

# Subcontract

**in relation to the CSEM Project entitled “Generative Artificial Intelligence for High Performing Inversions Models”**

between

**esc Aerospace s.r.o.**

IČ: 03267555

Nám. Dr. Holého 1052/11, 180 00 Prague 8, Czech Republic

(hereinafter referred to as “ESC” or “Contractor”)

and

**Czech Academy of Sciences, Institute of Atmospheric Physics**

IČ: 68378289

Boční II, 1401/1a Prague 4, Czech Republic

(hereinafter referred to as “IAP” or “Subcontractor”)

(hereinafter referred to as Party individually and Parties collectively, as the context may require)

## Preamble

In relation to the performance of the ESA project entitled “Generative Artificial Intelligence for High Performing Inversions Models (“Project”) CSEM and the European Space Agency (“Agency”) have entered into the contract n° 4000128225/19/NL/AS (“Prime Contract”) on 9 October 2019.

Pursuant to the Prime Contract, CSEM undertakes to perform the work and to deliver the items as foreseen in the Prime Contract.

The Agency agreed that part of the work to be provided by CSEM shall be subcontracted to ESC.

The Agency agreed that ESC is allowed to take IAP as subcontractor regarding ionospheric domain.

The Parties wish to enter into this Subcontract for the execution of ESC’s part of the Prime Contract.

NOW THEREFORE, the Parties hereto agree as follows:

## 1. Object of the Subcontract

1.1 This subcontract is based on Statement of the Work (SoW), not attached here but known to the Parties, as specified in Appendix 1 to AO/1-9783/19/NL/AF, issued on 9.3.2019. This SoW shall be

reduced to content regarding only to Use Case 2 (as specified in SoW). The Subcontractor confirms that understand the content of the specified SoW.

- 1.2 The Subcontractor undertakes to provide consultations on the following subjects:
  - o consultation in ionospheric domain, available data, its reasonableness and content;
  - o review of documentation prepared by the Contractor;
  - o attendance to teleconferences.
- 1.3 The Subcontractor shall deliver answers to raised questions and clarifications, and provide reviews to requested documentation.
- 1.4 The Subcontractor shall attend meetings and reviews upon the request from Contractor. The Contractor requires the active participation of the Subcontractor in the meetings.
- 1.5 The Subcontractor shall grant access to their provided deliveries also to ESA, CSEM and NTUA.
- 1.6 All communication between the Parties shall be denoted by the name of the project "GERANIUM".

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## 2. Price and Payment Plan

- 2.1 The price of this Subcontract amounts to € 6'000.- (six thousand Euro).
- 2.2 The price is a Firm Fixed Price and as such, it shall not be subject to any adjustment or revision by reason of the actual costs incurred by the Subcontract in the performance of this Subcontract.
- 2.3 This contract expects approximately 100 normative man-hours.
- 2.4 The price does not include any added value taxes or import duties.
- 2.5 The payment plan is the following:

	Schedule Date	Payments from ESC to IAP in €
MS1: Upon successful completion of WP130 and successful Design Review as well as CSEM's acceptance of all related deliverable items including ACR.	April 2020	
MS2: Upon successful completion of WP240 and WP330 as well as CSEM's acceptance of all related deliverable items including ACR.	November 2020	3'000
MS3: Upon successful completion of Task 4, 5, 6 and successful Design Review as well as CSEM's acceptance of all related deliverable items including ACR.	June 2021	0

	Schedule Date	Payments from ESC to IAP in €
MS4: Final Settlement: upon CSEM's successful acceptance of all deliverable items and the Subcontractor's fulfillment of all other contractual obligations (ACR including Final acceptance statement)	August 2021	3'000
<b>Total</b>		<b>6'000</b>

- 2.6 IAP shall request the ACR from ESC before issuing the invoice. The ACR signed by both Parties is needed for the invoice to be regarded as due by ESC.
- 2.7 Any amount will be paid by ESC to IAP within thirty (30) days upon receipt of a corresponding invoice.
- 2.8 Any special charges related to the execution of payments will be borne by the Subcontractor.
- 2.9 Penalties for late delivery do not apply.

### 3. Parties' Representatives

- 3.1 All correspondence for ESC shall be addressed as follows:

esc Aerospace s.r.o.

Nám. Dr. Holého 1052/11, 180 00 Prague 8, Czech Republic

- a) for technical matters as follows:

	To:	With copy to:
Name	XXXXXXXXXX	XXXXXXXXXX
Phone No.	XXXXXXXXXX	
Email address	XXXXXXXXXX	

- b) for contractual and administrative matters as follows:

	To:	With copy to:
Name	XXXXXXXXXX	XXXXXXXXXX
Phone No.	XXXXXXXXXX	
Email address	XXXXXXXXXX	

- 3.2 All correspondence for ESC shall be addressed as follows.

Czech Academy of Sciences, Institute of Atmospheric Physics

Boční II, 14131 Prague 4, Czech Republic

a) for technical matters as follows:

	To:	With copy to:
Name	XXXXXXXXXX	XXXXXXXXXX
Phone No.	XXXXXXXXXX	XXXXXXXXXX
Email address	XXXXXXXXXX	XXXXXXXXXX

b) for contractual and administrative matters as follows:

	To:	
Name	XXXXXXXXXX	XXXXXXXXXX
Phone No.	XXXXXXXXXX	XXXXXXXXXX
Email address	XXXXXXXXXX	XXXXXXXXXX

c) Subcontractor's key personnel:

- XXXXXXXXXXXX – Key personnel of the activity
- XXXXXXXXXXXX – Technical matters

### 3.3 Bank accounts

Unless Subcontractor otherwise notifies the Contractor, all payments of Subcontractor's invoices shall be made by the Contractor to:

Bank Name: XXXXXXXXXXXX

Account No.: XXXXXXXXXXXX

Swift Code: XXXXXXXXXXXX

IBAN: XXXXXXXXXXXX

Unless Contractor otherwise notifies the Subcontractor, all refunds, credits or other amounts due to the Customer hereunder shall be made by the Contractor to:

Bank Name: XXXXXXXXXXXX

Account Name: XXXXXXXXXXXX

Account No.: XXXXXXXXXXXX

Swift Code: XXXXXXXXXXXX

IBAN: XXXXXXXXXXXX

## 4. Obligations of the Subcontractor

4.1 IAP undertakes to perform its respective obligations in accordance with the relevant trade, industrial and technical practices. In particular, workmanship shall conform with the modern technical

standards required for first class work and shall be strictly in accordance with the technical specifications of this Subcontract.

## **5. Acceptance**

- 5.1 For each milestone the Contractor and the Subcontractor shall prepare the Acceptance Confirmation Report (ACR). The ACR is attached to each invoice.
- 5.2 Contractor shall provide the following information needed to prepare the ACR:
- Milestone identification (according to payment plan)
  - List of requested reviews and consultations
  - List of recorded attendance of the Subcontractor
  - List of unfinished requests and their closure definition
  - Signature of the Project Manager
- 5.3 Subcontractor shall provide the following information needed to prepare the ACR:
- Total recorded effort spent on all listed requests above
  - Signature of the Key Personnel
- 5.4 The last ACR shall beside items mentioned above, contain the following statements:
- Approval by the Contractor that no activities from Subcontractor are still pending;
  - Declaration by the Subcontractor that no Background IPR has been used during the activity.

## **6. Miscellaneous**

- 6.1 Should any part or provision of this Subcontract be determined to be prohibited, or rendered void or unenforceable, by an legislation or other cause, the remaining terms and conditions of this Subcontract shall be interpreted in an equitable manner in order to maintain the balance of the Parties' respective obligations. The validity and enforceability of this Subcontract as a whole shall not be affected.
- 6.2 The waiver by either Party hereto of its rights under this Subcontract in respect of any breach default or omission by the other in the performance or observance of any term or provision of this Subcontract shall neither be deemed nor implied a waiver of its rights in respect of any other breach default or omission by the other.
- 6.3 This Subcontract constitutes the entire agreement between the Parties with respect to the subject matter hereof and supersedes and cancels all prior representations, negotiations, undertakings, letters, acceptances, understandings, agreements between the Parties.
- 6.4 No additions, deletions or modifications to this Subcontract may be made unless in writing and signed by the Parties.
- 6.5 All Work Results under this Subcontract and/or the relevant CCN to this Subcontract shall be deemed as Intellectual Property Rights of Contractor.

## 7. Applicable Law and Jurisdiction

7.1 This Subcontract shall be governed by the laws of Czech Republic.

7.2 The Parties shall use their best endeavours to amicably settle any dispute arising out of this Subcontract. Failing an attempt towards an amicable settlement, all disputes shall be finally settled by the competent courts of Prague, Czech Republic.

IN WITNESS WHEREOF, the Parties have signed this Subcontract by their duly authorized representatives:

**esc Aerospace s.r.o.**

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Petr Suchanek  
Managing Director  
Date: 27.1.2020

**Czech Academy of Sciences, Institute of Atmospheric Physics**

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doc. RNDr. Zbyněk Sokol, CSc.  
Director  
Date: 27.01.2020

Appendix 1 – list of the workpackages

	.3 WP130
	<ul style="list-style-type: none"> <li>⑩ SoW</li> <li>⑩ IGS vTEC maps and other related parameters (Solar Flux 10.7 cm)</li> </ul>
	<ul style="list-style-type: none"> <li>⑩ Evaluate and discuss use case 2. If necessary provide modifications and improvements. Consider the revised cases as the baseline for the following tasks and described it in D1</li> <li>⑩ Use case 2 assessment with respect to data production for complementing GNSS IGS vTEC maps accounting for foreseen features variability augmentation and augmented dataset quality</li> <li>⑩ Use case 2 assessment with respect to usage of generative model <ul style="list-style-type: none"> <li>↘ as gap filler so as to improve density of points in Global Ionosphere Maps</li> <li>↘ to produce anomalies</li> <li>↘ to act as synthetic ionospheric generator</li> </ul> </li> <li>⑩ Select and sub-divide the data sets to accomplish all the activities foreseen in both cases.</li> <li>⑩ Identify and describe the validation data set because it is considered a critical element for deriving performances.</li> <li>⑩ Describe in D1 all the necessary steps (e.g. processing, re-formatting...) to prepare the data sets</li> <li>⑩ Describe the software and any other processing tools for data preparation</li> </ul>
	<ul style="list-style-type: none"> <li>⑩ Contribution to D1 Cases assessment and datasets description</li> <li>⑩ Contribution to D3, Tools user manual</li> </ul>

	.8 Contractor's activity	WP250	(the
	<ul style="list-style-type: none"> <li>⑩ SoW</li> <li>⑩ D1 and D2 from WP1xx</li> <li>⑩ Training datasets Data-1 from WP1xx</li> <li>⑩ GAN and produced features for UC2</li> </ul>		
	<ul style="list-style-type: none"> <li>⑩ Use tools (e.g. based on statistics, correlations...) able to have a preliminary verification of the synthetic features from the Generative Model</li> </ul>		
	<ul style="list-style-type: none"> <li>⑩ Contribution to D3 Tools User Manual (quality check tools)</li> </ul>		



	<b>.13</b>	<b>WP330</b>
	<ul style="list-style-type: none"> <li>⑩ SoW</li> <li>⑩ D1 from WP100 Cases assessment and Data Sets description</li> <li>⑩ D2 from WP100 Technical Note data throughput budget</li> <li>⑩ D3 from WP100 Tools User Manual (part for data preparation)</li> <li>⑩ Data-1 Training data sets: in reference to flow charts case 1 and 2, the output from the block Training Data Preparation</li> <li>⑩ SW-1 Tools, scripts and libraries for data preparation</li> </ul>	
	<ul style="list-style-type: none"> <li>⑩ Updating data preparation</li> <li>⑩ Supporting CSEM and NTUA</li> </ul>	
	<ul style="list-style-type: none"> <li>⑩ Updated D1 Cases assessment and Data Sets description</li> <li>⑩ Updated Data-1 Training data sets: in reference to flow charts case 2, the output from the block Training Data Preparation</li> <li>⑩ Data-1 and SW-1 snapshots</li> </ul>	

	.18	WP710
	<ul style="list-style-type: none"> <li>⑩ SoW</li> <li>⑩ D1-D6</li> <li>⑩ Outputs from activity</li> </ul>	
	<ul style="list-style-type: none"> <li>⑩ Wrap-Up and discuss all the trade-off from Task 1 (libraries, processing facilitates, data rates ...)</li> <li>⑩ Describe the most updated performances of the processing environment. In case propose alternative solutions.</li> <li>⑩ Propose and discuss any possible optimization regarding the software, the development libraries and the processing facilitates</li> <li>⑩ Assess and describe the overall quality of the Augmented Data Sets.</li> <li>⑩ Assess and describe up to what extent Generative Models can make the production of data sets less expensive and complex (e.g. reducing computation power, acquire less in-situ measurements, better combination of inputs parameters...).</li> <li>⑩ Assess and describe if Generative Models can support the science behind the simulation tools, and models. For example by understanding the relation and weights of input variables, help modelling uncertainties, simplify the physical theory.</li> </ul>	
	<ul style="list-style-type: none"> <li>⑩ Contribution to D8 Cases final assessment and discussion</li> <li>⑩ FR Final Report</li> <li>⑩ TDP Consolidated documents, data and script produced in the previous tasks</li> </ul>	

	.23 WP730
	<ul style="list-style-type: none"> <li>⑩ SoW</li> <li>⑩ D1-D6</li> <li>⑩ Outputs from activity</li> </ul>
	<ul style="list-style-type: none"> <li>⑩ UC2: Assess the qualitative analysis of Task 6</li> <li>⑩ UC2: Confirm and in case propose a new architecture for the vTEC delay NNs model</li> </ul>
	<ul style="list-style-type: none"> <li>↘ Contribution to D8 Cases final assessment and discussion</li> </ul>