized in writing by the disclosing Partner.

6.3 The obligation of non-disclosure shall not apply to information that is:

- i) published or otherwise made available to the public other than by breach of this Agreement by the receiving Partner;
- ii) already in its possession of the receiving Partner at the time of its signature of this Agreement;
- iii) received from a third party that is under no obligation of non-disclosure;
- iv) communicated by the disclosing party to a third party without restriction on disclosure;
- v) independently developed by or for the receiving Partner; or
- vi) required to be communicated by law, provided that, insofar as reasonably possible, the receiving Partner shall provide the disclosing Partner advance notice of such communication and shall comply with the disclosing Partner's reasonable instructions designed to protect the confidentiality of such information.

6.4 The Partners shall contractually impose the same obligations provided in Chapter 6.1 above on all of their employees, or on any other person working for them who may have access to confidential information, which obligations shall survive termination of employment.

6.5 Nothing contained in this Chapter shall be construed as prohibiting:

- i) the submission of academic theses to examiners in the public institution to which the Partner is related *provided, however*, that the concerned Partner shall obtain the consent of the examiners to abide by the confidentiality provisions herein; or
- ii) the issuance of scientific activity reports or similar to the institute or administrative entity to which it belongs.

Chapter 7. Partners

7.1 Additional Partners

7.2.1 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.

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

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

7.1.4 Any new Partner shall be granted Access rights to the Background and Foreground Information on the same conditions as the other Partners (Chapters 5.1 and 5.2). The new Partner will have co-ownership of the code developed from MEDSLIK-II from the date of signature of the amendment mentioned in Chapter 9.1.2.

7.2 Removal and Withdrawal

7.2.1 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

- 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 receipt 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) becomes insolvent or ceases to operate.

7.2.2 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.

7.2.3 The notice required in 7.2.1 and 7.2.2 shall indicate the effective date of the removal or withdrawal, within the time frames stipulated therein.

7.3 Consequences of Removal or Withdrawal

7.3.1 Any Partner that withdraws or is removed from this Agreement agrees to treat all Confidential Information, in accordance with the requirements set forth in Chapter 6, for a period of five (5) 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.

7.3.2 Any Partner that withdraws or is removed from the Agreement shall automatically relinquish the Access Rights granted under Chapter 5 and 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.

7.3.3 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.

7.3.4 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

7.4.1 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.

7.4.2 The Partners shall ensure that all licenses granted under Chapter 5.4 contain an express disclaimer of liability *vis-à-vis* all downstream users.

7.5 No Warranties

The Partners agree that MEDSLIK-II shall be provided free of any warranty as to its performance, accuracy, quality or fitness for a particular purpose, and shall ensure that all licenses granted under Chapter 5.4 contain the same disclaimer.

7.6 No Partnership

7.6.1 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.

7.6.2 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

7.9.1 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.

7.9.2 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.

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

Chapter 8. Term and Amendments

8.1 Term and Termination

8.1.1 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.

8.1.2 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 Chapter 6) or prevailing legislation.

8.1.3 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 (Members of Agreement Committees and Teams), which may be amended by written notice of the Chairperson to the Partners.

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 fulfills 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.

Chapter 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.

INTENDING TO BE LEGALLY BOUND, the Partners have executed Agreement in ten (10) original copies.

Istituto Nazionale di Geofisica e Vulcanologia (INGV)



(Full name of Partner)

IST.NAZ. DI GEOFISICA E VULCANOLOGIA
IL PRESIDENTE
(Prof. Carlo DOGLIONI)

(Name of authorized signatory)

Carlo Doglioni

(Signature)

12/6 MAR. 2019

(Date)

Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC)

FONDAZIONE CENTRO-EUROMEDITERRANEO
SUI CAMBIAMENTI CLIMATICI

IL PRESIDENTE

(Full name of Partner)

Dott. Antonio Navarra

____ Prof. Antonio Navarra ____

(Name of authorized signatory)



(Signature)

19/11/2018

(Date)

Consiglio Nazionale delle Ricerche-Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino (CNR-IAS)

(Full name of Partner)

_____ Dr. Mario Sprovieri _____

(Name of authorized signatory)



(Signature)

_____ Genova, 8 dicembre 2018 _____

(Date)

ORION - Joint Research and Development Centre (ORION)

(Full name of Partner)

Evis DROUSIOTIS

(Name of authorized signatory)

A handwritten signature in blue ink is written over a circular blue stamp. The stamp contains the text "ORION Joint Research & Development Center" around the perimeter and a stylized logo in the center.

(Signature)

24 October 2018

(Date)

The Department of Physics and Astronomy at Alma Mater Studiorum - University of Bologna (UNIBO-DIFA)

(Full name of Partner)

IL DIRETTORE
Prof. Nicola Semprini Cesari

PROF. NICOLA SEMPRINI CESARI



(Name of authorized signatory)

(Signature)

4 | 12 | 2018

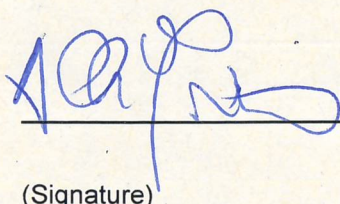
(Date)

Department of Civil, Chemical, Environmental, and Materials Engineering at University of Bologna (UNIBO-DICAM)

(Full name of Partner)

____ Prof. Alberto Montanari ____

(Name of authorized signatory)



(Signature)

28 NOV 2018

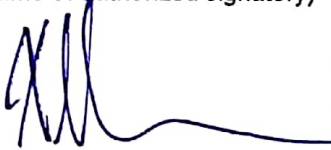
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The Institute of Applied & Computational Mathematics (FORTH-IACM)

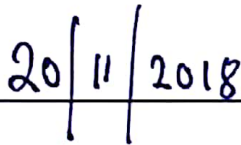
(Full name of Partner)

____ Prof. Charalambos G. Makridakis ____

(Name of authorized signatory)



(Signature)



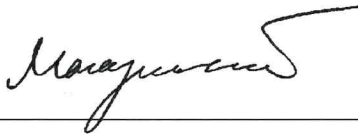
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The METOcean Dynamic Solutions Pty Ltd (METHODS)

(Full name of Partner)

____ Dr. Oleg Makarynskyy _____

(Name of authorized signatory)



(Signature)

26/11/2018

(Date)

The Ocean Physics and Modeling Group at Department of Physics at University of Athens (NKUA-OPAM)

(Full name of Partner)

____ Prof. Sarantis Sofianos ____

(Name of authorized signatory)



(Signature)

21/11/2018

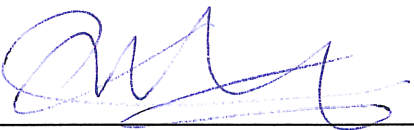
(Date)

The Laboratory of Maritime Engineering & Maritime Works at Division of Hydraulics and Environmental Engineering at School of Civil Engineering at Aristotle University of Thessaloniki (LMEMW-AUTH)

(Full name of Partner)

Theofanis Karambas

(Name of authorized signatory)



(Signature)

31/01/2019

(Date)

ANNEX 1 TECHNICAL SPECIFICATIONS

A.1.1 Medslik-II_1.01 description

The MEDSLIK-II.V1.01 system includes the source code, input data files, output data files, script files to compile and execute in a Linux operative system, visualization software and a Test Case set up. The MEDSLIK-II.V1.0 Fortran source codes perform the extraction of the required netCDF data and their conversation to the ASCII format; and simulation of a single oil spill. The input data files for MEDSLIK-II.V1.0 contain the input spill data needed to perform the simulation (spill date & time, position (lat & lon), spill duration, spill volume, type of oil: and the parameters needed for the simulation, such as the drift angle, the drift angle, the current depth, the horizontal and vertical diffusivity etc. The ASCII output data files contain the oil concentration at the sea surface, on the coastlines and the fraction dispersed in the water column. Output time series are devoted to the oil weathering as follows: evaporation, water column dispersion, emulsification, as well as the oil beaching. The script RUN.sh first launches the model run (medslik_II.sh) and then the visualization execution (medslik_plots/medslik_plots.sh). The visualization software contains the NCL codes and the shell script to run the visualization procedure. In order to the code performance, the test case of TEST_ALGERIA is set up.

A.1.2 Medslik-II_1.02 description

The MEDSLIK-II.V1.02 system provides the new options including the capability to simulate multiple independent oil spill sources; the capability to be forced by Stokes' drift velocities computed directly by a wind-wave model; using the local wind fields rather than interpolated to a oil gravity center; the possibility to use a 4th order Runge-Kutta numerical scheme to solve the advective part of the active tracer equation; the possibility to switch off the weathering part to simulate passive tracers. Additionally, some new code features are implemented as follows: a modular Fortran90 ExtractII: F 90 subroutine that is responsible for the pre-processing of the meteo-oceanographic data. With the new structure, it can be easily adapted to read any kind of netCDF input file. A more general linear time interpolation subroutine is developed: now only 3 time interpolation subroutines exist, one for each kind of forcing. Each subroutine works with a specific kind of forcing at any time resolution. An external modular Fortran 90 package is implemented to create a netCDF output. A visualization package based on python and PyNIO and PyNGL libraries is developed for the applications to the test cases. Three test cases are available including the Algeria test case to perform consistency check with MEDSLIK-II.V1.01, the Lebanon test case and Elba Island Serious Game test case.

A.1.3 Medslik-II_2.0 description

MEDSLIK-II v2.0 is derived from version 1.01 and shares most of its code and structure with the latter. The present section will be therefore limited to the changes applied to version 1.01 and the reader can assume the remaining points as unchanged.

Two major changes were applied to the original code. Previous MEDSLIK-II versions were limited to the Mediterranean basin, delivering integrated results on the oil fate (i.e. beached oil, surface oil and dispersed oil) in ASCII files. The new code allows model users to implement MEDSLIK-II outside the Mediterranean sea and delivers parcel-based results in netCDF4 format. Support Python scripts used to generate MEDSLIK-compatible coastline geometry and bathymetry files based on NOAA GSHHS and GEBCO 30", respectively, are available online to guide end-users in such enterprise. Post-processing scripts aimed to integrate and map oil concentrations at the sea surface, water column and coastline were also made available at the model website (<http://medslik-ii.org/>).

Minor changes aimed at simplifying the source code and "outsourcing" the task of preprocessing meteorological inputs were also applied. The multiple inputs previously regarded by MEDSLIK v1.01 and 1.02 (e.g. MFS and AFS current fields, SKIRON and ECMWF wind fields) are no longer supported and a standardized input was defined. The translation between original model input formats into MEDSLIK-II supported format is now performed using Python scripts made available at the official website (<http://medslik-ii.org/>).

Further information on how the pre and post-processing Python scripts were designed, their inputs/outputs and how to use them can be found in the MEDSLIK-II v2.0 manual. Detailed descriptions on how to prepare the standardized current and wind fields and how to use the new netCDF4 outputs are also presented in the document.

A.1.2 Medslik-II Web pages

The Medslik-II Web pages for the MEDSLIK-II are located at the following web site:

<http://medslik-ii.org/>

ANNEX 2 MEMBERS OF COMMITTEES and TEAMS

A.3.1 Members of Steering Committees

INGV: Simona Simoncelli

CMCC: Giovanni Coppini

CNR-IAS: Roberto Sorgente

ORION: George Zodiatis

UNIBO-DIFA: Nadia Pinardi

UNIBO-DICAM: Renata Archetti

FORTH-IACM: Nikos Kampanis

METHODS: Oleg Makarynskyy

NKUA-OPAM: Sarantis Sofianos

LMEMW-AUTH: Yannis Krestenitis

A Chair of Steering Committees will be confirmed

A.3.2 MEDSLIK-II System Team

<i>Name of person</i>	<i>Affiliation</i>	<i>Expertise</i>
A.A. Sepp Neves	UNIBO-DIFA	Numerical modeling, hazard/risk mapping
F. Trotta	UNIBO-DIFA	Numerical modeling
K. Spanoudaki	FORTH-IACM	Numerical modelling
A. Cucco	CNR-IAS	Numerical modelling
R. Sorgente	CNR-IAS	MEDSLIK-II forsings and validation
Hari Radhakrishnan	ORION	Linux architecture and scripts
S. Liubartseva (chair)	CMCC	Numerical modeling

E. Jansen	CMCC	Numerical modeling
R. Lecci	CMCC	MEDSLIK-II forcings
S. Creti	CMCC	MEDSLIK-II forcings
S. Simoncelli	INGV	MEDSLIK-II forcings and validation

ANNEX 3 BACKGROUND INFORMATION

A.4.1 INGV

INGV has developed the first version of the code, so-called MEDSLIK-II.V1.01 (De Dominicis et al. 2011), based on its pre cursor oil spill model MEDSLIK (Lardner and Zodiatis 1998; Lardner et al. 2006; Zodiatis et al. 2005, 2008). In 2015, INGV developed a MEDSLIK-II.V1.02 version.

A.4.2 CMCC

In 2012, CMCC has released the initial version of the MEDSLIK code v. 5.2.3 and in addition has developed the visualization software for the MEDSLIK-II.V1.01 version (Annex 1). Over 2012-2015, CMCC run MEDSLIK-II for operational purposes.

A.4.3 CNR-IAS

CNR-IAMC implemented the MEDSLIK.v.5.2.3 at the broader sea area of the Sicily Strait, coupled to the Sicily Strait forecasting model.

A.4.4 ORION

ORION developed 3D oil plume MEDSLIK model and gain the experience in oil platform leak modelling in the Eastern Mediterranean. Additionally, ORION supports further multi-model development and applications.

A.4.5 UNIBO- DIFA

In 2018, UNIBO-DIFA developed a MEDSLIK-II.V2.0 version already used in the several papers (Sepp Neves 2015, 2016). Additionally, hazard mapping methodology is implemented and applied to the Atlantic basin.

A.4.6 UNIBO- DICAM

In 2015, UNIBO-DICAM improved the representation of oil beaching in MEDSLIK-II.V1.01 for the Lebanon crisis test case.

A.4.7 FORTH-IACM

In 2016-2018, FORTH-IACM implemented the biodegradation algorithms into MEDSLIK-II, and starts the development a deep-sea subsurface blowout module for the Crete area.

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June 23, 2020

**Addendum I to
Memorandum of Agreement
for
the Operation and Continued Development of
MEDSLIK-II**

The purpose of this Addendum I to the Memorandum of Agreement (MoA) signed 03/26/2019 is to enlarge the MoA partnership by adding the Laboratory of Ecological Engineering and Technology of the Department of Environmental Engineering of School of Engineering at Democritus University of Thrace (DUTH) in accordance with the request 06/15/2020.

By unanimous MEDSLIK-II Steering Committee vote 06/19/2020, MoA partners agree to bring into the Agreement the Laboratory of Ecological Engineering and Technology of the Department of Environmental Engineering of School of Engineering at Democritus University of Thrace (DUTH).

DUTH similarly agrees to accept the provisions of the MoA and work with the other partners on operation and continued development of MEDSLIK-II.

The present Addendum I will become effective upon signature by the authorized representative of DUTH.

Democritus University of Thrace (DUTH)

(Full name of Partner)

Prof. Georgios Sylaios, Director _____
(Name of authorized signatory)

(Signature)

Georgios Sylaios
Digitally signed by
Georgios Sylaios
Date: 2020.10.07
10:03:27 +03'00'