Delibera n. 264
30 Novembre 2020
Allegato AQ al Verbale n. 09/2020

Oggetto: Research Contract tra il Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE) e l'Istituto Nazionale di Geofisica e Vulcanologia (INGV).

IL CONSIGLIO DI AMMINISTRAZIONE

VISTO il Decreto legislativo 29 settembre 1999, n. 381, concernente la costituzione dell'Istituto Nazionale di Geofisica e Vulcanologia (INGV);
VISTO il Decreto Leg.vo 25/11/2016, n. 218, concernente "Semplificazione delle attività degli Enti Pubblici di Ricerca ai sensi dell'art. 13 della Legge 7/08/2015, n. 124";
VISTO lo Statuto dell'INGV, approvato con Delibera del Consiglio di Amministrazione n. 114/2020 del 19 giugno 2020, emanato con Decreto del Presidente n. 78/2020 del 27/10/2020, pubblicato sul Sito WEB istituzionale – Avviso di emanazione di cui al Comunicato su Gazzetta Ufficiale della Repubblica Italiana - Serie generale - n. 264 del 24 ottobre 2020), in particolare, l'art. 8, comma 6, lettera f), il quale prevede che il CdA "*omissis….delibera la partecipazione a società, fondazione e consorzi, nonché la stipulazione di accordi con organismi nazionali, europei e internazionali*";
VISTO il Regolamento di Organizzazione e Funzionamento dell'INGV, emanato con Decreto del Presidente n. 36/2020 del 22/04/2020, pubblicato sul Sito WEB istituzionale e in particolare, l'art. 29 il quale disciplina le *Collaborazioni con soggetti esterni*, stabilendo al primo comma che: "*I rapporti di collaborazione nell'attività di ricerca tra l'Ente e soggetti pubblici e privati, italiani e stranieri sono regolati attraverso contratti aventi come riferimento di massima la seguente tipologia: protocolli d'intesa, accordi di programma quadro, convenzioni operative*";
VISTO il Regolamento del Personale emanato con Decreto del Presidente n. 118/2018 del 14/5/2018, pubblicato sul Sito WEB istituzionale;
VISTO il Regolamento di Amministrazione, Contabilità e Finanza, adottato con Delibera del Consiglio di Amministrazione n. 145/2020 del 22 luglio 2020, ed emanato con Decreto del Presidente n. 75/2020 del 21 ottobre 2020;
VISTO lo schema del Research Contract tra il Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE) e l'INGV;
CONSIDERATO che le Parti, con il presente Research Contract, realizzano una cooperazione a livello internazionale, mirata alla ricerca e allo sviluppo di capacità nelle scienze atmosferiche e correlate;

VALUTATA, dunque, l'opportunità di procedere alla sottoscrizione del sopra citato Research Contract, avente a oggetto l'obiettivo di studiare l'anisotropia nella propagazione delle onde sismiche, investigando le variazioni temporali e spaziali dei parametri di attenuazione Q e kappa in Italia centrale;
VERIFICATA la copertura finanziaria dell'importo annule di 15.000,00 euro, che trova la necessaria disponibilità su C.R.A. 1.03 - Capitolo di Bilancio 1.03.02.99.999.01;
CONSIDERATO che l'attività da espletare rientra tra i compiti scientifici e istituzionali dell'INGV;
VISTO il parere favorevole del Direttore di Sezione e del Direttore di Dipartimento;
su proposta del Presidente,

DELIBERA

L'approvazione dello schema del Research Contract tra il Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE) e l'INGV, allegato alla presente quale parte integrante e sostanziale (all.1).

Viene dato mandato al Presidente dell'INGV alla sottoscrizione definitiva dell'atto in questione.

Firmato il 07/12/2020
Depositato presso la Segreteria del Consiglio in data 07/12/2020

La segretaria verbalizzante
(Dott.ssa Maria Valeria INTINI)

IL PRESIDENTE
(Prof. Carlo DOGLIONI)

Firmato digitalmente da

MARIA VALERIA INTINI

CN = INTINI MARIA VALERIA
O = INGV
C = IT

Firmato digitalmente da DOGLIONI CARLO
C: IT

RESEARCH CONTRACT

BY AND BETWEEN

Istituto Nazionale di Geofisica e Vulcanologia, hereinafter referred to as "**INGV**", Taxpayer's Code no. 06838821004, with main office in Via di Vigna Murata, 605 – 00143 Rome, represented by its President, Prof. Carlo Doglioni, domiciled for his position in via di Vigna Murata, 605 – Rome;

AND

Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE), hereinafter referred to as "Contracting party", Taxpayer´s Registry Number CIC-730918-9G8, with its main office in Carretera Ensenada-Tijuana, No. 3918, Zona Playitas, Código Postal 22860, Ensenada, Baja California, México, represented by its Director General, Dr. Silvio Guido Lorenzo Marinone Moschetto;

THE PARTIES COVENANT AND AGREE AS FOLLOWS:

Art.1 (Object)

Within the framework of activities carried out by the working group of INGV-Milano, aimed at investigating the attenuation of the seismic waves and the variability of the ground motion, INGV intends to assign to the Contracted Party the performance of a Research Project, described in Annex 1, which is full and substantial part of this contract, according to the regulations below.

Art.2 (Research Coordinator)

Dr. Raul Ramon Castro Escamilla will be the research coordinator on behalf of the Contracted Party, and will be the sole responsible, in according to the operational modes and with the research staff, indicated in Annex 1.

Dr. Francesca Pacor will be the scientific responsible on behalf INGV and will be engaged in following the research project.

Art. 3 (Duration)

The project will start on January 1, 2021, and finish on January 31, 2022. The duration of the contract is the same.

Art. 4 (Funding)

The Research Project will be financed by INGV, with the INGV-MIUR Project "S3-Progetto Dinamico" funds (C.OBFU 1020.010).

The funds assigned to the whole Research Project amount to **€ 15,000.00** (Euro Fifteen Thousand/00) to be paid to the Contracted party as follows:

- **€ 7,500.00** (Euro Seven thousand Five hundred/00) at the beginning of the project (on January **2021**);

- **€ 7.500.00** (Euro Seven thousand Five hundred/00) at the end of the **project** (on January **2022);**

The transfer of the amount at the end of the Research Project will be subject to the approval given by the INGV scientific responsible. To give approval, the compliance of the activities performed with those listed in Annex 1 shall be evaluated.

Art. 5 (Management)

Funds for the performance of the Research Project are managed by the Contracted Party according to its own institutional.

The Research Coordinator and the INGV scientific responsible will meet at least two times during the research project to organize the activities and discuss the results. To strengthen the cooperation, exchanges of personnel between the two Parties will be also envisaged. The parties will cover the travel costs for its own staff.

Art. 6 (Personnel)

The research program is performed by the staff indicated in the sheet under Annex 1, plus any other personnel that will be chosen and committed exclusively care of the Contracted Party, under its own institutional regulations.

The Contracted Party shall pay all the relative charges, without exclusions, also with the funds made available by INGV, without any possibility of claim against INGV, even partial, in the event of higher cost.

Art. 7 (Availability and confidentiality of data and results)

The Research Coordinator of the Project, undertakes to:

- make available to INGV the results of the attenuation and ground motion variability studies;
- make available to INGV the inversion codes developed within the Project;
- support INGV in the implementation of the inversion codes within the INGV data structure adopted by INGV-Milano to archive seismic data;

Art. 8 (Privacy)

The parties mutually state that they have been informed (and for what concerns them, expressly accept) that “personal data” provided, also verbally for pre-contract activities or collected as a consequence of and during the execution of this contract, are exclusively processed for the aims of the contract, by means of consultation, processing, interconnection, comparison with other data and/or any further manual and/or automated treatment and also, for statistical purposes, with the exclusive processing of data in anonymous form, by means of the communication to public institutions, when they request so to pursue their institutional objectives, as well as to private entities, when the objective of the request is compatible with the institutional objects of the Institution, aware that the lack of acceptance may imply the non-execution or partial execution of the contract.

With respect to this article, the owners are the parties as defined, denominated and domiciled above.

The parties also state that they have been informed on the rights sanctioned by European Regulation UE 679/2016.

Art. 9 (Publications)

The publication of the Research Project results by means of free access web, as well as its communication to the population and public administrations must be agreed with INGV with respect to its modes and times. The publication of scientific articles produced as intermediate and final products of the activity of this research will be will be agreed between the parties, with the obligation to mention the names of the individual authors and collaborators of the works. Furthermore, they stipulate that the parties will enjoy, as appropriate, the rights granted by the laws on copyright both in the United States of Mexico and abroad.

Art. 10 (Termination)

The contract can be terminated in the event the Contracting Party states that it is impossible for it, for whatever cause, to fulfill the research program which is the object of this contract, without prejudice to the report of the amounts already utilized.

INGV can withdraw from the contract if during the execution of the research project there occur facts or decisions that make it impossible to fulfill the agreements included in this contract;

Art. 11 (Reference)

For that which is not expressly envisaged in this contract, reference is made to the provision of the Italian Civil Code.

Art. 12 (Litigation)

In the event that the Parties do not reach an agreement in accordance with the terms established in the previous Article, they must submit for its interpretation and compliance, to the governing laws of the country or state in which the project, work or activities raised from this Agreement were conducted; or when applicable, to the laws governing the place where the violation of the act leading to legal action was performed. Therefore, both courts, from Rome, Italy and Mexico may be competent according to the legal actions exercised by the plaintiff.

Any form of arbitration is excluded.

This contract consists of 3 pages and one attachment: Annex 1 – activity planning

Read, confirmed and signed by the parties in the City of Rome, Italy and the City of Ensenada, State of Baja California, Mexico, deemed as formalized on January 1st, 2021.

A signed copy of this Agreement delivered by e-mailed portable document format file or other means of electronic transmission shall be deemed to have the same legal effect as delivery of an original signed copy of this Agreement.

The Contracting Party (INGV)	The Contracted Party (CICESE)
Prof. Carlo Doglioni President of INGV	Dr. Silvio Guido Lorenzo Marinone Moschetto Director General and Legal Representative

SPATIAL VARIABILITY OF THE SEISMIC ATTENUATION: APPLICATION TO CASE STUDIES IN CENTRAL ITALY

PROJECT DESCRIPTION

1. Foreword

The INGV-Milan research group is involved in the S3 Task of the Pianeta Dinamico Project (Agreement MIUR-INGV), with the aim of investigating the attenuation of the seismic waves and the effects on the ground motion caused by an earthquake. This activity is planned to exploit the huge number of seismic records, available in Italy thanks to the INGV and DPC monitoring networks and the increasing quantity of geological and geophysical data acquired in the last years. The long-term objective is to improve the modeling of the spatial and temporal variation of seismic ground motion, taking into account the regional and local characteristics of seismic waves propagation, to be also applied for studying the evolution of seismic sequences.

The CICESE (Mexico) research group coordinated by dott. R. Castro has gained considerable experience in the field of the attenuation of seismic waves, developing spectral inversion codes, both following non parametric and parametric approaches. Raul Castro has been collaborating with INGV for many years to study the seismic attenuation in different regions in Italy, publishing several papers in International journals.
To successfully integrate the skills of the two research groups in the field of the regional ground-motion modelling, a joint research program is planned, using events and records of central Italy as case study.

Objectives and activities are defined below.

2. Goals

The general objective is the study of the anisotropy of the seismic waves propagation, investigating the spatial and the temporal variation of the attenuation parameters in central Italy. The ambition of this project is to provide useful data to reach the complete regionalization of seismic motion, especially in central Italy, where the geomorphological context is very complex, due to the presence of multiple faults alignments, variable geological units and local site conditions very different within narrow areas.
The intermediate goals are:

1. To compile a dataset of spectral amplitudes in central Italy for P and S waves, including the metadata relative to the events and the recording stations;
2. To improve the inversion techniques both following parametric and non-parametric approaches to compute source, attenuation and site terms and their spatial variability;
3. To apply the inversion methods to explore the azimuthal and temporal attenuation properties in central Italy, in terms of quality factor Q and high-frequency decay kappa.

3. State of the art

There are two parameters that are generally used to quantify seismic attenuation: (1) The quality factor Q that measures the losses of seismic energy due to anelasticity and scattering of the propagation media. The anelasticity is related to internal friction and the scattering to the heterogeneity of the crust. (2) The high-frequency decay parameter kappa (κ), that accounts for the high-frequency deviation between observed spectral amplitudes and the ω^{-2} model.
To retrieve Q from observed seismograms it is necessary to separate path effects from source effects. Different inversion techniques, parametric and nonparametric, have been proposed in the literature to separate these effects and to be able to make estimates of Q.

A general representation of the observed spectra $U_{ij}(f,r_{ij})$ for a fixed frequency f at hypocentral distance r from a source $S_i(f)$ recorded at the j site can be expressed as:

$$U_{ij}(f, r_{ij}) = S_i(f)A(f, r_{ij})Z_j(f) \quad (1)$$

Where $Z_j(f)$ represents the site effects and $A(f, r_{ij})$ is the attenuation function that accounts for energy loss due to intrinsic and scattering attenuation, geometrical spreading and the high-frequency decay.

Nonparametric approach

The attenuation function can be determined directly from the observed spectral amplitudes following the technique developed by Castro *et al*. (1990). In this approach the spectral amplitude at frequency f and hypocentral distance r is modeled as:

$$U_i(f, r) = S_i(f)\, A(f, r) \quad (2)$$

where $S_i(f)$ is a scalar that accounts for source effects and depends on the size of the earthquake. $A(f, r)$ is the function that describes how the amplitudes decay with distance, and we will call them nonparametric attenuation functions (NAF). It is assumed that the attenuation is a slowly decreasing functions with distance and this is accoplished by adding a smoothness constraint in the inversion. This assumption implies that the amplitudes vary slowly with distance and that the possible undulations of the data are related to site effects.

Parametric Model

The attenuation function can be parameterized as:

$$A(f, r) = G(r) \cdot e^{-\pi f R/\beta Q} \quad (3)$$

where $R=(r-r_n)$ and β is the average S wave velocity of the crust. $G(r)$ is the geometrical spreading function that we approximate as:

$$G(r) = \begin{cases} \frac{r_n}{r}, & r < r_x \\ r_n/(r \cdot r_x)^{1/2}, & r \geq r_x \end{cases} \quad (4)$$

where r_n is the minimum distance define by the NAF and $G(r)$ is normalized at that distance. r_x is the distance where the NAF starts decaying more slowly with distance due to multiple wave arrivals. Once $G(r)$ is defined, estimates of Q can be made by inverting equation (3).

The frequency dependence of $G(r)$ can be explored by defining the geometrical spreading function as (Bindi *et al*., 2004; Castro *et al*., 2008):

$$G(r) = \frac{r_n}{r^b} \quad (5)$$

Then, equation (3) can be written as:

$$logA(f, r) - \log(r_n) = -b\, log(r) - \frac{\pi f log(e)}{\beta Q}\, r \quad (6)$$

For a given frequency f equation (6) represents a system of equations that permits to estimate b and Q.

Since the shape of the geometrical spreading function can change at more than two distance ranges, Pacor *et al.* (2016) consider a tri-linear hinged geometrical spreading model with crossover distances inferred from the NAF at 1 Hz. However, a tri-linear frequency-dependent $G(r)$ model can be defined using the NAF at different frequencies.

The attenuation decay parameter kappa (κ)

This parameter, defined by Anderson and Hough (1984), is widely used in many earthquake engineering applications. k increases with distance and includes the local effects due to geologic characteristics near the recording site and the attenuation due to the regional structure. k can be measured from the high-frequency slope of the acceleration spectra, from the slope of the residual

after subtracting the Brure (1970) source model (Anderson and Humphrey, 1991) and from assuming a fixed stress drop value (Kilb et al., 2012). Following Anderson (1991), the distance dependence of κ at a given site can be expressed as:

$$\kappa(r) = \kappa_0 + \kappa_s + \tilde{\kappa}(r) \qquad (7)$$

Where κ_0 is the near site attenuation, κ_s is the near source attenuation and $\tilde{\kappa}(r)$the average attenuation along the *S*-wave path. Although several studies (Tsai and Chen, 2000; Purvance and Anderson, 2003; Van Houtte et al., 2011; kilb et al., 2012) interpret the contribution of κ_s insignificant or related to the scatter of the kappa measurements, this parameter may be important to correct the source functions determined using equation (1). To determine κ_s, equation (7) is constrained making $\tilde{\kappa}(0) = 0$.

4. Working Program

The project is organized in three working tasks

Task 1: Dataset

The aim of this task is to build a dataset of Fourier spectral amplitude for P and S waves in central Italy, using seismic data recorded since 2008 with magnitude M > 2.5. The spectra will be provided as-recorded (NS-WE and UP components) and rotated in the directions useful to investigate the spatial variability. The dataset will also include information concerning the events and the recording stations, collected from the INGV databases and from recent publications available in the literature. This activity will be carried out in cooperation with Daniele Spallarossa from Genoa University and associated to the INGV. The dataset will be subjected to a sanity check to exclude noisy and anomalous records and optimized the spatial coverage.

Task 2: Inversion codes

The aim of this task is to develop a common software to perform spectral inversions, adopting both parametric and non-parametric approaches. The software will be realized in Matlab language by INGV, translating the routines developed in CICESE and will be compatible with the data format of the flat-file of Task1. Several tests will be performed to investigate the pros and cons of using the two approaches in estimating ground motion spectral parameters.

Task 3: Spatial and temporal Variability of the attenuation parameters

The aim of this task is to study the azimuthal dependence of the quality factor Q and of the high-frequency attenuation parameter kappa, exploiting data and codes developed in the Task1 and Task2.

1. *Temporal Variability of the attenuation parameters*

Studies of the temporal changes of *Q* have been done in central Italy before. For instance, Castro *et al*. (2002) estimated *Q* using foreshocks and aftershocks of the 1997 Umbria-Marche sequence and found temporal changes of *Q* that vary from 27% to 56% depending of the earthquake locations. In a more recent study, Castro and Ben-Zion (2013) using aftershocks of the 2010 (Mw 7.2) El Mayor-Cucapah earthquake, Baja California, Mexico found that south of the Sierras, where before the main event there was no surface rupture, *Q* changed by a factor of 3 at 5 Hz, indicating significant temporal variations of rock properties.

To identify temporal variations in central Italy we can select one or two sequences with well recorded foreshocks and aftershocks to estimate *Q* and *k* using the data and codes developed in Tasks 1 and 2.

2. *Spatial Variability of the attenuation parameters*

During the occurrence of main seismic events brittle deformation produce rock damage and changes of elastic moduli in the source region (Ben-Zion and Ampuero, 2009). For instance, Castro and Ben-Zion (2013) observed isotropic radiation associated with rock damage studying aftershocks of the El Mayor-Cucapah (Mw 7.2) earthquake. These changes in the elastic properties of the rocks will change the attenuation characteristics

of the wave-propagation media and they can be quantified measuring Q near the rupture area and in areas where rock-damage is not expected.

The near surface decay parameter κ_0 is also useful to delimit the rupture area. For instance, Castro and Villalobos-Escobar (2020) found that κ_0 is higher on a fault segment that ruptured during the 1887 Sonora, Mexico earthquake (Mw 7.5). In addition, estimates of the near-source attenuation parameter (κ_s) can be useful to identify regions in the seismogenic zone where radiation of high-frequency seismic energy may be expected. This can be done by selecting earthquakes along the main seismogenic zone of central Italy.

5. Time schedule

The Project will start on November 2020 and finish on October 2021. One meeting will be held to planning and developing the activities after six months by the beginning of the Project. Moreover, if possible, visits of the CICESE staff at INGV Institute and vice versa will be planned during the project to share knowledge and to jointly work on inversion codes and discuss the results. If the health emergency remains, online meeting will be organized

Task	**Months**			
	November-December 2020	January-March 2021	April-June 2021	July-October 2021
T1				
T2				
T3				

6. Working Group

WG1. INGV - Milan: Francesca Pacor, Giovanni lanzano, Paola Morasca, Sara Sgobba, Maria D'Amico, Leonardo Colavitti

WG2. CICESE: Raul Castro, Antonio Mendoza, with the external contribution of Claudia Vidales

7. Products

1. Scientific paper to be submitted on JCR journal describing the Central Italy case studies;
2. Technical Report on the comparison between parametric and non parametric inversion technique;
3. Fortran and Matlab Codes for spectral inversions

Reference

Anderson, J.G. and Hough, S. (1984). A model for the shape of the Fourier amplitude spectrum of acceleration at high frequencies, *Bull. Seismol. Soc. Am.,*74, 1969-1984.

Anderson, J. G., (1991). A preliminary descriptive model for the distance dependence of the spectral decay parameter in southern California, *Bull. Seismol. Soc. Am.,* 81, 2186-2193.

Anderson, J.G. and J.R. Humphrey (1991). A least squares method for objective determination of earthquake source parameters, *Seismol. Res. Lett*., 62, 201-209.

Ben-Zion, Y., and J. Ampuero (2009). Seismic radiation from regions sustaining material damage, *Geophys. J. Int*., 178, 1351-1356.

Bindi, D., R.R. Castro, G. Franceschina, L. Luzi and F. Pacor (2004). The 1997-98 Umbria-Marche sequence (Central Italy): source, path and site effects estimated from strong motion data recorded in the epicentral area, *Jour. of Geophys. Res.,* 109, B04312, 1-17.

Brune JN (1970) Tectonic stress and the spectra of seismic shear waves from earthquakes. *Jour Geophys Res* 75: 4997-5009.

Castro, R.R., Anderson, J.G. and Singh, S.K. (1990). Site response, attenuation and source spectra of S waves along the Guerrero, México, subduction zone, *Bull. Seism. Soc. Am*., 80, 1481-1503.

Castro, R.R., M. Monachesi, L. Trojani, M. Mucciarelli and M. Frapiccini (2002). An attenuation study using earthquakes from the 1997 Umbria-Marche sequence, *Jour. of Seismology*, 6, 43-59.

Castro, R.R., M. Massa, P. Augliera, and F. Pacor (2008). Body-wave attenuation in the region of Garda, Italy, *Pure and Appl. Geophys.***165**, No. 7, 1351-1366, doi: 10.1007/s00024-008-0365-1.

Castro, R.R., and Y. Ben-Zion (2013). Potential signatures of damage-related radiation from aftershocks of the 4 April 2010 (Mw 7.2) El Mayor-Cucapah earthquake, Baja California, México, *Bull. Seism. Soc. Am.*, **103**, 1130-1140.

Castro, R.R., and G. Villalobos-Escobar (2020). Seismic energy radiated by earthquakes in the Basin and Range Province of Sonora, Mexico, near the rupture of the 1887 Mw7.5 earthquake, *Jour. of Seismology*, doi:10.1007/s10950-020-09953-0.

Kilb, D., G. Biasi, J.G. Anderson, J. Brune, Z. Peng, and F.L. Vernon (2012). A comparison of spectral parameter kappa from small and moderate earthquakes using southern California ANZA seismic network data, *Bull. Seismol. Soc. Am*. 102, 284-300.

Pacor, F., Spallarossa, D., Oth, A., Luzi, L., Puglia, R., Cantore, L., Mercuri, A., D'Amico, M. and Bindi, D. (2016). Spectral models for ground motion prediction in the L'Aquila región (central Italy): evidence for stress-drop dependence on magnitude and depth, *Geophys. J. Int*., **204**(2), 697-718.

Purvance, M.D., and J.G. Anderson (2003). A comprehensive study of the observed spectral decay in strong-motion accelerations recorded in Guerrero, Mexico, *Bull. Seismol. Soc. Am*. 93, 600-611.

Tsai, C.-C. P., and K.-C. Chen (2000). A model for the high-cut process of strong motion accelerations in terms of distance, magnitude, and site condition: An example from the SMART 1 array, Lotung, Taiwan, *Bull. Seismol. Soc. Am*. 90, 1535-1542.

Van Houtte, C., S. Drouet and F. Cotton (2011). Analysis of the origins of *k* (kappa) to compute hard rock to rock adjustment factors for GMPEs, *Bull. Seismol. Soc. Am*. 101, 2926-2941.

ISTITUTO NAZIONALE
DI GEOFISICA E VULCANOLOGIA

Alla Direzione Centrale Affari Generali e Bilancio

Centro Servizi Contabilità e Bilancio

Modulo F3 - COPERTURA FINANZIARIA

Oggetto

- O Tipologia (Accordo/Protocollo d'intesa/Associazione/Convenzione: __**Convenzione**_____;
  - O Titolo: **SPATIAL VARIABILITY OF THE SEISMIC ATTENUATION: APPLICATION TO CASE STUDIES IN CENTRAL ITALY;**
- O Altro: _____

ATTESTA

Costo previsto

- O **Annuale;** **Importo annuale:__15.000**_____
- O Pluriennale; (in caso di pluriennale indicare le date_____) Importo totale: _____
- O Oneri futuri o altri eventuali oneri da sostenere in attuazione della convenzione : (da indicare nel caso sia prevista la possibilità di sostenere costi negli esercizi futuri a seguito di accordi/programmi attuativi):_____

Copertura finanziaria

- O Fondi Istituzionali;
- O Fondi di progetto; Indicare il codice OB.FU.: _1020.010

Dati relativi alla contabilità

C.R.A: 1.03;

Esercizio: 2020; Capitolo: 1.03.02.99.999.01

Numero impegno provvisorio 6916

Data: 20/10/2020

Importo: 15.000

NOTE

IL RESPONSABILE DEI FONDI

IL DIRETTORE DI SEZIONE

IL DIRETTORE DEGLI AFFARI GENERALI E BILANCIO