Preface to the Focus Section on Geophysical Networks and Related Developments in Latin America

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Latin American countries share similar history and culture, and complicated tectonic settings. Subduction of the Rivera, Cocos, and Nazca plates had produced 23 $M \geq 8.0$ subduction and intraplate earthquakes since 1900 when seismic instrumentation took off. This seismicity includes the 22 May 1960 M_w 9.5 Valdivia, Chile, earthquake, the largest ever recorded in the world; and the most recent intraplate M_w 8.2 earthquake in the Gulf of Tehuantepec, in southern Mexico. Subduction is also present to the east of the Caribbean plate with earthquakes of $M \geq 7.0$, including some historical megathrust earthquakes (Robson, 1964). In addition, 18.6% of the large deep earthquakes ($M \geq 6.0$) in the world have occurred in South America, including two of the largest (31 July 1970 M_w 8.0 in Colombia and 9 June 1994 M_w 8.2 in Bolivia). Seismic hazards in the region are also associated with transform faults earthquakes ($M \geq 7.0$) that take place at the boundaries between the North American plate and the Pacific and the Caribbean plates; as well as the South American plate and the Caribbean and Scotia plates. Other significant earthquakes have occurred in the region, such as the Nicaragua tsunami earthquake (2 September 1992 M_w 7.7) and the destructive Haiti earthquake (12 January 2010 M_w 7.0). In fact, in almost all countries in the region, there is at least one earthquake that has had a significant impact on the society, infrastructure, and economy.

Geophysical networks are the basis for observation of Earth processes. In consonance with development in the rest of the world, seismological networks in Latin America were first established in the early 1900s. The following noncomprehensive list of stations reveals the rapid development of observation in the Latin American region. According to Udías (2015), the first seismographs (seismoscopes) were locally built and installed by G. Heredia in Mexico at the end of the nineteenth century. An independent seismological station, composed by two Bosch-Omori seismographs, was installed in 1906 in Havana, Cuba. A three-component Vicentini seismograph was installed in 1907 at the Astronomical Observatory in La Plata, Argentina. After the 1906 Central Chile earthquake, F. Montessus de Ballore developed a countrywide network consisting of a central station with Bosch-Omori, Wiechert, and Stiattesi components located in Santiago, and four horizontal Wiechert instruments of 200 kg spaced at about 800 km, complemented by 29 Agamennone seismoscopes.

The efforts continued through the following decades with stations installed at Tacubaya, Mexico; La Paz, Bolivia; Huancayo, Peru; and Bogota, Colombia, among others, further propelled by the International Geophysical Year (1958–1959) and the deployment of the World Wide Standardized Network, from the mid-1960s on.

One of the objectives of this focus section of *SRL* is to give network operators an opportunity to present information about the state of these local, regional, and national networks.

From north to south, for Mexico, this focus section includes a description of the national Mexican broadband network (Pérez-Campos *et al.*, 2018), and four regional seismic networks (Castro *et al.*, 2018; Córdoba-Montiel *et al.*, 2018; Quintanar *et al.*, 2018; Vidal-Villegas *et al.*, 2018). It also introduces a regional strong-motion network (Núñez-Cornú *et al.*, 2018), the Global Positioning System (GPS) TLALOCnet initiative (Cabral-Cano *et al.*, 2018), and a dedicated network for seismic early warning (Suárez *et al.*, 2018).

For Central America, Linkimer *et al.* (2018) describe the national seismic network of Costa Rica, and Strauch *et al.* (2018) summarize the Nicaraguan network and the effort of Central America for earthquake monitoring and tsunami early warning. For the Caribbean, Bent *et al.* (2018) report the current efforts in Haiti for real-time earthquake monitoring and Sardiña *et al.* (2018a,b) summarize the capabilities and performance of the Pacific Tsunami Warning Center for Puerto Rico, the Virgin Islands, and the Caribbean.

For South America, Alvarado *et al.* (2018) introduce the Ecuadorian seismic, volcanic, and geodetic networks. Vargas *et al.* (2018) and Mora-Páez *et al.* (2018) present the geophysical and geodetic infrastructure, respectively, in Colombia. Bianchi *et al.* (2018) describe the Brazilian national network, Sánchez Bettucci *et al.* (2018) describe the Uruguayan national network, and Barrientos and National Seismological Center (CSN) Team (2018) present the Chilean network. Furthermore, Piñón *et al.* (2018) describe the Argentine continuous satellite monitoring network.

Moreover, the focus section includes the description of products of these regional and national networks. In particular, Salazar *et al.* (2018) introduce a comprehensive strong-motion database for El Salvador, which constitutes a major source of information for seismic hazard evaluation for that country. For near-real-time products, Folesky *et al.* (2018) obtain rupture direction from local data collected by the Integrated Plate

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Boundary Observatory Chile in northern Chile, and Leyton, Ruiz, and Madariaga (2018) present estimations of focal mechanism and final fault using an Elliptical Patch Method. Leyton, Pastén, *et al.* (2018) point out the importance of characterizing the sites where the seismological stations are installed and present the methodology used in Chile. Also, Leyton, Leopold, *et al.* (2018) show a site classification based on the strong-motion data recorded at the Chilean national network.

Three studies are presented in the focus section as examples of the quality and potential use of the data produced by the networks. The three cases are for GPS data. González-Ortega *et al.* (2018) and Mothes *et al.* (2018) study the earthquake cycle for northern Mexico and the northern Andes, respectively; Crowell *et al.* (2018) analyze the potential of implementing a G-Fast Global Navigation Satellite Systems-based model for earthquake early warning for Chile.

The major contribution of this focus section, published in this issue of *SRL*, is to show current state and capabilities of the national, regional, and local geophysical networks in Latin America. These geophysical networks hold great potential for evaluating future seismic and associated natural hazards (e.g., volcanic eruptions and tsunamis), or as a backbone for future geophysical experiments and studies in this region. The publication of this focus section also coincides with the upcoming Seismology of the Americas Conference on 14–17 May 2018 in Miami, Florida, which is a joint meeting of the Latin American and Caribbean Seismological Commission (LACSC) and the Seismological Society of America (SSA).

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