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**CALL FOR SCHOLARSHIP APPLICATIONS**

**INTERNATIONAL DIPLOMA IN**

**SEISMOLOGY:** Logotipo

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Descripción generada automáticamente **USE OF SEISMOLOGICAL DATA**

**2nd ONLINE EDITION**

**30 June – 17 November, 2025**

Logotipo

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Call for Applications available at: <https://www.agcid.gob.cl>

Chilean International Cooperation Agency for Development │ AGCID



**BACKGROUND**

According to the United Nations Office for the Coordination of Humanitarian Affairs (2020), Latin America and the Caribbean is the second-most disaster-prone region in the world. Their occurrence not only threatens lives and property but can also reverse the progress of nations in terms of their development, eroding resilience and increasing vulnerability.

The Government of Chile, through the Chilean International Cooperation Agency for Development (AGCID) and in collaboration with the Japan International Cooperation Agency (JICA), seeks to contribute to developing and strengthening the capacities of professionals and technicians in the region. To this end, and inspired by the Sustainable Development Goals of the 2030 Agenda and the Sendai Framework for Disaster Risk Reduction, they have formed an alliance to carry out the **Project for Building Resilience and Sustainable Societies for Disasters in Latin America and the Caribbean (Kizuna II)**. The initiative is part of the second phase of the successful Kizuna Programme, which trained more than 5,000 participants between 2015 and 2020.

The Diploma in Seismology: Use of Seismological Data is an international cooperation action that contributes to developing professional, institutional and public policy capacities in order to move toward communities that are better prepared and more resilient to natural disasters.

This initiative will take place over a period of two years, beginning in Japanese Fiscal Year 2024. It is divided into two (2) online editions, one in each Japanese Fiscal Year until 2025. It is part of the Kizuna II Project and falls within the framework of the Japan – Chile Partnership Programme (JCPP2030) and the Technical Cooperation Agreement signed between the governments of Japan and Chile.

The second edition of the diploma will take place in 2025.

**OVERVIEW**

1. **OVERRIDING OBJECTIVE**

To promote policies, strategies, programmes and collaborative actions with Latin American and Caribbean (LAC) countries, in accordance with the action priorities of the Sendai Framework for Disaster Risk Reduction 2015 – 2030 and the Sustainable Development Goals (SDG 2030).

1. **DIPLOMA OBJECTIVES**

* To provide participants with the scientific and technical foundations as well as the classical and modern tools for the analysis and processing of seismic data to study and model seismic sources of earthquakes, and to apply them in the real-time monitoring of seismic activity.
* To discuss the state-of-the-art of seismology, providing a modern view of the study of earthquakes based on the scientific advances of recent decades, through studying the most recent mega-earthquakes in Chile and the rest of the world.
* To acquire and deepen knowledge of seismology applied to the characterization and rapid estimation of earthquake source parameters. In addition, there will be discussions of the role of the combined use of different types of observations in the estimation process.

1. **OUTCOMES**

Upon completion of the Diploma, participants will:

* Understand the physical processes behind the generation of earthquakes, according to a modern view of seismology and geodesy.
* Have technical knowledge of the different types of instruments for monitoring seismic activity and the deformation processes in the Earth’s crust.
* Understand the theoretical basis of seismic source modelling, including point source and finite source approximations.
* Identify the techniques to estimate earthquake source parameters.
* Understand the methods for determining source parameters in real-time seismic monitoring operations.
* Have an understanding of seismic source modelling using the W-Phase method, in addition to using far-field body waves for earthquake source characterization.
* Gain an understanding of fault characterization through modelling the aseismic processes responsible for the accumulation of energy released during an earthquake, using geodetic observations.
* Understand the processes related to seismic hazard assessments, recognizing their scopes and limitations. Case studies will focus on different areas of Chile, including Northern and Central-Southern Chile.
* Master the knowledge and procedures for accessing data from national and international seismic networks used for determining the seismic hazard of a specific site.
* Understand the basic principles and knowledge of the procedures used in real-time seismic activity monitoring systems for the quick estimate of earthquake source parameters, as well as their dissemination to national and international agencies and the general public. Special emphasis will be placed on the Chilean case.

1. **IMPLEMENTING INSTITUTIONS**

The mission of the Faculty of Physical Sciences and Mathematics of the Universidad de Chile is to generate, develop, integrate and communicate knowledge of basic sciences, engineering, Earth sciences, and economics and management. This mission is fulfilled through teaching, research and outreach activities, undertaken at the highest levels of complexity and according to international standards of excellence.

1. **DURATION OF THE DIPLOMA**

The Diploma course will be taught in an online format between 30 June and 17 November 2025. It is a 20-week course that includes 166 hours of synchronous lectures, workshops and group activities (3 sessions a week, 3 hours per session).

The Diploma will be delivered in a 100% online format (via streaming) taught via Zoom, with each of the lectures by the experts/lecturers being streamed live. Participants will also have access to the U-Cursos digital learning platform.

1. **LANGUAGE**

The Diploma will be taught entirely in Spanish.

1. **SCHOLARSHIP BENEFITS**

The programme will finance[[1]](#footnote-1):

* The tuition and programme fees.
* Certificate of completion.

1. **INVITED COUNTRIES AND/OR ORGANISATIONS**

The governments of the following countries and regions will be invited to nominate applicants to the Diploma: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and the following CARICOM member states: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

1. **TOTAL NUMBER OF PARTICIPANTS**

The number of participants from the invited countries shall not exceed 20 in total[[2]](#footnote-2) and there are no pre-established quotas per country.

1. **APPLICATION REQUIREMENTS**

The Diploma is aimed primarily at individuals who meet the following requirements:

* Must be a citizen of one of the countries invited to the course and reside in one of the invited countries. Should the applicant be residing temporarily in a country other than the country of citizenship, the application must be made via the Focal Point of the country of which they are a citizen.
* Must be nominated by their government in accordance with the process indicated in Section XI.
* Must not be a member of the Armed Forces and/or National Defence;
* Must hold a university degree related to engineering or earth sciences.
* Must have work experience in the public or private sector, in the field of Earth sciences, geological hazards assessment, engineering or disaster risk reduction. Or, alternatively, must have basic knowledge of Earth sciences, ideally from a geophysics or engineering background.
* Must be a professional working in a relevant institution in the field of Earth sciences or disaster risk management.
* Must have access to the internet for at least 12 hours per week to attend the online classes.

**Important:**

Selection priority will be given to candidates who are currently involved in projects related to the national development of their country.

1. **APPLICATION PROCESS**

Candidates must submit their application containing all of the required information (a full copy of their application including all respective signatures and stamps) in digital format via email to the Focal Point in their respective country of origin (see Annex V) for it to be officially registered. The following documents must be presented:

1. Application form (Annex I), duly completed and signed by the applicant and his/her direct supervisor;
2. Proposal for an Action Plan (Annex II);
3. Letter of Intent (Annex III);
4. Work Certificate (Annex IV)
5. Letter of Institutional Commitment (Annex V);
6. Degree certificate;
7. Non-Spanish-speaking applicants must provide proof of language proficiency, such as: certification through an international exam; a copy of their university degree if their undergraduate or graduate studies were completed in a Spanish-speaking country; or a letter of confirmation from the Embassy of Chile in their country.

Interested candidates must submit their application to the Focal Point in their respective country (see Focal Points, Annex VI) for their application to be officially registered. **Applications sent directly without being officially registered via the corresponding Focal Point will not be considered for selection.**

**Each Focal Point will set a date for the application submission deadline. It is therefore the responsibility of each applicant to consult directly with the Focal Point for their respective country (Annex VI) regarding the closing date for the Call for Applications. Closing dates may vary from one country to another.**

The stages and relevant dates of the Call for Applications to this International Diploma are as follows:

|  |  |
| --- | --- |
| **Stage** | **Dates** |
| Closing date for applications *(applicants must confirm the closing date with the Focal Point in their respective country)* | *31 May 2025* |
| Pre-selection of candidates and submission of applications to the AGCID Scholarship Platform *(for Focal Point)* | *06 June 2025* |
| Selection Committee | *09 – 13 June 2025* |
| Publication of results and notification of selected applicants | *16 June 2025* |

The final deadline for the receipt of applications by AGCID is **06 June 2025**, without exception. **However, the AGCID Focal Points in each country may close the Call for Applications earlier than specified.** Applicants must therefore confirm the closing date for applications with their corresponding Focal Point, the contact details for which can be found in Annex V.

**PLEASE NOTE:**

* No incomplete, illegible, or late applications will be considered.
* Only applications officially submitted via the Focal Points will be considered. Applications submitted directly by the applicant will not be considered for selection.
* It is the responsibility of applicants to read the Call for Applications carefully, along with all of its requirements, the application process, and the attached documents. Applicants must ensure their application meets the professional requirements specified in the call.

The information provided in the application form and its respective annexes will be considered a sworn declaration and, therefore, in the event falsified, adulterated, inaccurate or misleading information is presented for the purpose of receiving a scholarship, the applicant shall assume the respective administrative, civil and criminal sanctions, in accordance with the regulations of their country of origin. Moreover, the applicant will be indefinitely disqualified from applying to future Calls for Applications, and such circumstance will be reported to the scholarship committee.

1. **SELECTION**

The selection will be made by a technical committee composed of members of JICA, AGCID, and the university. This same committee may also evaluate the appropriateness of including additional experts in the field of natural disasters and/or public investment in the process.

**The results of the selection will be published on 16 June 2025, on the AGCID website, www.agcid.gob.cl, for the information of all interested parties.**

The administrators of the Diploma programme will contact each selected applicant via email, using the contact information provided in the application form, to notify them of their selection and will directly coordinate all arrangements for their participation.

Important: Only those applicants selected for the scholarship will be notified. Once they have confirmed acceptance of the scholarship, they will be sent a guide with the corresponding instructions and procedures that will need to be followed.

**The final results with respect to those who are awarded scholarships is the sole decision of the Selection Committee, and the decision cannot be appealed.**

1. **OBLIGATIONS OF PARTICIPANTS**

* Applicants are responsible for submitting their current contact information (Annex I: Application Form) and regularly checking their email accounts in case of requests and official notices from the coordinating team pursuant to the dates described in Section XI.
* Participants shall strictly adhere to the Diploma programme. Requests for changes or alterations to the initially established Diploma programme will not be accepted.
* Participants shall respect the instructions given during the Diploma and foster an atmosphere of cooperation among their fellow scholarship recipients.
* This edition of the Diploma will be taught entirely in a remote learning format. A minimum of 85% attendance is required to pass.
* Applicants must complete all of the paperwork necessary to participate in the programme, including obtaining authorization from their supervisor.
* Participation in the Diploma shall only be interrupted if duly authorized and only in qualified cases that prevent the participant from continuing the training.

1. **DIPLOMA PROGRAMME OVERVIEW (PRELIMINARY)**

|  |  |
| --- | --- |
| **NAME OF PROGRAMME** | International Diploma in Seismology: Use of Seismological Data |
| **NUMBER OF PARTICIPANTS** | Maximum of 20 participants per edition. |
| **DURATION** | * Maximum duration in hours: 166. * Number of asynchronous hours: 40 * Number of synchronous hours: 126. * Maximum duration in weeks: 20 weeks. * The Diploma is delivered in a synchronous online format. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module** | **Learning objectives**  **(List main objective at minimum)** | **Units** | **General description** | **Format, activities**  **(synchronous/asynchronous)** | **Duration (hours)** |
| 1. Introduction | **Objective:** Standardize participants’ basic knowledge of Earth sciences, mathematics and physics.  **Before:** Participants have a grasp of the general concepts related to Earth sciences as well as the mathematics, physics and computational skills needed for understanding them.  **After:** Participants will understand the essential Earth sciences concepts related to the occurrence of earthquakes. Likewise, they will understand the mathematical and physics concepts essential to the study of earthquakes and have the basic computer skills needed for employing state-of-the-art techniques in such studies. | Unit 1:  Minimum requirements in terms of physics, mathematics and computational skills. | * Basic commands in Linux, Python. * Linear algebra, vector calculus. * Probabilities. * Fourier and Laplace analysis. | Format: Asynchronous classes | 25 hours |
| Unit 2: Introduction to Earth sciences. | * Use of the scientific method. * General description of the Earth system (formation and evolution). * Structure and composition of the Earth (crust, mantle, core). * Plate tectonics. * Seismic cycle: seismic and aseismic processes (energy accumulation and release cycle). | Format: Asynchronous classes | 15 hours |
| 2. Seismological Observations | **Objective:** Acquire knowledge about the process through which different types of earthquakes and tremors are generated, their characterisation in terms of location and size, as well as their relationship to the geographical area where they occur.  **Before:** Participants understand the general concepts of seismology.  **After:** Participants will understand the possible causes of earthquakes and how these can be organized in terms of size and tectonic features. | Unit 1: Seismological Observations | * Basic concepts of seismology: Plate tectonics, the seismic cycle, hypocentre, rupture area, magnitude, intensity, focal mechanism, rupture speed, seismic waves, etc. * Types of earthquakes. * Laws of seismology: Gutenberg-Richter law, Omori law. * Scaling laws. * Large earthquakes and the evolution of seismology. * Seismicity in Chile. | Format: Synchronous classes | 22.5 hours |
| 3. Geodetic observations applied to active tectonics | **Objective:** Acquire knowledge of the geodetic techniques that can be applied to understand the seismic cycle in different tectonic contexts, in particular, geodesy and slow and aseismic cortical deformation processes with a focus on the elastic energy accumulation process that eventually releases during large earthquakes.  **Before:** Participants understand the general concepts of geodesy and the seismic cycle.  **After:** Participants will understand the different deformation processes associated with the seismic cycle, as well as general aspects of the mechanical behaviours of active faults and their relationship with the accumulation of energy that is released during an earthquake. | Unit 1: Geodetic Observations Applied to Active Tectonics | * Introduction to geodetics applied to active tectonics. * Energy accumulation processes: inter-seismic periods, asperity of a seismic zone, interpretation based on frictional and rheological models (examples in Chile and Japan). * Energy release processes: co-seismic and post-seismic periods, slow slip events, the mechanical behaviour of faults, and interpretation using frictional and rheological models (examples in Chile and Japan). * Estimation and characterisation methods for distributions of quasi-static dislocations in faults for different seismogenic zones. * Interpretation of the mechanical behaviour of faults during the seismic cycle and their role in seismogenesis. | Format: Synchronous classes | 12 hours |
| 4. Instrumentation and Networks | **Objective:** Acquire knowledge of the basic theory behind seismic and geodetic instrument records in order to process such observations. Learn the general technical characteristics of the instruments used in monitoring seismic activity and crustal deformation processes.  **Before:** Participants have an understanding of the basic concepts of seismic and geodetic instrument records and their use for understanding the movements of the Earth’s crust.  **After:** Participants will be able to identify the technical characteristics of a seismic station and recognise the instrumental response of different types of sensors. They will be able to identify the technical characteristics of space geodetic instruments, the accuracy, spatial and temporal coverage of their measurements, and methods of processing geodetic data and the identification of signals of interest. | Unit 1: Instrumentation and Networks | * Seismic instruments (e.g. short-period, broadband, accelerometers, etc.). * Instrumental response and calibration. * Description of geodetic instruments (terrestrial and space geodesy). * Basic theory for positioning using GNSS data. * Seismic and geodetic monitoring networks (local, regional and global networks, research networks). * Field demonstration of use of seismic and GNSS stations. * Demonstration of basic processing of seismic and geodetic data. * Decomposition of geodetic time series in signals caused by different geophysical and anthropogenic processes (trajectory models). | Format: Synchronous classes | 10.5 hours |
| 5. Data Analysis and Seismic Source Modelling | **Objective:** Acquire knowledge about the different types of seismic data used in the study of seismic sources, how to correctly process such data, the types of filters used and instrumental response. Acquire knowledge of the theoretical basis for modelling seismic sources and the principal techniques used for determining displacement and source parameters.  **Before:** Participants understand general concepts of seismic data and how to process it. Participants understand the basics of seismic source modelling.  **After:** Participants will be able to process seismic signals, apply filters, remove instrumental response and calculate Fourier amplitude spectra. Participants will learn the theoretical basis of seismic source modelling of earthquakes and to identify different methods and techniques for calculating source parameters. | Unit 1: Data Analysis and Seismic Source Modelling | * Understand the theoretical basis of seismic source modelling, including point source and finite source approximations. * Identify the techniques to estimate earthquake source parameters. * Understand the techniques for calculating the seismic moment tensor from seismic records. * Become familiar with different methods for determining source parameters. | Format: Synchronous classes | 16.5 hours |
| 6. Seismology in practice: quantitative characteristics of the identified seismic source; how to obtain scientific information about earthquakes quickly. | **Objective:** Acquire knowledge about methods for processing seismic signals to quickly characterise an event in terms of the moment tensor (centroid, focal mechanism, source time functions, etc.) in order to determine its tsunamigenic potential.  Acquire the necessary practical and theoretical knowledge for seismic source modelling and tsunami early warning systems.  Acquire skills for far-field and regional wave analysis: parameterisation of the seismic model for finite source analysis.  **Before:** Participants understand the basics of seismic instruments and networks for data capture, monitoring and signal processing for real-time and near-real-time processing. They understand the basic concepts of instrumental response and seismic signal processing. They have basic knowledge about the propagation of seismic waves, types of seismic sources and seismotectonic concepts.  **After:** Participants will be able to identify the methods and techniques to determine the physical parameters that characterise the size, mechanism and rupture process of the seismic source from waveform modelling. | Unit 1: Case studies of seismic events: Taxonomy of earthquakes in the Andean geodynamic context.  New records on the seismic source and taxonomy of earthquakes in Andean geodynamics. | * Presentation of new scientific records about seismic source types in the Andes. * Description and practical examples of the concept of centroid; comparison with hypocentre. * Analysis of the seismic moment tensor for typical Andean subduction events. * Examples of the calculation of seismic energy, seismic moment, seismic efficiency and stress drop. |  | 7 hours |
| Unit 2: Application for seismic source modelling: Case study analysis of earthquakes in the Andean context; point source and finite source earthquake models. | * Basic concepts of free oscillations of the Earth; how to use the analysis of normal modes as a standard seismological method for determining the moment tensor of the centroid. * Physical basis for kinematic seismic source models, for both point source and finite source; physical limitations for the parameterisation of seismic source models. * Validity range of ray theory approximations with body waves at far-field distances. Comparative analysis of deep and shallow earthquakes in an Andean tectonic context (case study analysis using the Fraunhofer approach). * Case study of seismic source time functions and the determination of the seismic moment tensor using the W-Phase method for M>6.0 earthquakes using waveform records at regional distances and ultra-long periods resulting from a superposition of the first harmonics of the Earth’s normal modes (range between 100 and 1,000 s) in the Andean tectonic context. |  | 7 hours |
| Unit 3: Seismic analysis to quickly obtain scientific information on earthquakes in tsunami early warning applications; new information for strong-motion earthquakes. | * Analysis of recent Mw 7-8 earthquakes in the Andean subduction context, such as the Mw 8.4 at Illapel in 2015: a successful case study for rapid seismic moment tensor determination using the W-phase method as a methodology for early tsunami warning systems in an Andean tectonic subduction context. Discussion of validity range and limitations. * Example of modelling the point source with the W-Phase method using ultra-long-period wave radiation data and co-seismic displacement data obtained from GPD stations at near and regional distances. * Example of modelling the finite source with the W-Phase method using broadband data as an application for real-time operations for tsunami warning systems. |  | 7 hours |
| 7. Database Management and Real-Time Operations | **Objective:** Learn about the National Seismology Centre (CSN), how it works, protocols and processes. Learn about the real-time data processing systems, operations and field systems for seismicity analysis developed at the CSN.  **Before:** Participants understand general concepts of seismology and data analysis.  **After:** Participants will be able to apply their knowledge to real-time seismic studies. | National Seismology Centre (CSN): Mission and operation. | * Brief history of the creation of the CSN. * Operation protocols. * Brief introduction to the systems used. * Description of the main products. | Format: Synchronous classes | 13.5 hours |
| Systems and tools for processing seismic data. | * Automatic systems (Earthworm, EarlyBird) * Event location systems * Catalogues * Rapid magnitude estimation systems * Station monitoring * Simulations * Seiscomp review |
| Field operations and communications | * Description of field work: exploration, construction, maintenance and decommissioning * Seismology telecommunications systems * Best field practices |
| Earthquake characterisation systems developed at the CSN | * Rapid intensity estimation and visualisation * Shakemaps developed in Chile * Inversion of co-seismic and PGD source parameters * Near real-time inversions with strong motion data |
| Geodetic applications | * Geodesy and its application to the study of earthquakes * Examples of applications * Real-time data acquisition * Other results in Chile |
| 8. Seismic hazards | **Objective:** Acquire knowledge about identifying seismic hazards  **Before:** Participants understand general concepts of seismology.  **After:** Participants are able to carry out the first steps for identifying seismic hazards in an area of interest, including the seismic sources present in the study area and determining the corresponding expected peak accelerations, as well as an estimate of the maximum magnitude for each seismic source. | Unit 1: Seismic hazards | * Historical seismicity: How much information can we really get? * Description of major global earthquakes with an emphasis on earthquakes in Chile and the region. * Analysis and completeness of catalogues. * Different seismic sources: Identification for hazard determination. * Gutenberg-Richter determination for the entire catalogue and for each seismic source. * Determination of the probability of occurrence according to Poisson. * Determination of maximum expected accelerations. | Format: Synchronous classes | 15 hours |
| 9. Workshop | **Objective:** Acquire general knowledge about seismology-related projects implemented in different countries of Latin America.  **Before:** Participants have a general knowledge of seismology-related projects.  **After:** Participants will gain experience in seismology-related projects implemented in different countries. | Workshop on experiences in LatAm and CARICOM. | * Presentation of 4 case studies from previous scholarship recipients of the Seismology Diploma programme, who will present their success stories on the implementation of their Action Plans at their institutions. | Format: Synchronous classes | 20 hours |
| Total |  |  |  |  | Diploma: Up to 166 hours |

**CONTACT INFORMATION**

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**KIZUNA II Project Coordination**

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1. No items additional to those mentioned above will be financed. Personal expenses must be covered by each participant. [↑](#footnote-ref-1)
2. This academic programme requires a minimum number of participants in order to be held and, for reasons of force majeure, may undergo changes in its programme, teaching staff and/or method of delivery. The course coordinator will provide notification of any changes. [↑](#footnote-ref-2)