



2021.

160 godina neprekidnih mjerena na meteorološkoj postaji Zagreb-Grič

160 years of continuous measurements on Zagreb-Grič meteorological station



2021



Dragi naši korisnici, partneri i kolege,

pred vama je naš kalendar za 2021. godinu u kojoj obilježavamo 160 godina neprekidnih mjerena na meteorološkoj postaji Zagreb-Grič.

Sve je započelo 1. prosinca 1861. kada su ravnatelj Josip Torbar i profesor Ivan Stožir započeli meteorološka mjerena u fizikalnom kabinetu Kraljevske velike realke na Griču 3, a time je ujedno započeo i sustavni razvoj meteorologije u Hrvatskoj. Iako su iz zgrade iselile škole (realka i kasnije licej), u njoj je neko vrijeme bio sud, skoro čak i kasino, no meteorološka mjerena i razvoj nastavljali su se neprekidno. Mjerena su se očuvala unatoč potresima i za vrijeme ratova. Čak ni snažan potres 22. ožujka 2020. u 6 h i 24 min koji je uzdrmao Zagreb i okolicu nije zaustavio mjerena. Ipak, zgradi na Griču 3, spomeniku kulture I. kategorije, dodijeljena je oznaka – NEUPORABLJIVO i DHMZ se više ne može vratiti u svoju rodnu kuću.

Sada smo podstanari u kući slatkiša na Ravnicama 48 čiji su proizvodi zasladili mnoga djetinjstva. Lijepo uspomene iz djetinjstva i mladosti temelj su lijepoj budućnosti. Stoga u našoj budućnosti s nestavljenjem iščekujemo realizaciju projekta nove zgrade u kampusu na Borongaju.

Meteorološka se mjerena i danas obavljaju na Griču 3 - instrumenti objektivno bilježe meteorološke parametre. Trend stoljetnog temperaturnog niza postaje Zagreb-Grič, s naslovnicu ovog kalendarja, okruglo pokazuje da živimo u vrijeme klimatskih promjena.

Naš je zadatak kao struke učiniti sve da se niz mjerena nastavi, a zadatak je svih nas kao odgovornih građana učiniti sve da se trend promijeni!

Branka Ivančan-Picek
glavna ravnateljica DHMZ-a

Dear users, partners and colleagues,

This is our calendar for the year of 2021 in which we mark 160 years of continuous measurements on Zagreb-Grič meteorological station.

It all started on the 1st December 1861 when Josip Torbar, a school principle and Ivan Stožir, a professor started recording meteorological measurements in physics classroom in the Royal General Programme Secondary School at Grič 3. At that point a systematic development of meteorology in Croatia started as well. Although the schools (Royal General Programme Secondary School and later Boarding School for Girls) moved out of the building, a court and almost a casino, was there for some time. However, meteorological measurements and development continued uninterruptedly. Measurements continued despite earthquakes and during the wars. Even when the strong earthquake hit Zagreb and its surroundings on the 22nd March 2020 at 6:24 the measurements did not stop. However, the building at Grič 3, which is a cultural heritage monument of the 1st category, was given a sign UNUSABLE and DHMZ could not go back to its home.

Currently, we are tenants in "the house of sweets" at Ravnice 48, whose products sweetened up many people's childhood. Nice memories of childhood and youth are a ground for the better future. Now, we are waiting impatiently for the project of our new building at Borongaj to be carried out.

Meteorological measurements are still being recorded at Grič 3 - the instruments still mark objective meteorological parameters. The trend of a hundred-year series of Zagreb-Grič station, which is on a cover of this calendar, cruelly shows that we live at the time of climate change.

It is our task to do everything in our power to continue with the measurements. However, it is a task of all of us responsible citizens to do everything we can to change that trend!

Branka Ivančan-Picek
Director-General

160 godina postaje Zagreb-Grič

Meteorološka mjerena u zgradi na Griču 3 započela su 1. prosinca 1861. godine u fizikalnom kabinetu zahvaljujući entuzijazmu dvaju prirodoslovaca, ravnatelja Kraljevske velike realke Josipa Torbara i profesora fizike Ivana Stožira.

S obzirom na to da su 1859. prestala meteorološka mjerena na prvom katu Klasične gimnazije na Katarininom trgu, ravnatelj Torbar dogovorio se s ravnateljem Klasične gimnazije Josipom Premrušem o preseljenju meteoroloških instrumenata u zgradu Kraljevske velike realke na Griču. Profesor Ivan Stožir pak preuzeo je na sebe motrenja i upisan je u meteorološku povijest kao prvi grički motritelj. On je 30 godina vodio brigu o meteorološkoj postaji Zagreb-Grič i razvio je do opservatorija.

Od 1865. godine meteorološki podaci s Griča počinju se slati u Beč. Zaslugom profesora Stožira postaja se oprema sa sve više instrumenata. Tako se od 1880. godine na njoj nalaze autografi za neprekidno praćenje temperature, tlaka, smjera i brzine vjetra, a profesor Stožir uveo je i mjerena ozona. Svojim radom stvorio je temelje za tadašnji Kraljevski opservatorij iz kojeg je nastao Geofizički zavod, a iz kojeg se poslije II. svjetskog rata (27. kolovoza 1947.) izdvajila Uprava hidrometeorološke službe. Uprava je ubrzo promijenila naziv u Republički hidrometeorološki zavod, a u novoj hrvatskoj državi prelazi u nacionalnu meteorološku i hidrološku službu pod nazivom - Državni hidrometeorološki zavod.

Na 70. sjednici izvršnog vijeća Svjetske meteorološke organizacije (WMO) održanoj u Ženevi od 20. do 29. srpnja 2019. meteorološka postaja Zagreb-Grič dobila je status stoljetne postaje WMO.

Neprekidni meteorološki niz s opservatorijem Grič čini jednu od najvjrednijih riznica meteoroloških podataka u svijetu i jedan je od najhomogenijih nizova u Europi jer od početka mjerena nije bilo prekida motrenja, promjene mesta postaje, ni bitnih promjena u okolini postaje.

160 years of Zagreb-Grič meteorological station

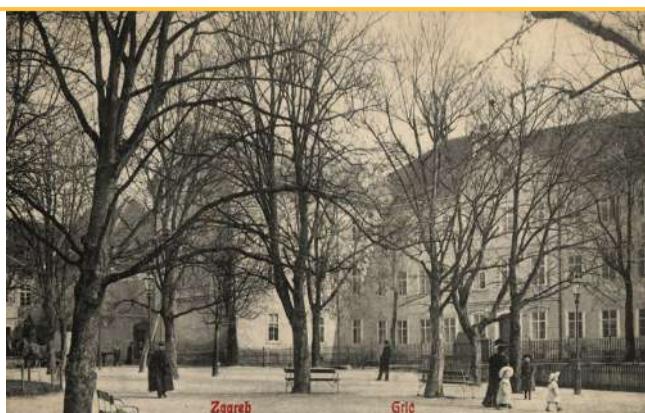
Meteorological measurements started at Grič 3 on 1st December 1861 in the physics classroom thanks to the enthusiasm of two natural scientists, the principle of the Gymnasium Josip Torbar and professor of physics Ivan Stožir.

As the meteorological measurements stopped in 1859 on the first floor of Classical Gymnasium on St. Catherine's square, principle Torbar had an agreement with Josip Premruš, the principle of the Classical Gymnasium to move the meteorological instruments into the building of the Royal Gymnasium at Grič. Moreover, professor Ivan Stožir started recording the measurements and thus became the first observer at Grič. He had taken care of Zagreb-Grič meteorological station for 30 years and made it into an observatory.

Since 1865 meteorological data from Grič had been sent to Vienna. To his credit, professor Stožir equipped the station with many instruments. What's more, since 1880 autographs have been continuously measuring the temperature, air pressure, direction and wind speed. Also, professor Stožir initiated the ozone measurements as well. Thus he laid the foundation for the Royal Observatory which developed into Geophysical Institute. Later, after WWII in 1947 the board of directors of hydrometeorological service separated from the Institute and soon they changed its name into Republički meteorološki zavod. When the new Croatian state was formed, it became a national meteorological and hydrological service and was given the name of Croatian Meteorological and Hydrological Service.

On the 70th session of the Executive Council of the World Meteorological Organization, which was held from 20 to 29 July 2019 in Geneva, Zagreb-Grič meteorological station was recognized the status of a Centennial Observing Station by WMO.

The uninterrupted meteorological series on Grič Observatory is one the most valuable treasures of meteorological data in the world and it is one the most homogeneous series in Europe because there have not been any interruptions in monitoring, the station did not change its place nor were there any important changes in the surrounding area.





Snježno kraljevstvo / Frozen, Jarunsko jezero, ©Zrinka Lovrić

SIJEČANJ / JANUARY 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 0,6 |
| | Apsolutni maksimum / Abs. maximum (°C) | 19,0 7.1.2001. |
| | Apsolutni minimum / Abs. minimum (°C) | -22,2 24.1.1942. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 64,0 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 50,7 |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 54 15.1.2013. |



Hrvatski geofizičar svjetskog glasa **Andrija Mohorovičić** (Volosko, 23. siječnja 1857. – Zagreb, 18. prosinca 1936). za svojim radnim stolom u zgradbi na Griču 3 u kojoj je i došao do svog eponalnog otkrića diskontinuiteta - granice između Zemljine kore i plasti (Moho-sloj).

Andrija Mohorovičić, a world-famous Croatian geophysicist (Volosko, 23rd January 1857 – Zagreb, 18th December 1936) at his desk in the building at Grič 3 where he discovered the epochal discontinuity between the Earth's crust and the mantle in the Earth's interior (Moho).

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 28 | 29 | 30 | 31 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |



Zlatni zalazak / Golden Sunset, Lokvarsko jezero, ©Goran Grudić

VELJAČA / FEBRUARY 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|--------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 2,7 |
| | Apsolutni maksimum / Abs. maximum (°C) | 21,6 16. 2. 1998. |
| | Apsolutni minimum / Abs. minimum (°C) | -21,7 15. 2. 1940. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 97,4 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 46,7 |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 84 28. 2. 1895. |



Prvi grički motritelj **Ivan Stožir** (Rožna Dolina, 12. travnja 1834. – Zagreb, 12. veljače 1908.) na slici s bugarskim meteorologom i zagrebačkim dakovom Spasom Vacovim i Andrijom Mohorovičićem početkom 20. stoljeća.

The photo shows **Ivan Stožir** (Rožna Dolina, 12th April 1834 – Zagreb, 12th February 1908), the first observer at Grič, with a Bulgarian meteorologist and a Zagreb student Spaso Vacov and Andrija Mohorovičić at the beginning of the 20th century.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |



Baranjska polja / Baranja Fields, Baranja, ©Ivan Ranogajec

OŽUJAK / MARCH 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|-------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 7,2 |
| | Apsolutni maksimum / Abs. maximum (°C) | 26,1 31. 3. 1989. |
| | Apsolutni minimum / Abs. minimum (°C) | -17,0 5. 3. 1888. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 143,9 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 55,0 |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 82 1. 3. 1895. |



U hladno nedjeljno jutro 22. ožujka 2020. u 6 h 24 min snažan potres uzdrmao glavni grad Hrvatske i okolicu, a zgradi na Griču 3, spomeniku kulture I. kategorije, dodijeljena je oznaka – NEUPORABLJIVO.

On a cold Sunday morning of 22nd March 2020 at 6:24 a strong earthquake struck the capital of Croatia and the surrounding area. The building at Grič 3, which is a cultural heritage monument of the 1st category, was given a sign UNUSABLE.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|--------------------------------------|---|-----------|-----------|-----------|-----------|-----------|
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Svjetski dan voda World Water Day | Svjetski meteorološki dan World Meteorological Day | | | | | |
| 29 | 30 | 31 | 1 | 2 | 3 | 4 |



Oblak u zrcalu vode / Mirror Clouds, Prelog, ©Miroslava Novak Hranjec

TRAVANJ / APRIL 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | | Datum / Date |
|-----------------------------------|--|-------|--------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 12,0 | |
| | Apsolutni maksimum / Abs. maximum (°C) | 29,8 | 29. 4. 2012. |
| | Apsolutni minimum / Abs. minimum (°C) | -1,9 | 6. 4. 1929. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 175,6 | |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 65,7 | |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 9 | 14. 4. 1996. |



Ravnatelj realke i vrstan promicatelj meteorologije
Josip Torbar (Krašić kraj Jastrebarskoga, 1. travnja 1824. – Zagreb, 26. srpnja 1900.) čijom je zaslugom započela s radom meteorološka postaja na Griču 3.

Josip Torbar, a principle of the Royal Gymnasium and an accomplished promoter of meteorology (Krašić near Jastrebarsko, 1st April 1824 - Zagreb, 26th July 1900). Owing to his merit, the meteorological station began working.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 29 | 30 | 31 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |

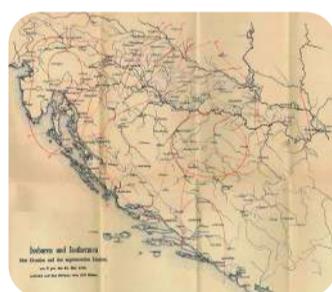


Makovi / Poppies in Spring, Zagreb, ©Kristina Jelenčić

SVIBANJ / MAY 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|-------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 16,5 |
| | Apsolutni maksimum / Abs. maximum (°C) | 33,4 27. 5. 2008. |
| | Apsolutni minimum / Abs. minimum (°C) | 0,5 11. 5. 1953. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 223,0 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 82,3 |



Prva **sinoptička karta** tiskana za područje Hrvatske i okolnih zemalja. Izradio ju je Andrija Mohorovičić za 31. svibnja 1892. u 14 h istražujući tornado kod Novske.

The first **synoptic chart** printed for the area of Croatia and the surrounding countries. It was made by Andrija Mohorovičić when he was doing research on a tornado near Novska on 31st May 1892.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 26 | 27 | 28 | 29 | 30 | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 1 | 2 | 3 | 4 | 5 | 6 |



Prekrasan kumulonimbus / Beautiful Cumulonimbus, Drage, ©Šime Barešić

LIPANJ / JUNE 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|-------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 19,8 |
| | Apsolutni maksimum / Abs. maximum (°C) | 37,0 28. 6. 1935. |
| | Apsolutni minimum / Abs. minimum (°C) | 4,6 3. 6. 1928. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 244,3 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 95,7 |



Šetalište Grič sa starom zgradom realke 1862. Akvarelirani crtež Josipa Svobode, daka škole.

The Grič promenade with the old school building in 1862.
A watercolour painting was done by a school student Josip Svoboda.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 31 | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |



Periskop / Periscope, Orahovica, ©Goran Gašparac

SRPANJ / JULY 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

Datum / Date

| | | | |
|-----------------------------------|--|-------|--------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 21,9 | |
| | Apsolutni maksimum / Abs. maximum (°C) | 40,3 | 5. 7. 1950. |
| | Apsolutni minimum / Abs. minimum (°C) | 7,3 | 11. 7. 1948. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 280,3 | |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 83,0 | |



Akvarel Slave Raškaj koji prikazuje zgradu realke na Griču 3 nakon dogradnje. Na krovu je vidljiv anemograf, a na drugom katu na lijevom prozoru top koji je pucnjem označavao podne. Meteorološka postaja je od 1877. obavještavala javnost i o točnom vremenu pucnjem iz topa.

A watercolour painting by Slava Raškaj shows the building of the Gymnasium at Grič 3 after it was rebuilt. An anemograph can be seen on the roof, and on the left window on the second floor there is a cannon which marks the noon when fired. Ever since 1877 the meteorological station was announcing the exact time to its residents by firing the cannon at midday.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 28 | 29 | 30 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |



Nasukani brod / A Stranded Boat, Split, ©Damir Borčić

KOLOVOZ / AUGUST 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 21,2 |
| | Apsolutni maksimum / Abs. maximum (°C) | 38,8 8. 8. 2013. |
| | Apsolutni minimum / Abs. minimum (°C) | 7,3 22. 8. 1894. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 265,4 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 83,4 |



Uredba Vlade NR Hrvatske o osnivanju Uprave hidrometeorološke službe (Službeni list, danas NN, br. 77 od 27. kolovoza 1947), današnjeg Državnog hidrometeorološkog zavoda.

The regulation of PR of Croatia about the establishment of Hydrometeorological administration (Official journal, today Official Gazette, No. 77 of 27th August 1947), which is Croatian Meteorological and Hydrological Service today.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 26 | 27 | 28 | 29 | 30 | 31 | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | 1 | 2 | 3 | 4 | 5 |



Pijavica / Waterspout, otok Lošinj, ©Sandro Puncet

RUJAN / SEPTEMBER 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 17,2 |
| | Apsolutni maksimum / Abs. maximum (°C) | 34,2 7. 9. 1946. |
| | Apsolutni minimum / Abs. minimum (°C) | 2,3 27. 9. 1889. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 192,7 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 86,4 |



Nakon iseljenja kraljevske realke 1895. u zgradu na Griču 3 je do 1913. godine bio smješten Ženski licej.

After the Royal Gymnasium moved out of the building at Grič 3 in 1895, Boarding School for Girls remained there until 1913.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 30 | 31 | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |



Trenutak / A Moment, Ivanec, ©Branko Težak

LISTOPAD / OCTOBER 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | Datum / Date |
|-----------------------------------|--|--------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 11,9 |
| | Apsolutni maksimum / Abs. maximum (°C) | 27,6 23. 10. 1971. |
| | Apsolutni minimum / Abs. minimum (°C) | -6,0 30. 10. 1920. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 133,1 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 90,5 |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 2 15. 10. 1925. |



Univerzalni geofizičar **Josip Goldberg** (Sarajevo, 18. veljače 1885. – Zagreb, 15. listopad 1960.) bio je i motritelj na postaji Zagreb Grič (1927. – 1955.), utemeljitelj je studija geofizike (1948.) te je bio predstojnik Geofizičkog zavoda (1951. – 1955.) na Griču 3.

Josip Goldberg, a universal geophysicist (Sarajevo, 18th February 1885 – Zagreb, 15 October 1960) and an observer on Zagreb-Grič station (1927 – 1955). He also established a study of geophysics (1948) and was a head of the Department of Geophysics.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 27 | 28 | 29 | 30 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |



Dvostruki vrtlozi / Twin Vortexes, Dubrovnik, ©Mislav Bilić

STUDENI / NOVEMBER 2021.

Srednje mjesecne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1862. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1862 – 2019

| | | | Datum / Date |
|-----------------------------------|--|------|---------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 6,5 | |
| | Apsolutni maksimum / Abs. maximum (°C) | 25,0 | 16. 11. 1963. |
| | Apsolutni minimum / Abs. minimum (°C) | -9,7 | 27. 11. 1884. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 68,4 | |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 83,5 | |
| | Maksimalna visina snijega / Max. Snow Cower (cm) | 47 | 30. 11. 1993. |



Na pročelju zgrade prema Strossmayerovom šetalištu 1. prosinca 2001. svečano je otkrivena spomen-ploča prigodom obilježavanja **140. obljetnice** početka rada Opservatorija Zagreb-Grič.

On the façade of the building facing the Strossmayer promenade the commemorative plaque was uncovered on 1st December 2001 to mark the **140th anniversary** of the beginning of the Zagreb-Grič Observatory.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 1 | 2 | 3 | 4 | 5 |



Vlak u snijegu / Train in the Snow, Zagreb, ©Marijan Forgač

PROSINAC / DECEMBER 2021.

Srednje mjesечne vrijednosti i ekstremi za Zagreb-Grič u razdoblju 1861. – 2019.
Monthly values and extremes for Zagreb-Grič in the period 1861 – 2019

| | | Datum / Date |
|-----------------------------------|--|---------------------|
| Temperatura / Air temperature | Srednja / Mean (°C) | 2,1 |
| | Apsolutni maksimum / Abs. maximum (°C) | 21,5 17. 12. 1989. |
| | Apsolutni minimum / Abs. minimum (°C) | -18,7 22. 12. 1927. |
| Osunčavanje / Insolation duration | Srednja suma / Mean duration (h) | 51,2 |
| Oborina / Precipitation | Količina / Total precipitation (mm) | 63,6 |
| | Maksimalna visina snijega / Max. Snow Cover (cm) | 53 29. 12. 1906. |



Kako bi se naglasio kontinuitet niza s postaje Zagreb Grič monografija povodom 150. obljetnice Geofizičkog zavoda i postaje na Griču 3 dobila je naziv Nulla dies sine observatione.

In order to emphasize the continuity of uninterrupted series of Zagreb-Grič Observatory a monograph entitled Nulla dies sine observatione was issued to mark the 150th anniversary of both the Department of Geophysics and the station at Grič 3.

| PON / MON | UTO / TUE | SRI / WED | ČET / THU | PET / FRI | SUB / SAT | NED / SUN |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 29 | 30 | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Grički vremeplov – od kapucina do geofizičara

Izgradnja i namjene zgrade

Na zagrebačkom Gornjem gradu na prostoru današnjeg parka i zgrade na Griču 3 bio je kapucinski samostan, crkva, groblje i vrt.

Nakon ukinuća kapucinskog reda (1788.) objekti propadaju te se zajedno sa zemljištem rasprodaju početkom 19. st. Plemić Ludovik Jelatić, profesor na zagrebačkoj Akademiji, ruši kapelicu i gradi palaču čiji je graditelj bio Bartol Felbinger. Palača je dovršena 1826., a suvremenici ju smatraju ukrasom grada. U pristorije prema Strossmayerovom šetalištu, Jelačić je želio smjestiti casino.

Grad otkupljuje palaču 1857. i u njoj smješta kraljevsku realku, u kojoj 1861. ravnatelj Torbar i profesor Stožir započinju meteorološka mjerena. (Povijesni pregled meteoroloških mjerena na Griču 3 dan je na trećoj stranici kalendara.)

Kada se 1864. godine podižu katovi na južnom dijelu, zgrada počinje poprimati današnji izgled. U prizemlju južnog dijela bila je kavana, a nakon što je realka presečila 1895. služila je ženskom liceju i sudovima.

Moho-sloj otkriven je na Griču 3

Uzgradi na Griču 3 je Andrija Mohorovičić, jedan od najvećih hrvatskih znanstvenika, otkorio diskontinuitet – granicu između Zemljine kore i plasti (Moho-sloj), najveću prirodnu tvorevinu na Zemlju.

Mohorovičić je na vlastit u molbu 1891. iz nautičke škole u Bakru premeđen na realku u Zagrebu i 1. siječnja 1892. postao je upraviteljem Meteorološkog opservatorija na Griču. Godine 1901. sve postaje na području banske uprave stavljene su pod nadzor Meteorološkog opservatorija Zagreb-Grič, a Mohorovičić počinje provoditi kontrolu podataka i pripremati ih za objavljivanje te motriteljima daje sljedeći naputak: „*Tko si tu moralna dužnost, preuzeće, da nešto bilježi, neka to iši u redu bilježi ili uopće neka ne bilježi. Bolje je ništa nego loše.*“

U natoč posvećenosti razvoju i unapređenju meteorološkog opservatorija i službe te svog znanstvenog i stručnog rada u meteorologiji, Mohorovičićev znanstveni interes sve se više okreće seismologiji. Pri analizi pokupskog potresa od 8. listopada 1909. Mohorovičić je na osnovi valova potresa otkrio platu diskontinuiteta brzina, koja odjeljuje koru od plasti Zemlje. Plata je njemu u čast nazvana Mohorovičićevim diskontinuitetom.

Zbog značaja Mohorovičićevog postignuća Europsko fizikalno društvo odlučilo je početkom 2020. zgradu na Griču 3 proglašiti

Povijesnim mjestom Europskog fizikalnog društva.

Odlazak i opstanak na Griču 3

Od uspostave meteorološke postaje 1861. do razvoja Geofizičkog zavoda, Geofizičkog odsjeka PMF-a Sreucilišta u Zagrebu, Seismološke službe Hrvatske i DHMZ-a mnogo je zasluznih imena čiji su rad i zrajanje utkani u našu geofizičku povijest.

Osmadeset godina 20. st. Geofizički zavod, Geofizički odsjek i Seismološka služba odselili su na Horvatovac, dok je DHMZ-u Grič 3 bio stalna adresa od osnutka 27. kolovoza 1947. do 22. ožujka 2020. u 6 h 24 min kada je snazan potres uzdrmao glavni grad Hrvatske i okolicu. Mnogi meteorolozi, neki još i danas aktivni, kročili su u zgradu na Griču 3 još kao studenti Geofizičkog odsjeka, a nakon diplome zaposili su se na istoj adresi u DHMZ-u. I njihove su uspomene zauvijek uzdrmane u hladno nedjeljno jutro 22. ožujka 2020. Uz zgradu su u vrijeme potresa bili dežurni djelatnici – prognošćari, meteorološki motritelj, meteorološki tehničar i informaticar. Srećom, svi su naši siguran zaklon. Sa zgradom su pali reljefi, dimnjaci i dijelovi fasade ... urušio se krov, pali su dijelovi stropa na stoljeve, popadali ormari s arhivama... Iz sigurnosnih razloga motritelj na glavnoj postaji Zagreb-Grič više ne smije ući u zgradu, no nastavlja svoj rad u dvorištu. Cijelo vrijeme mijenjaju temperature zraka, relativne vlažnosti zraka, tlaka zraka te smjera i brzine vjetra, kontinuirano se mijere automatskim meteorološkim sustavom te je kontinuitet niza očuvan.

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Grič time machine - from the Capuchins to geophysicists

The building and its purpose

In the Upper Town of Zagreb on the area of today's park and on the building at Grič 3 there used to be a Capuchin monastery, a church, a cemetery and a garden. After the Capuchin order was dissolved (1788), the buildings deteriorated and were sold together with the land at the beginning of the 19th century. Ludovik Jelačić, the nobleman and the professor at Zagreb Academy, pulled down the chapel and built a palace, which was constructed by Bartol Felbinger. The palace was completed in 1826 and was considered the city's ornament. Moreover, Jelačić wanted to open a casino in the rooms facing the Strossmayer promenade. In 1857 the city bought the palace and gave it to the Royal Gymnasium where principle Torbar and professor Stožir started recording meteorological measurements. (The historical overview of meteorological measurements at Grič 3 is given on the 3rd page of this calendar) Then, in 1864 the floors were added to the southern part of the building and it started getting its today's appearance. On the ground floor of the southern part of the building there used to be a café, and after the Gymnasium moved out in 1895, a Boarding School for Girls and courts moved in.

The Moho discovered at Grič 3

Working in the building at Grič 3 Andrija Mohorovičić, one of the greatest Croatian scientists, discovered the discontinuity – the boundary between the Earth's crust and the mantle (Moho-layer), which is the biggest natural creation on Earth. Mohorovičić was transferred from a Nautical School in Bakar to the Royal Gymnasium in Zagreb in 1891 at his own request, and on 1st January 1892 he became a director of Meteorological Observatory at Grič. Then, in 1901 all the stations in the area of ban administration were put under the supervision of Meteorological Observatory Zagreb-Grič and director Mohorovičić immediately undertook the control of the data and prepared them to be published. He also gave observers the following instruction: "The one who undertakes this moral duty, to make notes, may he make the notes regularly or may he not make ones at all. It is better not to record anything than record it badly." Despite being dedicated to the development and the improvement of meteorological observatory and the service, as well as his scientific and professional work in meteorology, Mohorovičić began to be more oriented to seismology. While analyzing the Kupa Valley earthquake of 8th October 1909, and on the basis of seismic waves Mohorovičić discovered the surface of discontinuity of the velocities, especially the one which divides the Earth's crust from the mantle. So, the surface was named Mohorovičić discontinuity in his honour.

At the beginning of the year of 2020 the European Physical Society decided to proclaim the building at Grič 3 an EPS Historic Site due to Mohorovičić's achievements.

Departure and the survival at Grič 3

There are many people's names whose work and knowledge have been woven into our geophysical history since meteorological station was established in 1861 until the development of Geophysical Institute, the Department of Geophysics at the Faculty of Science, the Seismological Survey of Croatia and Croatian Meteorological and Hydrological Service. In the 1980s Geophysical Institute, the Department of Geophysics and the Seismological Survey moved to Horvatovac, while DHMZ remained at its address ever since it was established on 27 August 1947 until the 22nd March 2020, when a strong earthquake struck the capital of Croatia and the surrounding area.

Many meteorologists, of which some are still active today, stepped into the building at Grič 3 when they were students at the Department of Geophysics, and after they obtained their degree they were employed at the same address by DHMZ. Their memories were also shaken up on a cold Sunday morning of 22 March 2020. The members of staff who were on duty that day, such as forecasters, a meteorological observer, a meteorological technician and an IT technician, were all in the building during the earthquake. Luckily, they all found a secure shelter. However, the sculptures, chimneys and parts of the facade fell off the building... The roof collapsed, parts of the ceiling fell on the desks, the cupboards with the archives fell over...

The observer still cannot enter the building because of the security reasons. However, he continues with his work in the backyard. Also, throughout the whole time the measurements of air temperature, relative humidity, air pressure as well as wind direction and speed have been continuously recorded by an automatic meteorological system and so the continuity of series has been preserved.