Nik esa IK IE 11 SE EB

Noordwijk, 27 May 2016

Dr. Ondrej Santolik
Institute of Atmospheric Physics
Academy of Sciences of the Czech Republic
Bocnill 1401, 141 31
Praha 4
Czech Republic

Exchange of Letters - PRQDEX Experiment Arrangement.

Dear Sir,

With reference to the Institute Agreement signed by ESA on 7 October 2010 and by the Institute on 13 October 2010 we hereby send you the conditions of the PRODEX Experiment Arrangement between ESA and your Institute:

IAFAS
Phone: + XXXXXXXXX
Email: XXXXXXXXX

related to C4000117599 "MAIGRET-WAM". The ESA representative for all administrative and contractual matters is Ms V. Dowson, and for all technical/scientific matters it is Ms M. Stienstra.

The total price of the present arrangement amounts to € 316,800. All invoices should mention the European standard 'iBAN" and "BIC" as bank account identifiers; failing to do so will block the settlement of the payment.

The term of the project shall be the time period 01-12-2015 through 31-05-2017.

I would appreciate if you could sign and approve the present letters and return one original to me at your earliest convenience.

I am looking forward to a fruitful co-operation,

Sincerely Yours,

M. Lazerges
Head of the PRODEX Office

16. june 2016

Received, accepted and signed by Institute:

Place / date: Prague

- 1 -07- 2016

.....

PRODEX EXPERIMENT ARRANGEMENT

ARTICLE 1: DEFINITIONS - PURPOSE OF THE ARRANGEMENT - APPENDICES

1. Throughout the present Arrangement the terms laid down in the left column below shall have the meaning set out opposite:

"Funds":	An amount of money whose maximum is laid down in Article 2;
"Project":	Institute's project specified in Appendix 1, certified by the Agency's PRODEX Office as - eligible for financial support according to the Financial Plan (Appendix 2) approved by the relevant Participating State,
"Cost":	Allowable cost of these categories: - labour cost - operational cost in the sense defined in Appendix 2 - travel expenses - .... incurred by the Institute in execution of the Project.

2. By entering into the PRODEX Experiment Arrangement the Agency undertakes to reimburse the Institute certain cost incurred in execution of the Project. Purpose of this arrangement is the detailed implementation of said undertaking.

   An obligation on the part of the Institute to carry out the Project is not created by this arrangement. Any other arrangement or agreement by which the Institute undertakes to carry out the Project remains unaffected by the present arrangement, save that the Agency acquires hereunder the rights to access, to audit, and certain licenses in intellectual property rights; details are stipulated in Article 4 and Appendix 4.

3. The Institute may claim the Funds subject to the provisions set forth in Articles 2 through 6 below.

4. The Institute shall utilise the Funds and any part thereof exclusively for defraying, in due time, the Cost incurred during the term of the Project defined in Article 3.1 below.

5. Appendix 1 (Work Description), Appendix 2 (Financial Plan) remain unaffected by this arrangement; Appendices 1 and 2 are appended for information only.
   Appendix 3 (Contract Change Notice procedure and form) and Appendix 4 (General Conditions) shall form an integral part of this arrangement.

ARTICLE 2: FUNDS

1. The Funds available for the present arrangement amount to .....(see cover letter)

2. The above amount is stated to be a limit of liability in the sense defined in Clause 9 of Annex I to the "General Conditions", attached as Appendix 4 hereto.

3. The above amount excludes profit for the Institute (not allowed) and value added tax on the costs charged to the Agency (so far as the Agency is exempted from VAT applied by the Agency's Member States).

4. (Optional)
The above amount is broken down into subtotals per cost category and/or per year as specified in Appendix 2 hereto.

ARTICLE 3: TERM OF THE PROJECT

1. Term of the Project shall be the time period stated in the cover letter.

2. Cost incurred outside said term shall not entitle the Institute to any payment under this arrangement.

ARTICLE 4: OTHER CONDITIONS

"General Conditions" lay down in Appendix 4 shall apply, with the amendments or replacements set forth in the Articles of this arrangement. The applicable General Conditions shall be construed and interpreted with due regard to the specific nature of this arrangement and its Article 1.2 Sentence 3 in particular. The Institute shall be deemed the "Contractor" wherever mentioned in those General Conditions.

CLAUSE 2: APPROVAL

Offers and acceptances with regard to arrangements are not binding on the Agency unless approved in writing by its Director General or his authorised representative.
For the purpose of this arrangement the authorised representative of the Agency's Director General is:
Dr. M. Lazerges,
Head of the PRODEX Office.
He is authorised by the Agency to sign the present arrangement on its behalf.

CLAUSE 5: AGENCY'S REPRESENTATIVES - INSPECTIONS

The Agency shall have the right to check the performance of the Project, and for this purpose the Agency nominates its representatives identified in Clause 7 here below.
The Institute shall in this respect, and in accordance with any relevant security regulations, give the representatives of the Agency access to its premises and shall give all other necessary assistance in order that they may fulfil their task.

CLAUSE 7: COMMUNICATIONS

All correspondence for either party shall be sent to the address and the representative in charge identified herein below, with a copy to the other representative(s) where any mixed nature of the matter so requires:

For the Agency to:

ESTEC
P.O. Box 299
NL-2200 AG Noordwijk

Tel/Fax: + XXXXX extension below

For the Institute to:

See address, fax and phone number in the cover letter.

The Institute's representative(s) is (are) as stated in the cover letter.

CLAUSE 12 - APPLICABLE LAW

The arrangement shall be governed by the laws of the country of residence of the Institute.

CLAUSE 13 - ARBITRATION

The arbitration proceedings referred to in Clause 13 shall take place in the capital of country of the residence of the Institute.

CLAUSE 22 – INVOICES, PLACE AND CURRENCY OF PAYMENT

1. Payments shall be made by the Agency to the account specified by the Contractor. Such information shall clearly indicate the IBAN and BIC/SWIFT codes. Payments shall be considered as effected on time if the Agency's orders of payment reach its bank within the payment period stipulated in Clauses 20 & 21.

2. ESA-P

   2.1. The Contractor undertakes to ensure that all invoices are submitted to the ESTEC Finance Division, Central Invoice Registration office (CIR) by electronic transmission, using the Agency's ESA-P System.
   2.2. The Contractor undertakes to submit complete invoices in adhering strictly to the instructions contained in the standard ESA-P package, e.g. with regard to supporting documentation, information on billing of taxes and duties, etc.
   2.3. If the Agency's ESA-P system is not operational with the Contractor, the Contractor may submit invoices in paper format in 2 copies, together with justifying documentation as required by the contract. All other non-ESA-P specific provisions of this clause 22 shall however apply.

2.4. As soon as ESA-P is operational with the Contractor, this Clause 22 shall apply in its entirety to all contracts between the Contractor and the Agency.

2.5. Any questions concerning the operation of ESA-P shall be addressed to the ESA Helpdesk (mail to: XXXXXXX .). Any questions concerning the latest status of due invoices can be addressed to the ESA Payment Officer (mail to: XXXXXXX .).

ARTICLE 5: PAYMENTS

1. Within the limits specified in Article 2 the Institute may claim in arrears payment of the Cost incurred. The Agency shall effect such payment after receipt of the respective invoice, which must identify the cost category/ies concerned and bear a statement by the Institute's financial controller that the invoiced costs are fair and reasonable, do not include profit and have been incurred exclusively in execution of the Project as defined in Article 1.1 and during the term specified in Article 3.1.

2. The Agency can make an advance payment if stated in the cover letter, upon signature of the cover letter by both parties and against submission of an invoice. Any claims for reimbursement of Costs incurred shall be set off against such advance payment; payments in excess of the advance payment shall be effected only once the advance payment has been consumed in the aforesaid manner.

ARTICLE 6: CESSATION, REFUND OF PAYMENTS

1. Notwithstanding any other provision of this Arrangement, the Agency may:

1.1 cease to effect any payments not already fallen due under this arrangement in case of unsatisfactory progress within the Project, provided the Participating State having approved Appendix 2 demands cessation of payments in writing;

1.2 cease to effect any payments in any of the following cases:
- a situation as per Clause 34.1 lit. a) of the General Conditions occurs;
- a situation as specified in Paragraph 2.2 below occurs.

2.1 The Agency may require the Institute to return to the Agency payments effected under this arrangement if and to the extent an audit carried out by the Agency or by the relevant national audit authority reveals any incorrectness of invoices or unauthorised use of Funds.

2.2 The Agency may require the Institute to return to the Agency all payments effected under this arrangement in case a situation as per Clause 34.1 lit. b) of the General Conditions occurs. Within said Clause the words "by deceit concerning the nature, quality or quantity of the supplies, and the methods or processes of manufacture employed" shall be deleted.

Appendix 1

Work Description

Overall Objective (mission):

The ExoMars Programme consists of two missions to Mars which are planned to be launched in 2016 and 2018. The launch of the latter mission is planned for May 2018 from Baikonur on Proton M (backup in Aug 2020). The anticipated arrival to Mars will be in Jan 2019 (backup in Apr 2021). The landing is planned by a direct entry from a hyperbolic trajectory, after the dust storm season. The landing site is still to be defined, but must be safe for landing and appropriate for "search for life" science. Anticipated latitudes are between 5º S and 25º N, all longitudes.

The mission will land a Rover, provided by the European Space Agency (ESA), making use of a 2000-kg Descent Module (DM) contributed by the Russian federal space agency (Roscosmos). The DM will travel to Mars on an ESA-provided Carrier Module (CM). Roscosmos will launch the spacecraft composite on a Proton rocket. The Rover will be equipped with a European and Russian suite of instruments, and with Russian Radioisotope Heating Units (RHUs). The Rover will also include a 2-m drill for subsurface sampling and a Sample Preparation and Distribution System (SPDS), supporting the suite of geology and life seeking experiments in the Rover's Analytical Laboratory Drawer (ALD). The Russian Surface Platform (SP) will contain a suite of instruments which will be mainly concentrated on environmental and geophysical investigations. Within Roscosmos, ExoMars is part of the Russian federal space programme and is supported by the Russian Academy of Sciences.

The ExoMars programme's scientific objectives are:

1. To search for signs of past and present life on Mars;
2. To investigate the water/geochemical environment as a function of depth in the shallow subsurface;
3. To study martian atmospheric trace gases and their sources;
4. To characterise the surface environment.

The ExoMars Surface Platform will conduct environmental and geophysical measurements in support of objective 4. After the Rover is released, the ExoMars Surface Platform will begin its science mission to study the surface and subsurface environment at the landing location. Data relay function will be provided by the Trace Gas Orbiter (TGO) launched as a part of the 2016 ExoMars mission. Whereas the Rover with the Pasteur payload (mass 310 kg, including drill/SPDS and instruments) is designed for a lifetime of 220 sols, the surface platform has anticipated lifetime of 1 Martian year (~670 sols), i.e., Jan 2019-Nov 2020 (ExoMars Science Management Plan, v6).

The proposed Surface Platform instruments are defined in the ExoMars 2018 Surface Platform Experiment Proposal Information Package (EXM-SP-EPIP-IKI-0001) of 31 March 2015. This package defines technical, managerial and programmatic data relevant in the context of the Announcement of Opportunity (AO) for European payload elements on the Surface Platform (SP) of the ExoMars 2018 mission. SP has anticipated lifetime of one terrestrial year according to this document. The SP science payload development is the responsibility of Roscosmos, with the exception of the contributions selected through this call.

Roscosmos has named the Space Research Institute of Russian Academy of Sciences (IKI) to be the leading entity for the development of the SP scientific payload, with the exception of the contributions selected through this call. IKI will manage the development of the SP payload according to Russian standards. The following European contributions to Russian-led instruments are envisaged:

1. Instrument: METEO
   - Humidity sensor
   - Pressure sensor
   - Optical depth sensor

- Solar irradiance sensor
- Magnetometer
- Dust sensor

Contact : XXXXXXXXX

2. Instrument: FAST
- Interferometer unit

Contact: XXXXXXXXX, XXXXXXXXX

3. Instrument: M-DLS
- Spectroscopic support, procurement and characterisation of diode lasers, principal optical, vacuum, electronic parts and modules, laboratory M-DLS prototype characterisation, development of the inversion algorithms

Contact: XXXXXXXXX

4. Instrument: Dust Suite
- Aerosol particle counter
- Electric field sensor

Contact: XXXXXXXXX, XXXXXXXXX

5. Instrument: MGAP
- Mass spectrometer

Contact: XXXXXXXXX

6. Instrument: MAIGRET
- Wave analyser module

Contact: XXXXXXXXX

The Wave analyser module which is the subject of this PRODEX proposal is a part of the MAIGRET (MArtlan GRound Electromagnetic Tool) instrument. Its development would be based on our previous cooperation with IKI in the frame of the Resonance and Luna-Resource-Orbiter spacecraft projects, where we work on similar hardware contributions.

The module will be dedicated for the measurement of magnetic-field fluctuations in the frequency band from 100 Hz to 20 kHz. The main scientific targets of the Wave analyser module are:

a) electromagnetic emissions of atmospheric origin: dust storms, wave activity originated in electrical discharges;
b) ionosphere and atmosphere-lithosphere interactions on Mars related to space weather effects;
c) magnetic anomalies on the surface of the planet;
d) internal structure of the planet using electromagnetic sounding methods based on the analysis of the response of deep conductive structures to excitation by time-varying external electromagnetic field of natural origin.

Role of the Institute:

The Institute of Atmospheric Physics (IAP) of the Czech Academy of Science is proposing to develop, build, test, and operate the Wave analyzer module for the MAIGRET instrument (XXXXXXXXX), as a part of the European payload element on the Surface Platform of the ExoMars 2018 mission, with XXXXXXXXX having the role of Co-Principal Investigator of the MAIGRET instrument with the overall responsibility for the Wave analyzer module.

Project term (to be) covered by the PRODEX Experiment Arrangement:

Phases B-D, definition and implementation: 2015 – 2017

Further phases:

- launch in May 2018,
- cruise phase: May 2018-January 2019,
- nominal operations: January 2019-November 2020,
- data reduction, submission of data products to the planetary science archives: **2021-2022**.

Brief description of Main Tasks:

The Wave analyzer module for the MAIGRET instrument will measure magnetic-field fluctuations in the frequency band from 100 Hz to 20 kHz. The design of the module will correspond to its scientific goals and technical limitations of the instrument. The module will measure both overview spectra and short waveform packets.

The design will be largely based on heritage from the Resonance ELMAVAN instrument, Luna-Resource-Orbiter LEMRA-L instrument, TDS subsystem of the Solar Orbiter RPW instrument, and JUICE RPWI- LFR subsystem, in order to save the development time in the very tight project schedule. This is a very important aspect of the project.

The Wave analyser module will perform digitization and onboard processing of the signal from magnetic field search coil. The signal will be processed by integrated digital logic implemented in an FPGA, performing filtering, decimation and spectral analysis of the signals. This science-based on-board processing allows us to save spacecraft telemetry and increase coverage by high quality pre-processed scientific data products. The device will contain analog circuits for input signal conditioning, as well as digital data processing and communication circuits. The search coil signals will first pass through an anti-aliasing low pass filter. Further processing improves dynamic range and produces 16-bit digital data. All digital processing is done in an FPGA. Tasks include ADC control and data acquisition, input CIC and/or FIR digital filters with decimation, FFT and power spectrum calculation, data buffering, and communication with the S/C data acquisition and control subsystems (telecommand processing, telemetry packet preparation and transmission).

The wave analyser will use a part of the 1 kByte/s digital bandwidth of the MAIGRET instrument to generate compressed data products related to its scientific goals, including the results of the onboard spectral analysis of the search coil signal and waveform snapshots. The components, materials and processes will be also compliant with the temperature range limits of the MAIGRET instrument, leading to operational temperatures from −20 °C to +50 °C and storage temperatures from −50 °C to +50 °C. The mass and power consumption limits of the MAIGRET instrument (1.7 kg and 5W, respectively) will be taken into account in the analyser design. Two identical electronics boards of the analyser (main board and spare board) will be placed in the MAIGRET box which will be powered by a separate power supply system of the platform in order to increase the reliability of the instrument. The EXOMARS surface platform is assigned COSPAR planetary protection category IVa, as it is not supposed to carry instruments for the investigations of extant Martian life. Reflecting the category IVa requirements, the bioburden of the Wave analyzer module shall be $\leq 3\times10^5$ bacterial spores and the average bioburden of the Wave analyzer module shall be ≤ 300 bacterial spores/m^2 on exposed internal and external surfaces. The landing site of the surface platform has not been selected yet; if the landing site is within the special Mars region, the COSPAR planetary protection category will be changed to IVc with stricter bioburden level (≤ 30 bacterial spores/m^2 on exposed internal and external surfaces).

The Wave analyzer module will be compatible with Dry Heat Microbial Reduction (DHMR), alcohol cleaning (IPA or ethanol) and with damp swab assays as per assay procedure described in ECSS-Q-ST-70-55C (Microbial examination of flight hardware and cleanrooms). Parts qualifications and

manufacturing processes when selecting components will be considered with respect to planetary protection requirements as described in ECSS-Q-ST-70-53C (Materials and hardware compatibility tests for sterilization processes). The flight hardware will be assembled and tested in ISO 7 clean room conditions and transported in an appropriate transport container. The bioburden on the Wave analyzer module at delivery on exposed internal and external surfaces will be assessed and documented. The bio burden monitoring procedures will respect the contamination predictions budgets. Corrective actions in terms of design, shielding and purging in case the predictions are outside acceptance limits will be defined.

Cleanliness and contamination control is an integral part of planetary protection tasks as the DHMR treatment could be a potential source of molecular and particular organic contamination. Firstly, the dead bioburden is not removed by DHMR and secondly the exposure to high temperatures might produce contaminants by outgassing. Parts qualifications and manufacturing processes when selecting components will be considered with respect to cleanliness and contamination control requirements as described ECSS-Q-ST-70-01C (Cleanliness and contamination control). The materials will be selected according to the outgassing criteria (TBD) using the ESA outgassing database. (http://esmat.esa.int/Services/outgassing_data/outgassing_data.html).The flight hardware will be assembled and tested in ISO 7 clean room conditions and transported in an appropriate transport container.

IAP will be responsible as a Co-Principal Investigator institute for the development of the proposed Wave analyzer module for the MAIGRET instrument, as a part of the European payload element on the Surface Platform of the ExoMars 2018 mission, taking responsibility for project management, interface with ESA and IKI, reviews and documentation. In the frame of the Wave analyzer module for the MAIGRET instrument IAP will be also responsible for the development and delivery of all subsystems (all required models), consisting of electronics boards, FPGA firmware and Ground Support Equipment. IAP has experience of building successful VLF receivers beginning with five MAGION missions. More recently, receivers with digital onboard processing have been developed for the Resonance, Luna-Resource-Orbiter, and Solar Orbiter missions. IAP has also developed an HF receiver for the upcoming TARANIS mission and is developing an LF receiver subsystem of the RPWI instrument for the JUICE mission.

The IKI Surface Platform – Instruments IRD shall be applicable to this activity.

Overview of the work breakdown:

1. Project management
   - Tasks related to the PI role of the Wave analyzer module and Co-PI role of the MAGRET instrument
   - Management of the interface with ESA and IKI
   - Planetary protection tasks
   - Input to reviews and documentation

2. Development and design of algorithms for science-based onboard processing
   - Research of electromagnetic emissions of atmospheric origin
   - Research of time-varying electromagnetic plasma waves of natural origin
   - Implementation of algorithms for science-based onboard processing

3. Thermal, mechanical, and electronics design
   - Design contribution to the MAIGRET Structural Model (SM) and to the MAIGRET Thermal Model (TM)
   - Mechanical, and electronics design of the Instrument Electrical Interface Simulator (EIS)of

the Wave analyzer module for the MAIGRET instrument.

- Thermal, mechanical, and electronics design of the EQM board of the Wave analyzer module for the MAIGRET instrument.
- Update of the thermal, mechanical, and electronics design for the Flight Model (FM) and Flight Spare Model (FSM) of the Wave analyzer module for the MAIGRET instrument.

4. FPGA and software design

- FPGA and software design of the Instrument Electrical Interface Simulator (EIS)of the Wave analyzer module for the MAIGRET instrument.
- FPGA and software design of the EQM board of the Wave analyzer module for the MAIGRET instrument.
- Update of the FPGA and software design for the Flight Model (FM) and Flight Spare Model (FSM) of the Wave analyzer module for the MAIGRET instrument.

5. Assembly/manufacturing

- Manufacturing and assembly of the Instrument Electrical Interface Simulator (EIS)of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)
- Manufacturing and assembly of the EQM board which will stay at IAP for future testing and analysis purposes
- Manufacturing and assembly of the Flight Model (FM) of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI).
- Manufacturing and assembly of the Flight Spare Model (FSM) of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)

6. Testing activities

- EGSE development
- Functional testing of the Instrument Electrical Interface Simulator (EIS)of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)
- Functional, thermal vacuum, and vibrational testing of the EQM board
- Functional, thermal vacuum, and vibrational testing, as well as the cleanliness and contamination control of the Flight Model (FM) of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI).
- Functional, thermal vacuum, and vibrational testing, as well as the cleanliness and contamination control of the Flight Spare Model (FSM) of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)

Project output at the end of the term specified in the PRODEX Experiment Arrangement in terms of:

- Design and documentation contribution to the Structural Model (SM) of MAIGRET, in cooperation with IKI
- Design and documentation contribution to the Thermal Model (TM) of MAIGRET, in cooperation with IKI
- Instrument Electrical Interface Simulator (EIS)of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)
- EQM board which will stay at IAP for future testing and analysis purposes
- Flight Model (FM) of the Wave analyzer module for the MAIGRET instrument (main

board and spare board, delivered to IKI).

- Flight Spare Model (FSM) of the Wave analyzer module for the MAIGRET instrument (main board and spare board, delivered to IKI)
- Input to all documentation packages for IKI reviews. IKI will manage the documentation according to Russian standards. No self-standing WAM documentation is foreseen to be delivered at WAM level.

The documentation outputs shall also be delivered to the Prodex office.

Major Milestones (if any):

- MAIGRET SM and TM delivery – December 2015 (TBCin cooperation with IKI).
- Wave analyzer module EIS delivery to IKI– June 2016 (TBC).
- Wave analyzer module FM and FSM delivery to IKI – May 2017 (TBC).

Appendix 2

FINANCIAL PLAN

Definition and implementation of the Wave analyzer module for the MAIGRET instrument as a part of the European payload element on the Surface Platform of the ExoMars 2018 mission

Institute of Atmospheric Physics, Czech Academy of Sciences

Starting date: December 2015

Ending date: May 2017

INSTITUTE COSTS	**Phase B**	**Phase C**	**Phase D**	**Total**
	Dec 2015-May 2016 **6 months**	Jun 2016-Nov 2016 **6 months**	Dec 2016 – May 2017 **6 months**	Dec 2015-May 2017 **18 months**
Salaries + insurance				
IAP staff (9 employees, funded in part by IAP) 1. XXXXXXXXXXX 2. XXXXXXXXXXX 3. XXXXXXXXXXX 4. XXXXXXXXXXX 5. XXXXXXXXXXX 6. XXXXXXXXXXX 7. XXXXXXXXXXX 8. XXXXXXXXXXX 9. XXXXXXXXXXX	18 000	18 000	18 000	54 000
Additional engineer hired for the project (1 FTE)	10 000	10 000	10 000	30 000
Total salaries:	28 000	28 000	28 000	84 000
Small Equipment, components, software	15 000	15 000	20 000	50 000
Services	30 000	30 000	40 000	100 000
Travel	18 000	18 000	18 000	54 000
Institute overhead	9 100	9 100	10 600	28 800
Total	100 100	100 100	116 600	316 800

FIGURE 1: Financial Plan in of Euros

Equipment to be purchased via PRODEX (in Euros):

Equipment	Phase B	Phase C	Total
Fiight/EM parts & PCB	23 000	332 000	**355 000**
Qualified assembly	0	32 000	**32 000**
Total	**23 000**	**364 000**	**387 000**

Total cost for PRODEX, 2015-2017: **703 800 EUR**

Notes:

1) The contractor shall be aware that, considering the situation of the related programme, the agency reserves the right to stop or re-scope this activity at any time should the circumstances so require. In case the activity would be stopped at the end of a given phase (B or C), no payment would be due for the upcoming phases except for the work already executed or LLI already authorized to be ordered, explicitly recognized as such by the Agency.
2) The salaries for the remuneration of work on definition and implementation of Wave analyzer module which will be carried out by IAP personnel are in accordance with Czech PRODEX rules (http://www.msmt.cz/vyzkum-a-vyvoj/evropska-kosmicka-agentura-program-vyvoje-vedeckych?lang=1: maximum 8000 EUR per year and person for IAP staff, and maximum 20000 EUR per year for an engineer hired for the project).
3) Travel expenses are calculated using an average cost of 900 EUR per person for a short trip. We expect the necessity of 10 trips in each phase of the project, with 2 persons participating, on average.
4) "Small Equipment, components, and software" include the components for development and breadboarding, transport equipment, and necessary licenses for the PCB and FPGA development software.
5) Services include the manufacturing of PCBs for development and breadboarding, fast shipping services, and assembly of the EIS and EQM boards
6) Institute overhead is 10%, in accordance with Czech PRODEX rules (http://www.msmt.cz/vyzkum-a-vyvoj/evropska-kosmicka-agentura-program-vyvoje-vedeckych?lang=1)
7) The "Flight/EM parts & PCB" budget includes the flight components and qualified flight PCB manufacturing for 5 electronic boards: Flight Model (FM) of the Wave analyzer module (main board and spare board); Flight Spare Model (FSM) of the Wave analyzer module (main board and spare board); one EQM board which will stay at IAP for future testing and analysis purposes.
8) The Qualified assembly of 4 electronic boards (FM and FSM) will be done in an ISO 7 clean room.

Appendix 3

PRODEX EXPERIMENT ARRANGEMENT CHANGE PROCEDURE

A PRODEX Experiment Arrangement change procedure shall apply at least to any modifications of the Agency's financial commitment (Articles 2 or/and 5 of the Arrangement) and of the Term (Article 3 of the Arrangement).

1. INTRODUCTION OF A CHANGE

For all changes, whether requested by the Agency or initiated by the Institute, the latter shall submit a proposal for a PRODEX Experiment Arrangement Change Notice (ACN) on the form attached hereto. The ACN shall be filled in completely, and boxes or lines which are not applicable shall be so designated by use of the letters "NA". The form shall be signed by the Institute's authorised representative(s) and be submitted to the Agency's representative for contractual and administrative matters.

The Institute shall ensure that each change proposal is fully co-ordinated with Appendices 1 and 2 to the arrangement and that all reasonably foreseeable implications of the change have been considered. If the space on the form is not sufficient to describe the change and its consequences, the additional information shall be annexed to the form. The Institute shall, on request of the Agency, provide additional documentary evidence.

2. APPROVAL OR REJECTION OF THE ARRANGEMENT CHANGE NOTICES

Upon receipt of a ACN signed by the Institute the Agency shall consider it as regards its acceptability. Should the ACN be approved, it will be signed by the ESA Prodex Office's authorised representative and a copy be returned to the Institute. Should a ACN be rejected for any reason, the Institute shall be informed accordingly, together with the reasons for the rejection.

3. IMPLEMENTATION AND STATUS OF APPROVED ARRANGEMENT CHANGE NOTICES

Upon signature of a ACN by both parties, the ACN has immediate effect and constitutes a binding contractual agreement.