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On the 150th anniversary of the Geophysical Institute in Zagreb, Croatia

On 1 December 1861 meteorological observatory was established within the Royal General Programme Secondary School (in Croatian, *Kraljevska velika realka*) at Grič in Zagreb. Measurements of the air temperature, relative humidity, air pressure and precipitation amounts together with observations of cloudiness and wind strength started under the supervision of professor of physics, Ivan Stožir (Fig. 1, left). Later, measurements and observations expanded to other localities and other geophysical disciplines. Growing professional tasks and consequent availability of numerous geophysical data sets served as a basis for the future teaching and scientific work.

Scientific research was initiated by Andrija Mohorovičić (Fig. 1, right), who replaced Stožir in 1892. Apart from the world-wide known discovery of the discontinuity between the Earth's crust and the mantle (Mohorovičić, 1910, 1992; Skoko, 1992) and the scientific accomplishments in the field of meteorology (Orlić, 2007, and references therein), Mohorovičić also deserves a credit for the further advancement in professional activities at the observatory in the area of seismology, meteorology, astronomy and geomagnetism (Tab. 1). In his professional work Mohorovičić always exhibited a deep interest in the practical aspects of geophysical results, ranging from construction of synoptic charts (the first chart for Croatia was published by Mohorovičić in 1893) to the list of rules to be observed in order to build earthquake-resistant buildings (Mohorovičić, 1911, 2009; Herak and Herak, 2009). Finally, during his man-

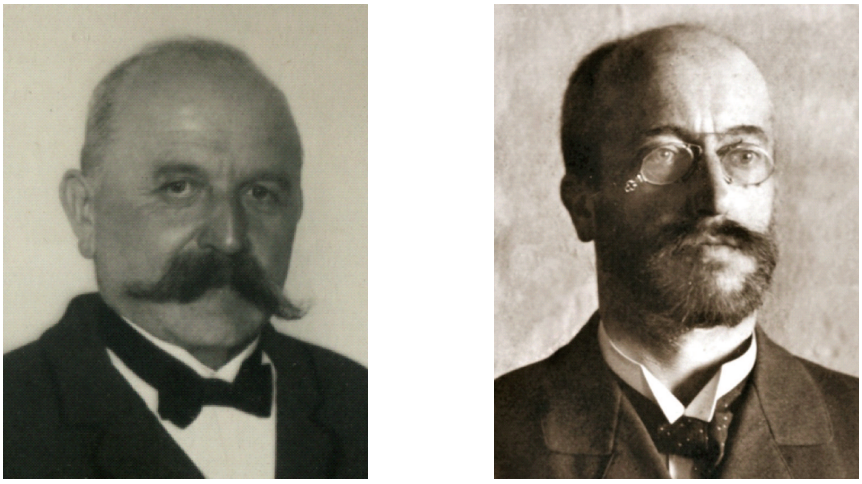

Figure 1. Ivan Stožir (1834–1908, left) and Andrija Mohorovičić (1857–1936, right).

Table 1. Events marking the development of the Geophysical Institute in Zagreb.

Year	Event
1861	Meteorological station founded at the Royal Secondary School in Zagreb
1880	Seismoscope used at the station
1889	Ozone measurements introduced
1892	Scientific research started
1892	Time service initiated
1893	First weather forecasts published
1894	Geophysical tuition started at the University of Zagreb
1896	Meteorological station received its autonomy
1899	Relationships with the Croatian economic entities initiated
1901	Network of meteorological stations organized
1906	Seismological station founded in Zagreb
1910	Andrija Mohorovičić published his discovery of discontinuity in the Earth's interior
1915	Geomagnetic measurements initiated
1921	Name of the institution changed to the Geophysical Institute
1923	*Papers of the Geophysical Institute in Zagreb* began to be published
1928	Institute of Geophysics founded at the Faculty of Philosophy
1929	Tide-gauge station established at Bakar
1937	One-dimensional numerical modeling of the sea started
1947	Hydrometeorological Service established as a separate institution (nowadays Meteorological and Hydrological Service)
1947	Undergraduate study of geophysics initiated
1949	Measurements of magnetic declination organized along the east Adriatic coast
1951	Geophysical Institute became part of the Faculty of Science, University of Zagreb
1957	Actinometric research initiated
1959	Institute of Atmospheric Physics founded at Puntijarka
1960	Graduate study of geophysics initiated
1969	First measurements of the rain acidity carried out
1970	Major international projects started
1981	New building of the Geophysical Institute completed
1984	Journal *Geofizika* began to be published
1984	Two- and three-dimensional numerical modeling of the sea started
1985	Seismological Service of the Republic of Croatia founded
1987	Observatory Zagreb-Grič taken over by the Meteorological and Hydrological Service
1998	Measurements of the ultraviolet radiation initiated
2000	Numerical mesoscale meteorological models applied for the first time
2001	First measurements of atmospheric turbulence organized
2002	Physical oceanographic measurements extended to the open Adriatic
2003	Geomagnetic research reestablished
2003	First forecasting system developed for the sea
2004	Intensive measurements of ambient seismic noise and dynamic properties of buildings organized
2005	Study of geophysics adjusted to the requirements of the Bologna Process
2005	Andrija Mohorovičić Memorial Rooms opened
2007	*Geofizika* journal indexed in the bibliographic database Web of Science (currently Web of Knowledge)
2009	First 1-s measurements of the concentrations of airborne particles with aerodynamic diameter up to 1 μm organized

date as the Head, namely in 1896, the observatory became independent institution whereupon it had different names at different times (the name Geophysical Institute stabilized after 1921).

Over the years, a variety of activities were initiated, such as the operation of the time service, geophysical tuition at the University of Zagreb, cooperation with economic entities, organization of the network of meteorological stations, operation of the seismological station in Zagreb and tide-gauge station in Bakar, geomagnetic measurements, and publication of the *Papers of the Geophysical institute in Zagreb* (Tab. 1). As the range of duties expanded, a certain number of employees together with some equipment and relevant archive were separated from the Geophysical Institute in order to form the Hydrometeorological Service (nowadays, Meteorological and Hydrological Service) in 1947. At the same time, the Geophysical Institute remained a core institution for scientific and educational work in geophysics, and also kept a number of professional assignments including the operation of the Grič Observatory. Much later, in 1987, the observatory was transferred to the Meteorological and Hydrological Service, after 125 years of continuous operation.

In 1951, Geophysical Institute joined the Faculty of Science, University of Zagreb. Nine years later its staff established the graduate study of geophysics, while in 1984 they founded the journal *Geofizika*. A year later, some of the institute employees were assigned to the newly founded Seismological Service of the Republic of Croatia. Today, the Seismological Service together with the Geophysical Institute (at the present time named the Andrija Mohorovičić Geophysical Institute) form the Department of Geophysics of the Faculty of Science, which is the only institution in Croatia providing geophysical education at all levels, from undergraduate to doctoral.

On the occasion of the 150th anniversary of the institute, the monograph entitled »*Nulla dies sine observatione – 150 Years of the Geophysical Institute in Zagreb*« (Orlić, 2011; also available at http://www.gfz.hr/amgi150/150_Geofizicki_zavod.pdf) was issued. It describes historical development of the institute and its activities, gives biographies of all scientific and teaching staff since 1861, lists former students at all levels, and offers the complete bibliography of the institute employees. Monograph also documents large oscillations in the position of the institute in a wider scientific, educational and professional community during its long and turbulent history, varying from a bare survival to the forefront of geophysical sciences.

In addition, and following an established tradition (Fig. 2), a scientific meeting devoted to the anniversary was organized, this time under the auspices of the President of the Republic of Croatia, Prof. Ivo Josipović (http://www.pmf.unizg.hr/geof/en/research/geophysical_challenges). The meeting was entitled »Geophysical Challenges of the 21st Century«, and it was held on 2 December 2011 in the Rectorate of the University of Zagreb. The meeting participants were greeted by the President of the Republic of Croatia (Fig. 3), the President of the World Meteorological Organization, Mr. David Grimes, the

Figure 2. Employees of the Geophysical Institute in Zagreb participating in the celebration of the 100th anniversary of their institution, in 1961. *Seating, from left to right:* Inga Lisac (Institute of Atmospheric Physics), Božena Volarić, Andro Gilić, Branko Maksić, Branka Penzar, Ivka Frangeš, Elza Bardić. *Standing, from left to right:* Ivo Lukšić, Marijan Kasumović, Dragutin Pavković (Institute of Atmospheric Physics), Dragutin Cvijanović, Ivan Penzar, Većeslav Bezinović, Pero Štefiček, Ivan Bogomolec, Dragutin Skoko.

Figure 3. Prof. Ivo Josipović, President of the Republic of Croatia, addressing geophysicists and their guests at the celebration of the 150th anniversary of the Geophysical Institute in Zagreb, in 2011.

Director of the Croatian Meteorological and Hydrological Service and the President of the Europe Regional Association of the World Meteorological Organization, Mr. Ivan Čačić, the Vice-rector of the University of Zagreb, Prof.

Figure 4. Present employees of the Department of Geophysics, Faculty of Science, University of Zagreb (Orlić, 2011).

Bojan Baletić, the Dean of the Faculty of Science, Prof. Amir Hamzić, and the Head of the Department of Geophysics, Prof. Zvjezdana Bencetić Klaić. After the presentation of the monograph given by Prof. Mirko Orlić, four invited eminent geophysicists gave talks on the near-future challenges regarding their fields. These were Dr. Paolo Papale (National Institute of Geophysics and Volcanology, Pisa, Italy), Dr. Philip L. Woodworth (Proudman Oceanographic Laboratory, Liverpool, UK), Prof. Peter Suhadolc (Trieste University, Trieste, Italy), and Prof. Tim Palmer (European Centre for Medium-Range Weather Forecasts, Reading, UK, and University of Oxford, Oxford, UK). Other participants presented results of their work in the poster session. More details on the presentations given can be found in the Book of Abstracts (available at http://www.pmf.unizg.hr/_download/repository/Book_of_abstracts.pdf).

The celebration enabled the present employees of the Geophysical Institute (Fig. 4) to acknowledge their predecessors for keeping the institute alive over a long and frequently challenging 150 years and to emphasize the need for maintaining the high working standards that would enable the Croatian geophysics to prosper in the future.

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