

Idős és fiatal vizek a Mórágyi Gránit környezetében

Palcsu László

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²Isotoptech Zrt.

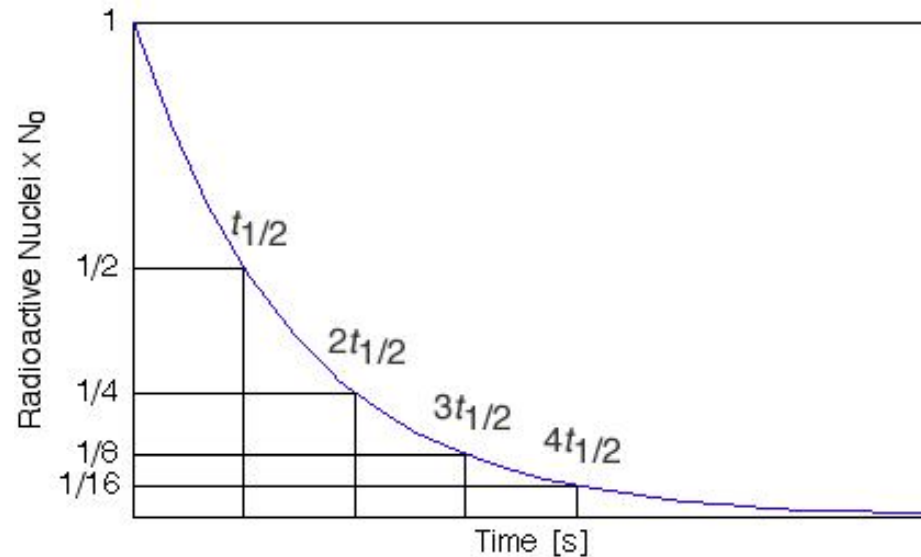
IZOTÓÓÓÓÓÓP

Atomfajta
Stabil
Radioaktív

Emberfajta
Nő
Férfi

Vizek korolása izotópokkal (és egyéb nyomjelzőkkel)

Bomlástörvény

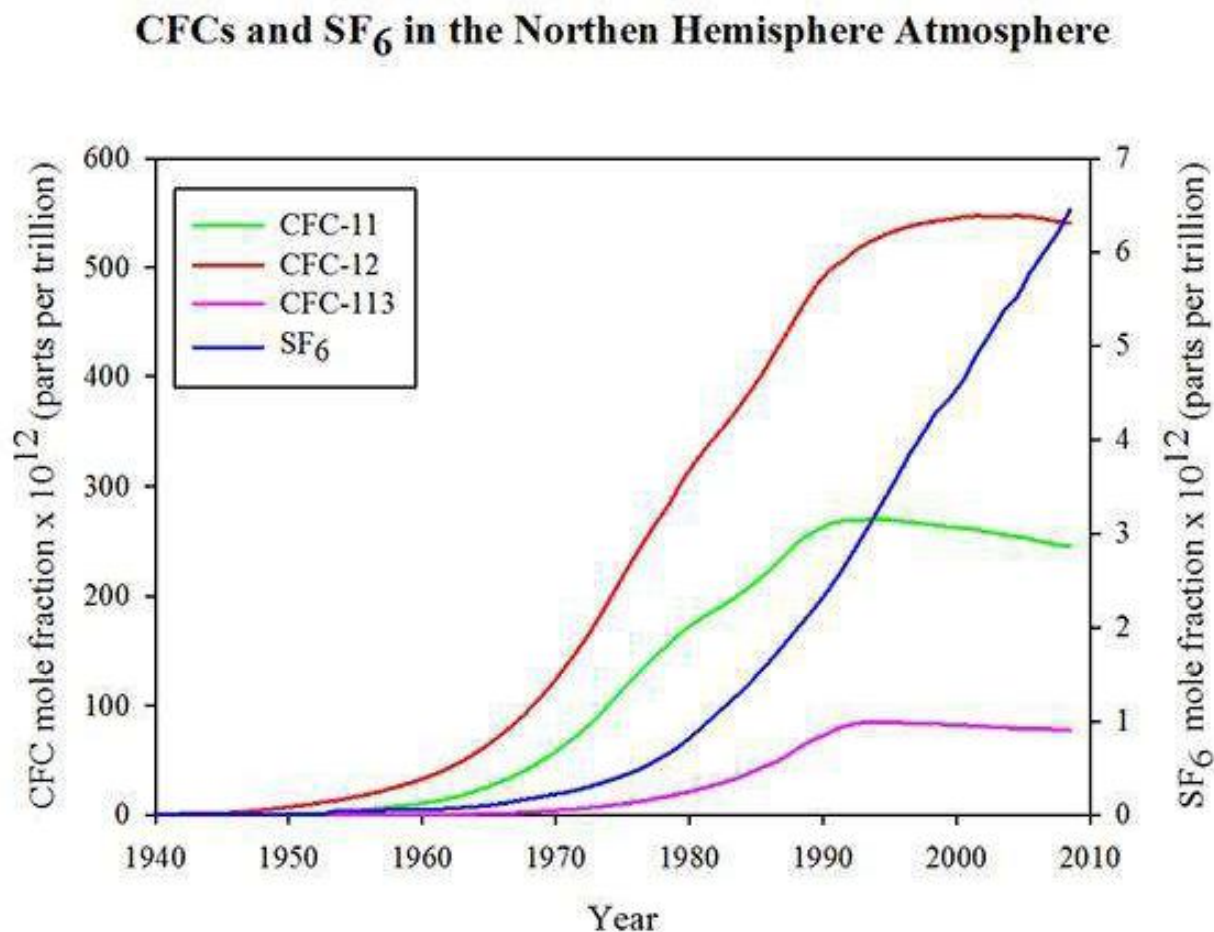


$$A_{\text{mother}}(t) = A_0 \cdot e^{-\lambda \cdot t}$$

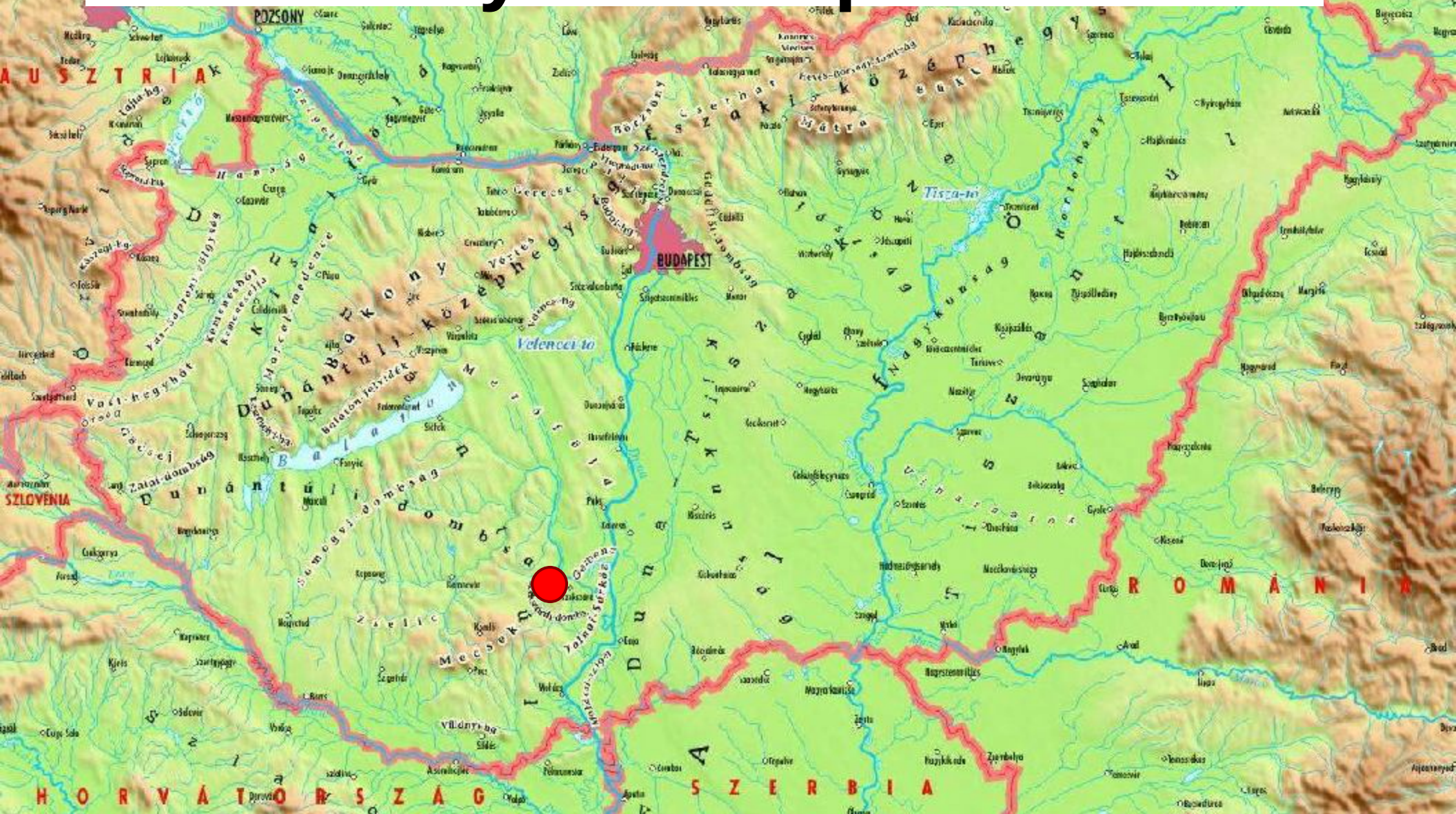
$$A_{\text{daughter}}(t) = A_0 \cdot (1 - e^{-\lambda \cdot t})$$

Vizek korolása izotópokkal (és egyéb nyomjelzőkkel)

Időben változó koncentrációk



Forrásvizek és a gránit töredezett zónáiban lévő vizek korviszonyai Bátaapáti mellett



Még amikor Üveghutának neveztük

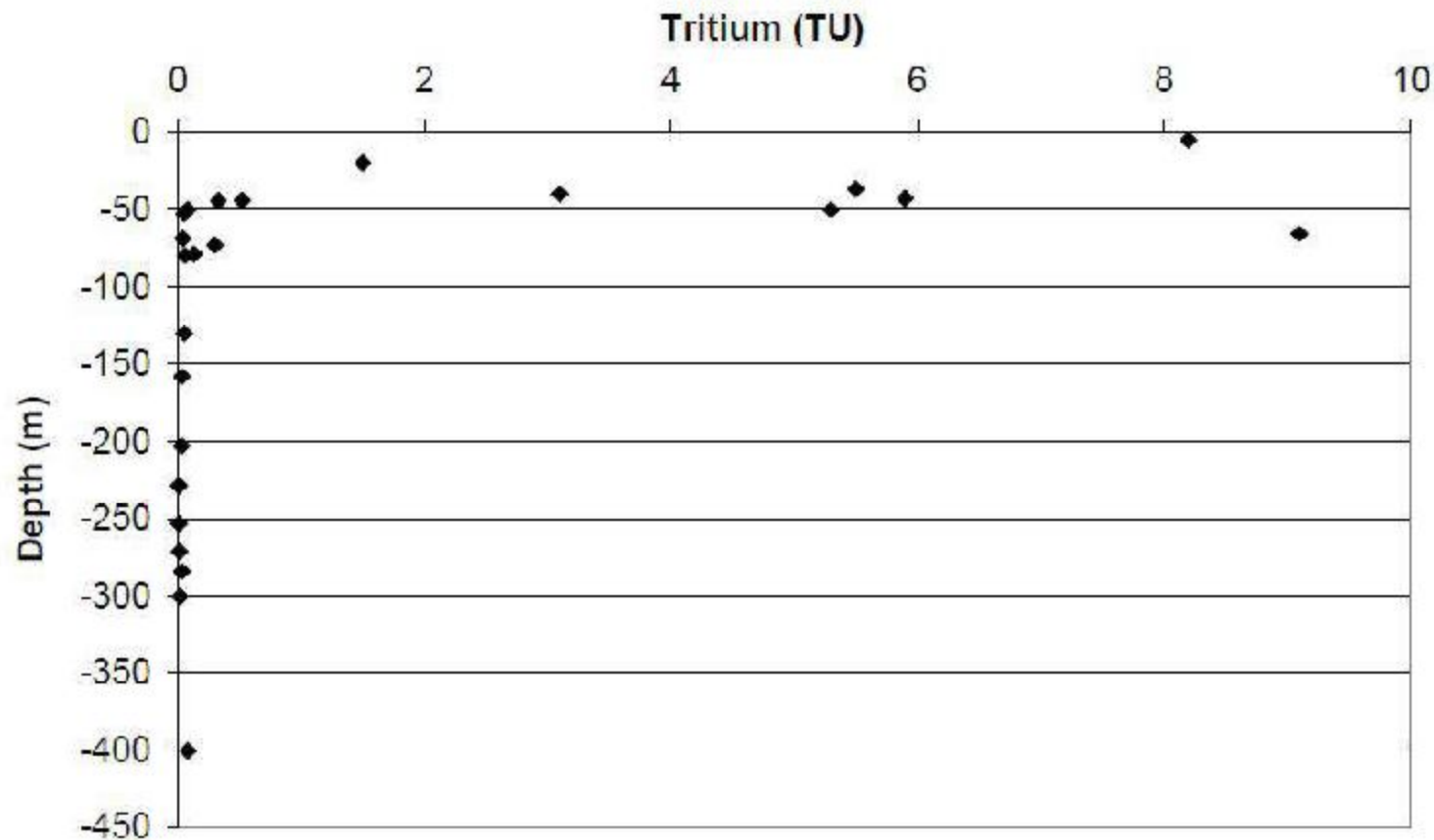
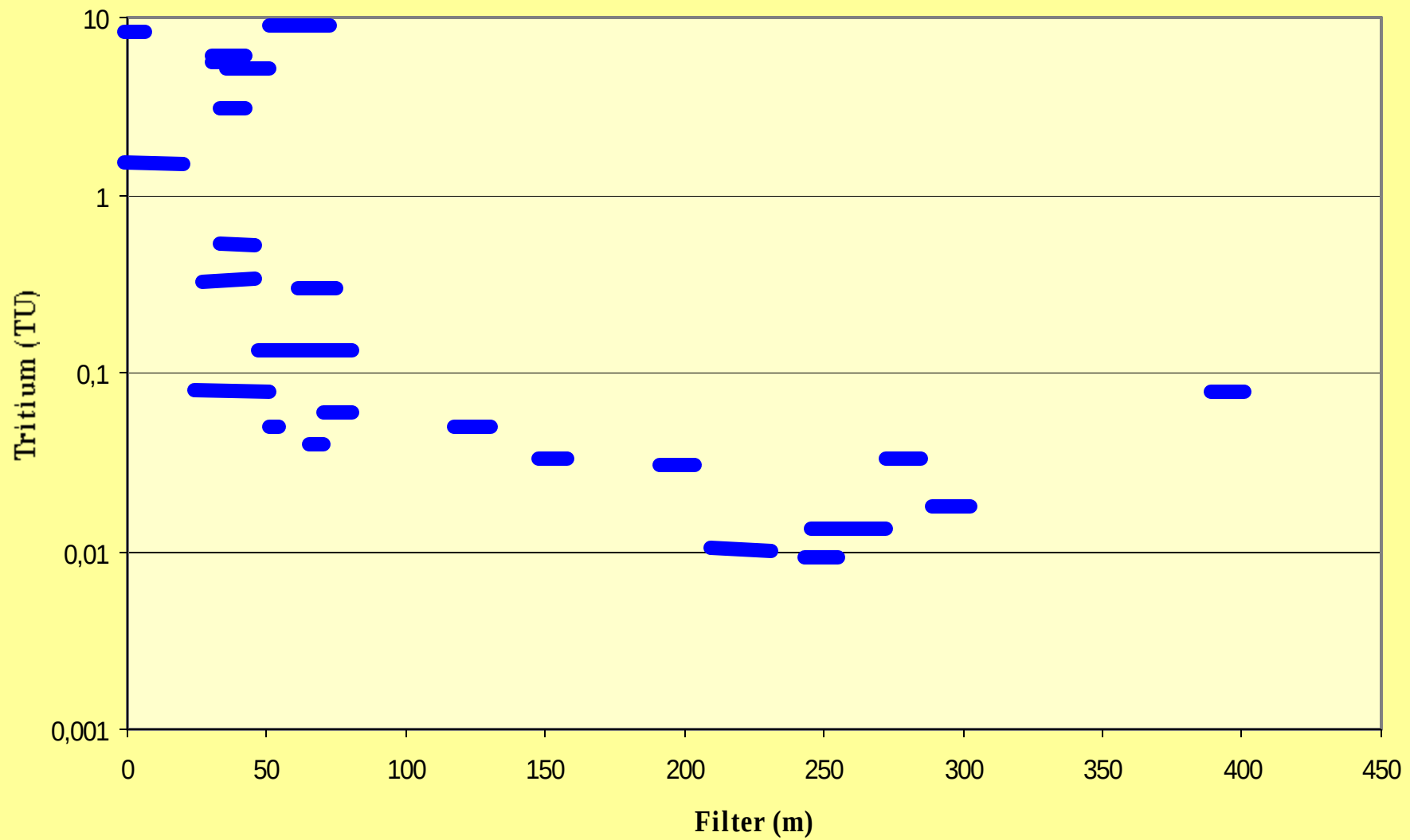
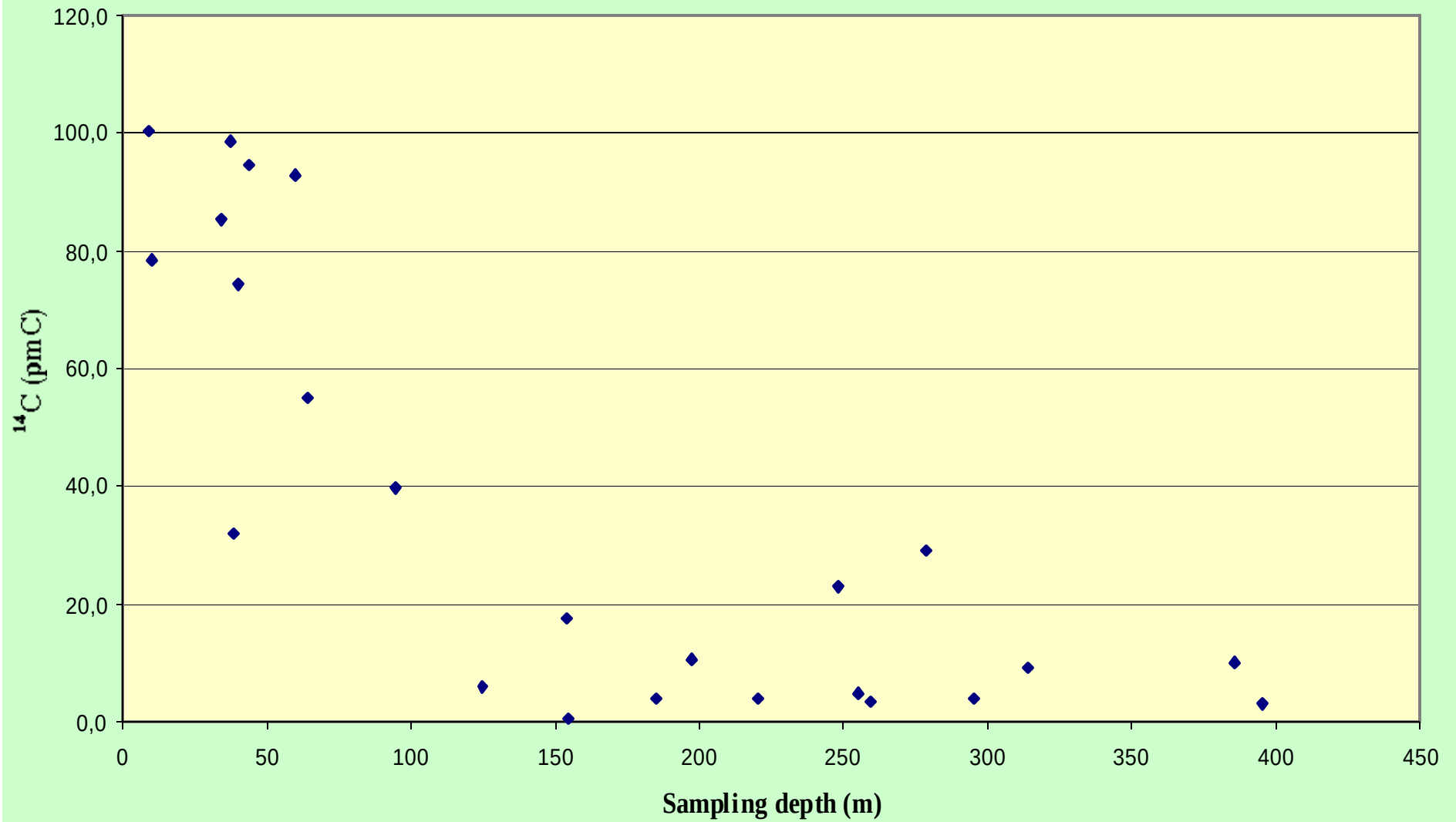


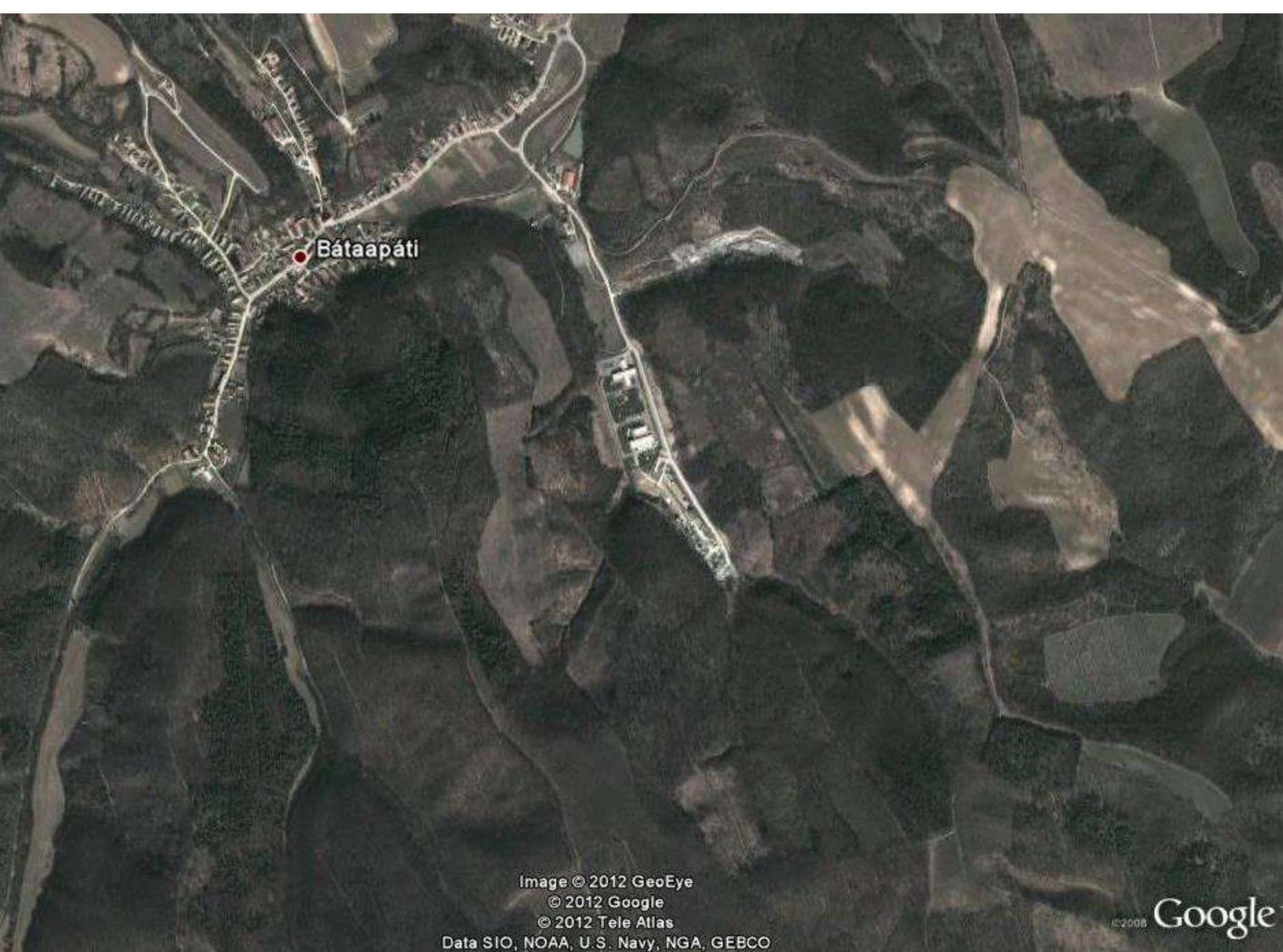
Fig. 3. Tritium concentration of groundwater samples plotted against sampling depth

Tritium content of water samples in function of the filter depth



Relationship between the ^{14}C and the depht





● Bátaapáti

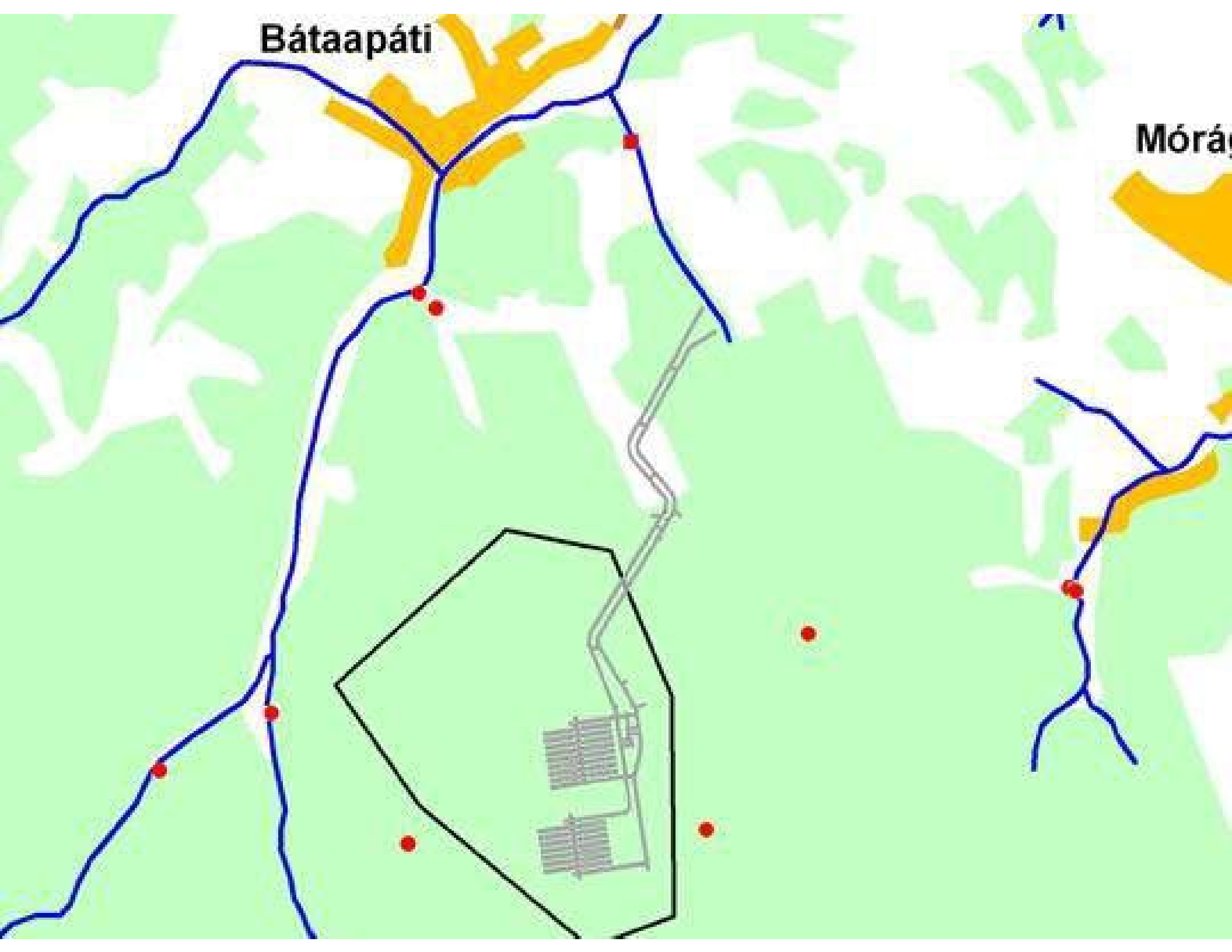
Image © 2012 GeoEye
© 2012 Google
© 2012 Tele Atlas
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

© 2008 Google

6° N 18°36'34.89" E

Mar 7, 2012

Eye alt 2.86 km

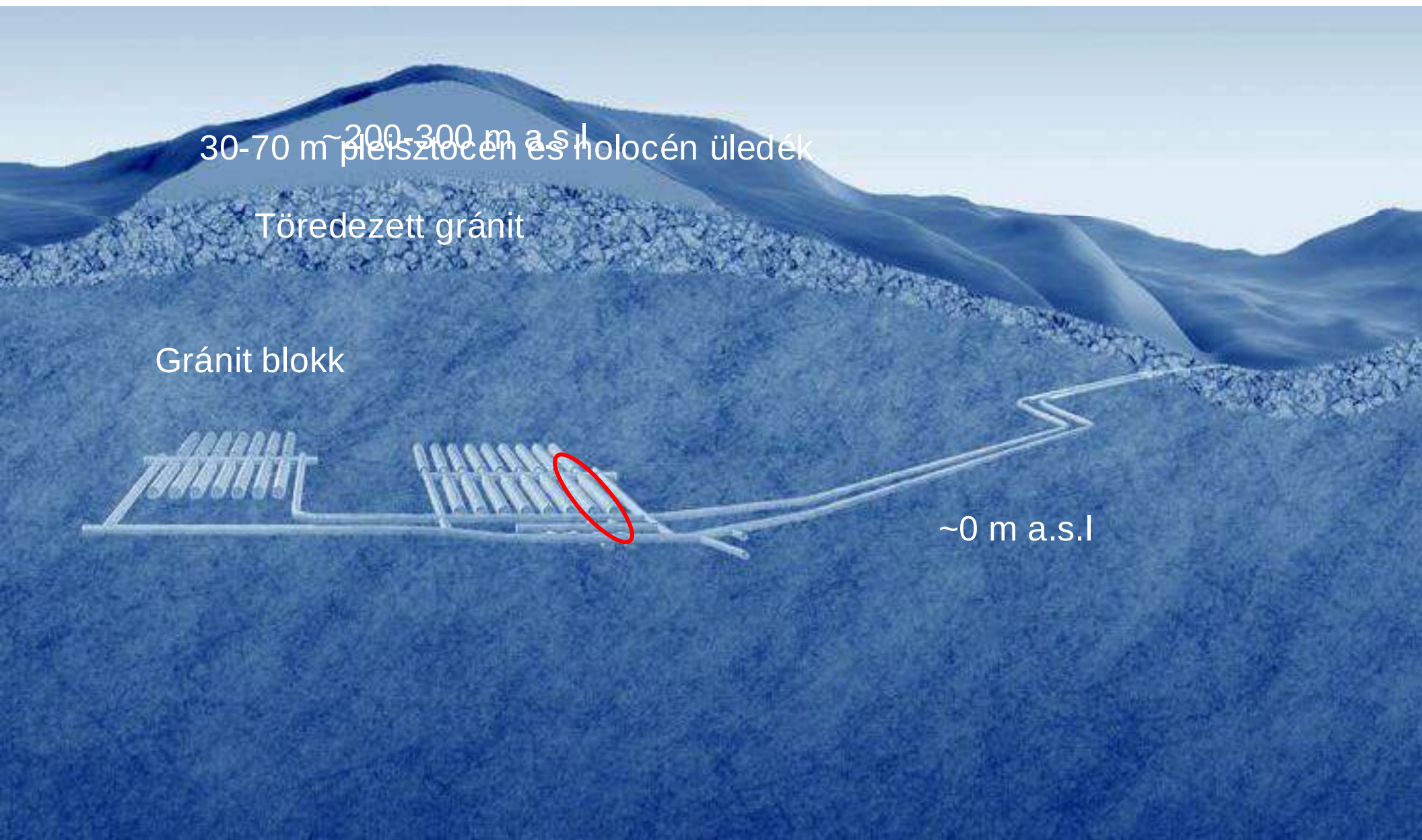


30-70 m pleisztocén és holocén üledék

Töredezett gránit

Gránit blokk

~0 m a.s.l

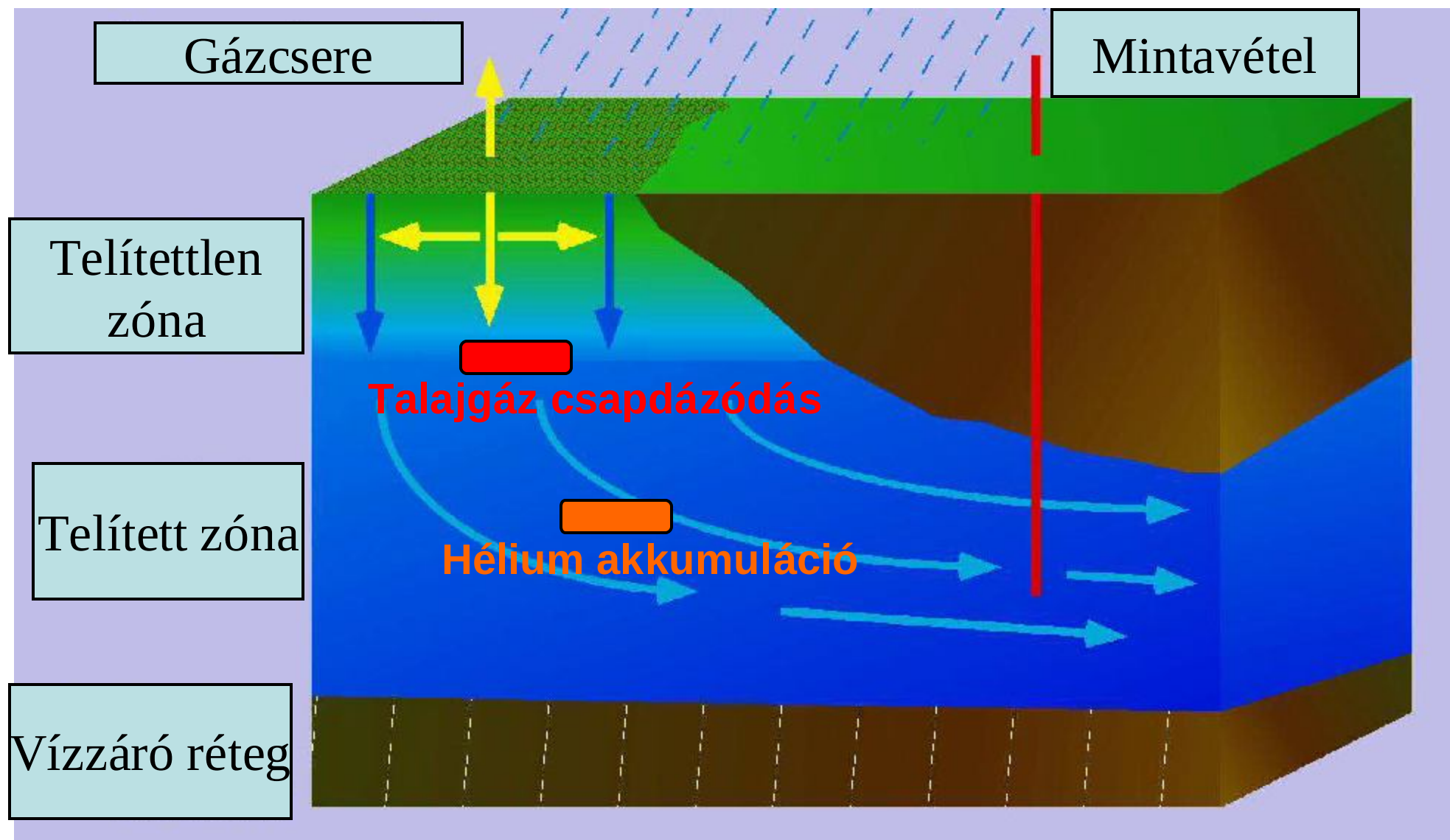




Forrásvizek átlagos tartózkodási idejének meghatározása (természetes nyomjelzők segítségével)



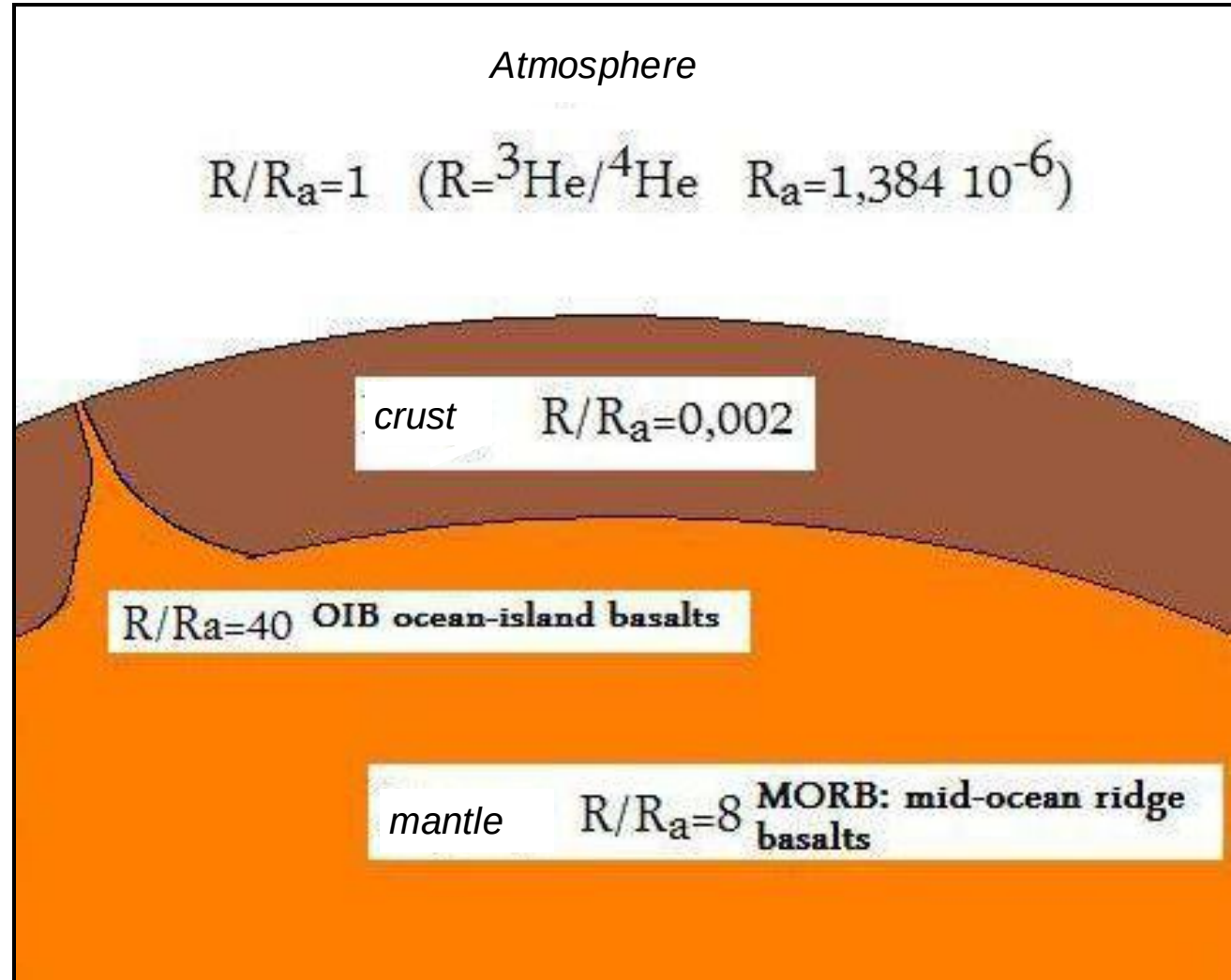
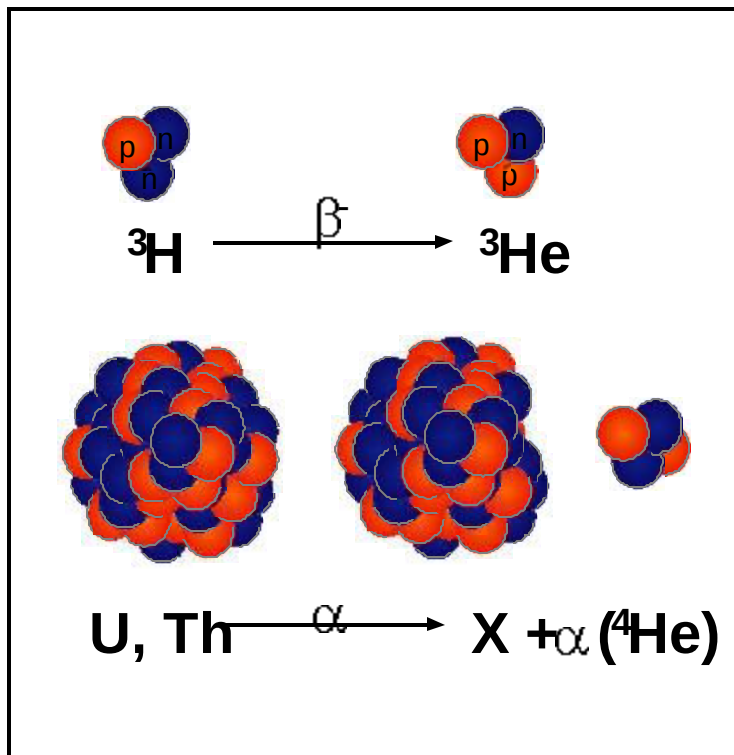
De egyáltalán, hogyan kerülnek a természetes nyomjelzők a vízbe?



Hélium izotópok a vízben

Légköri eredet

$$\left(\frac{{}^3\text{He}}{{}^4\text{He}} \right)_{\text{sample}} = \frac{{}^3\text{He}_{\text{trit}} + {}^3\text{He}_{\text{eq}} + {}^3\text{He}_{\text{ex}} + {}^3\text{He}_{\text{crust}} + {}^3\text{He}_{\text{mantle}}}{{}^4\text{He}_{\text{eq}} + {}^4\text{He}_{\text{ex}} + {}^4\text{He}_{\text{crust}} + {}^4\text{He}_{\text{mantle}}}$$



Anikó

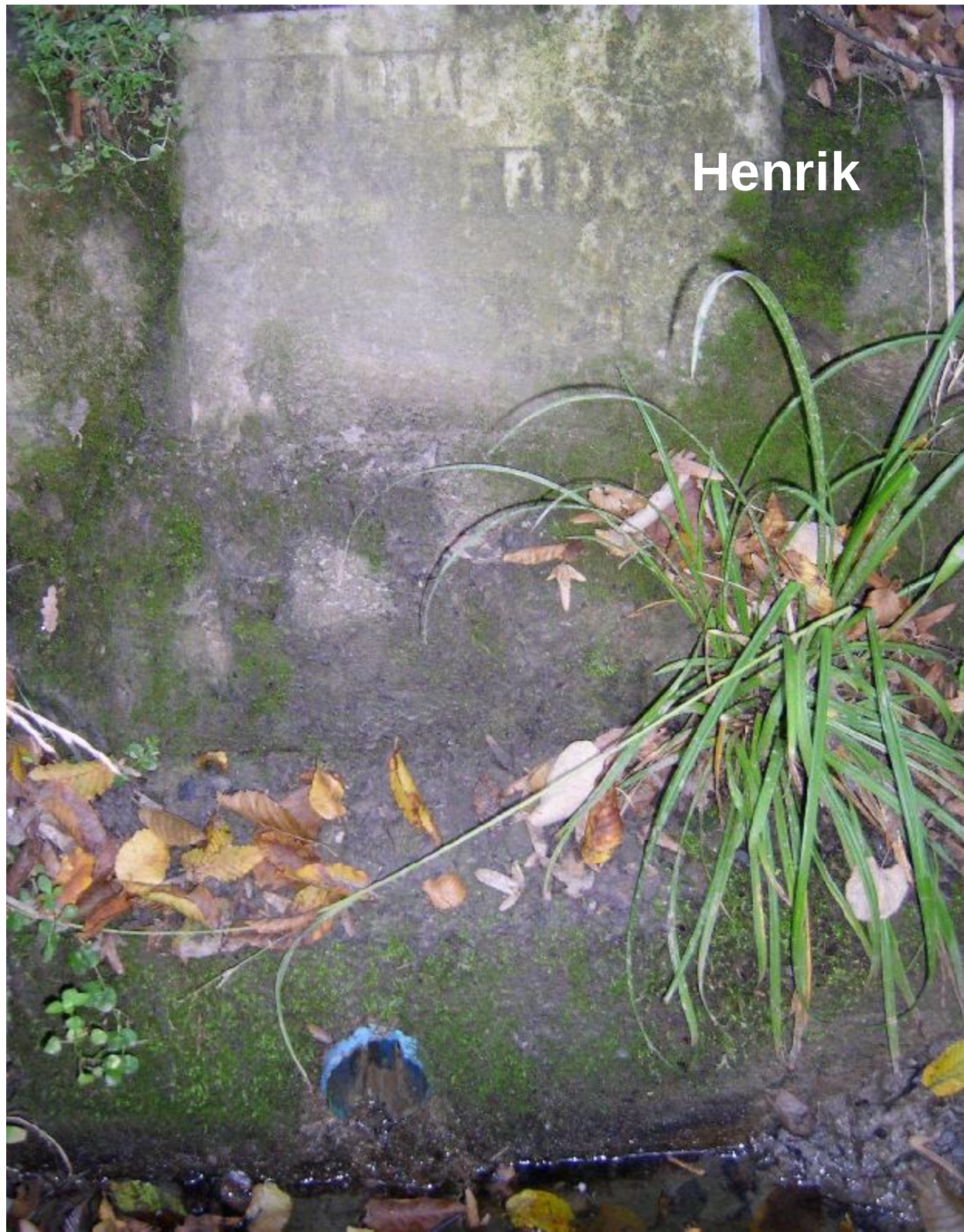


Anikó



Anikó

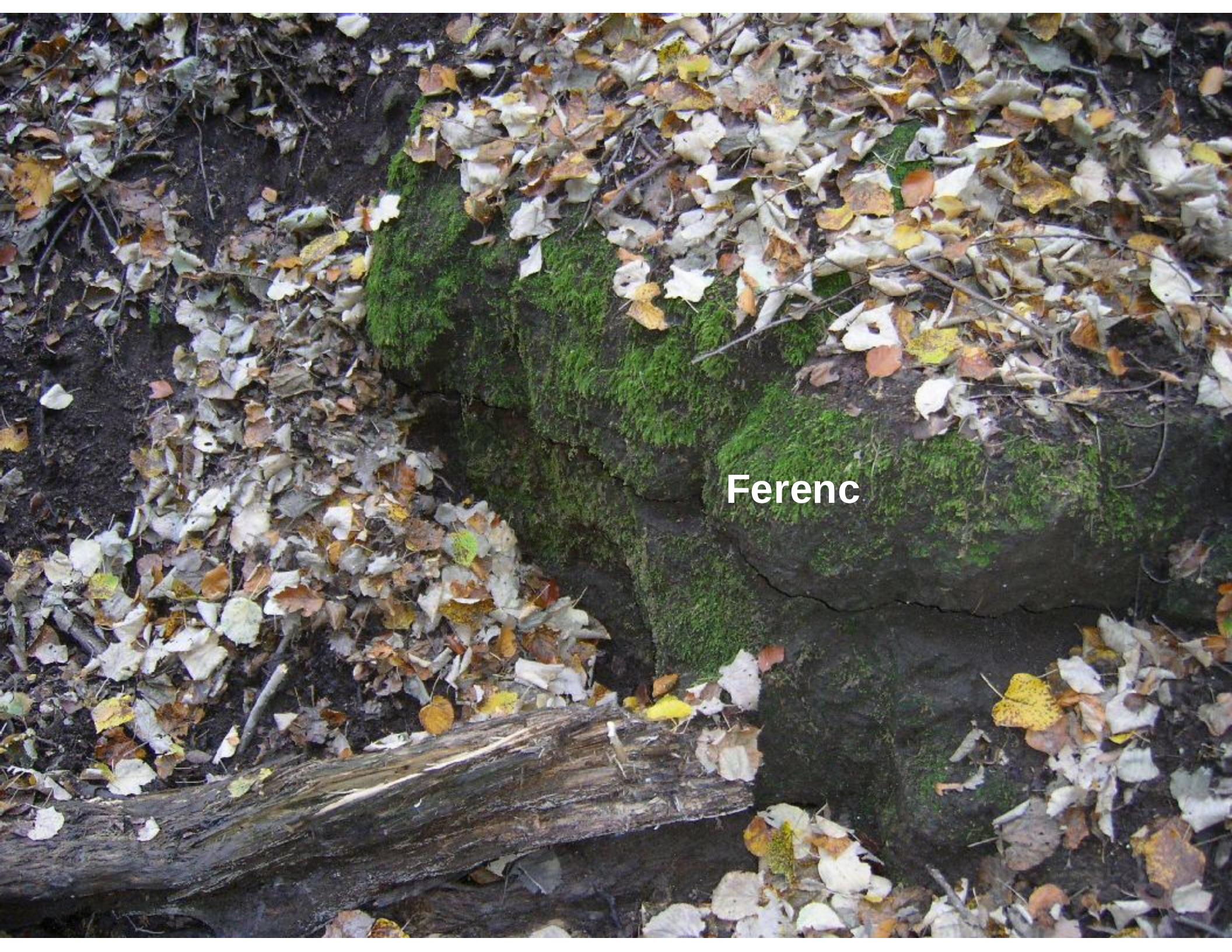




Henrik

Ferenc



A photograph of a mossy rock in a forest. The rock is covered in bright green moss and is surrounded by a thick layer of fallen autumn leaves in shades of yellow, orange, and brown. A weathered log lies horizontally in the foreground, partially covered by leaves. The word "Ferenc" is written in white text on the right side of the rock.

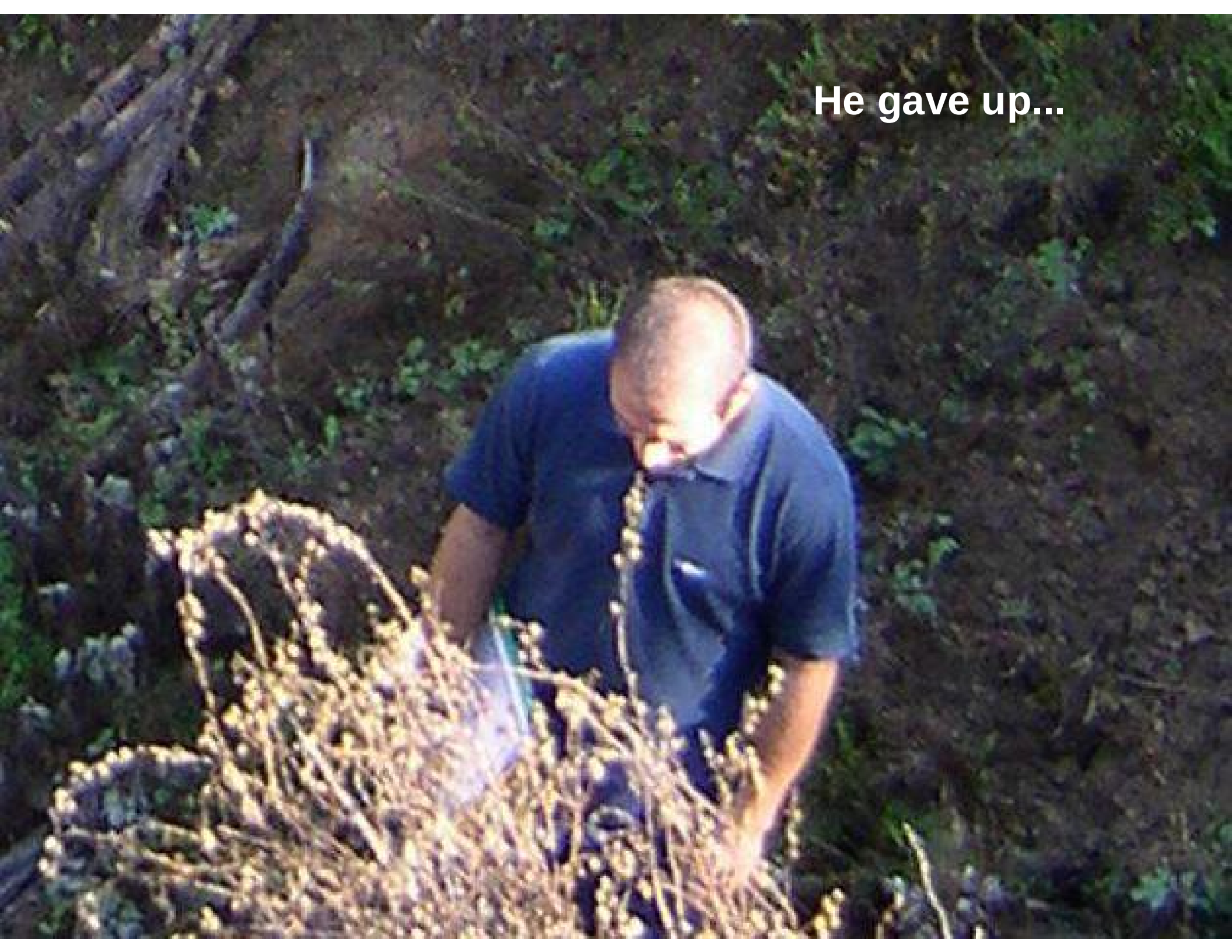
Ferenc

A photograph of a steep, eroded hillside. The slope is covered with a mix of green and brown vegetation, including grasses and shrubs. Numerous large, light-colored, weathered logs or branches are scattered across the hillside, some lying horizontally and others diagonally. On the left side, there is a prominent, light-colored, eroded area that appears to be a scarp or a large rock face. At the bottom center of the image, a person wearing a blue shirt and dark pants is standing on a small patch of ground, looking up at the hillside. The word "Elek" is written in white text in the upper right quadrant of the image.

Elek



He gave up...



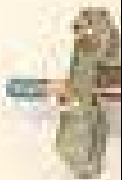
Anyák (Mothers' well)



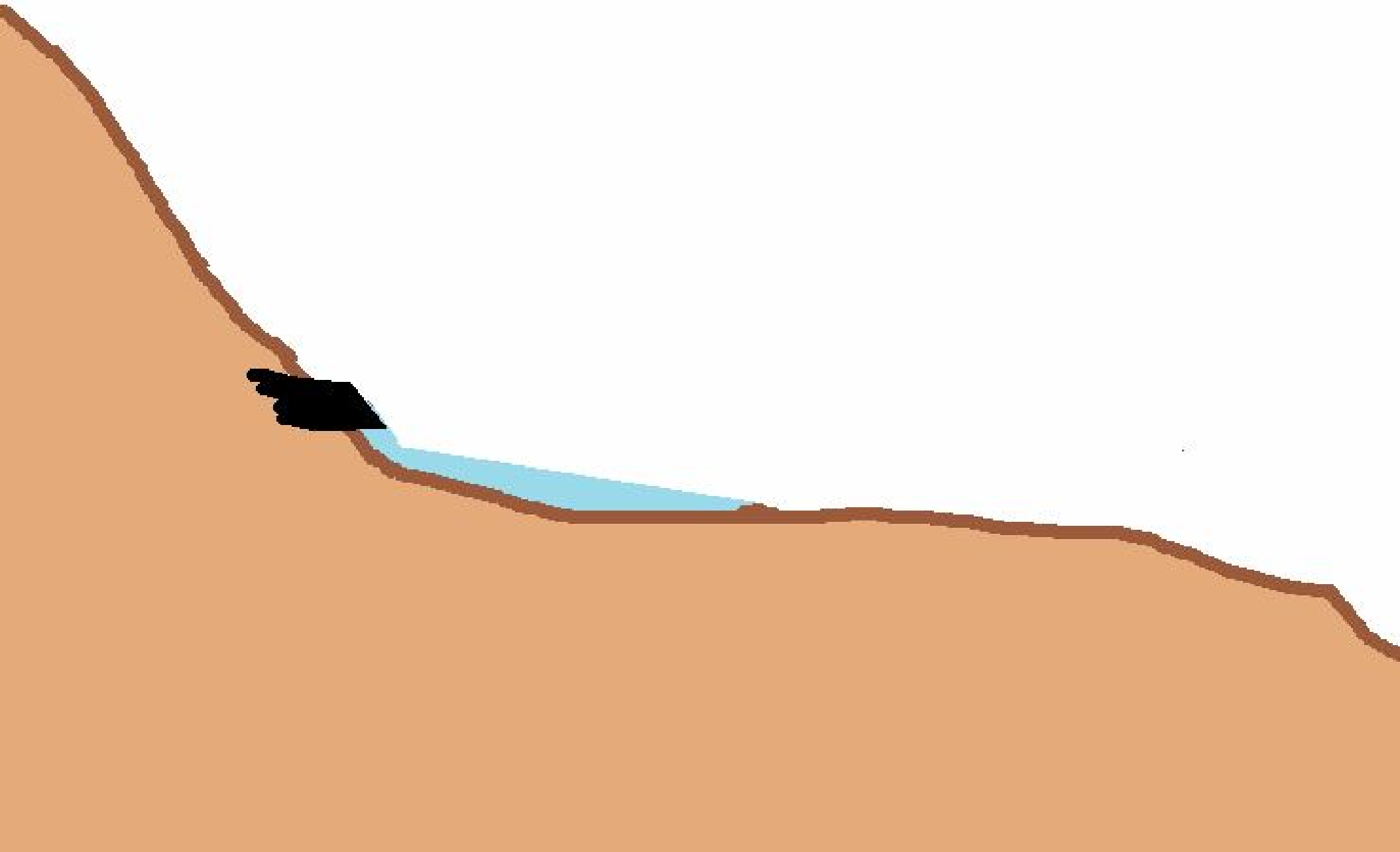
Véménd (after the name of the village)



**Hogyan mintázzuk a vízben
oldott nemesgázokat?**



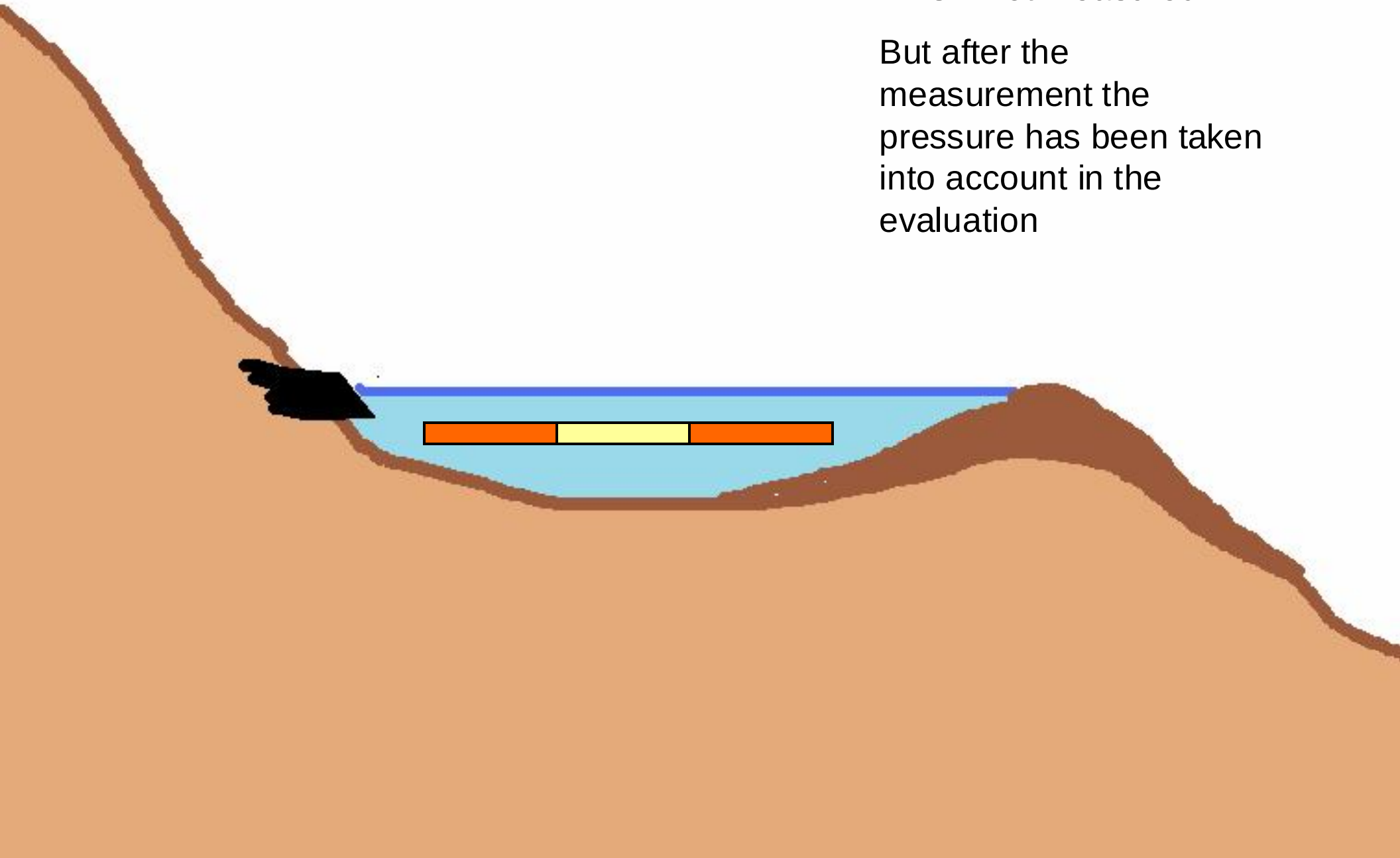
Springwater sampling with diffusion samplers for noble gases



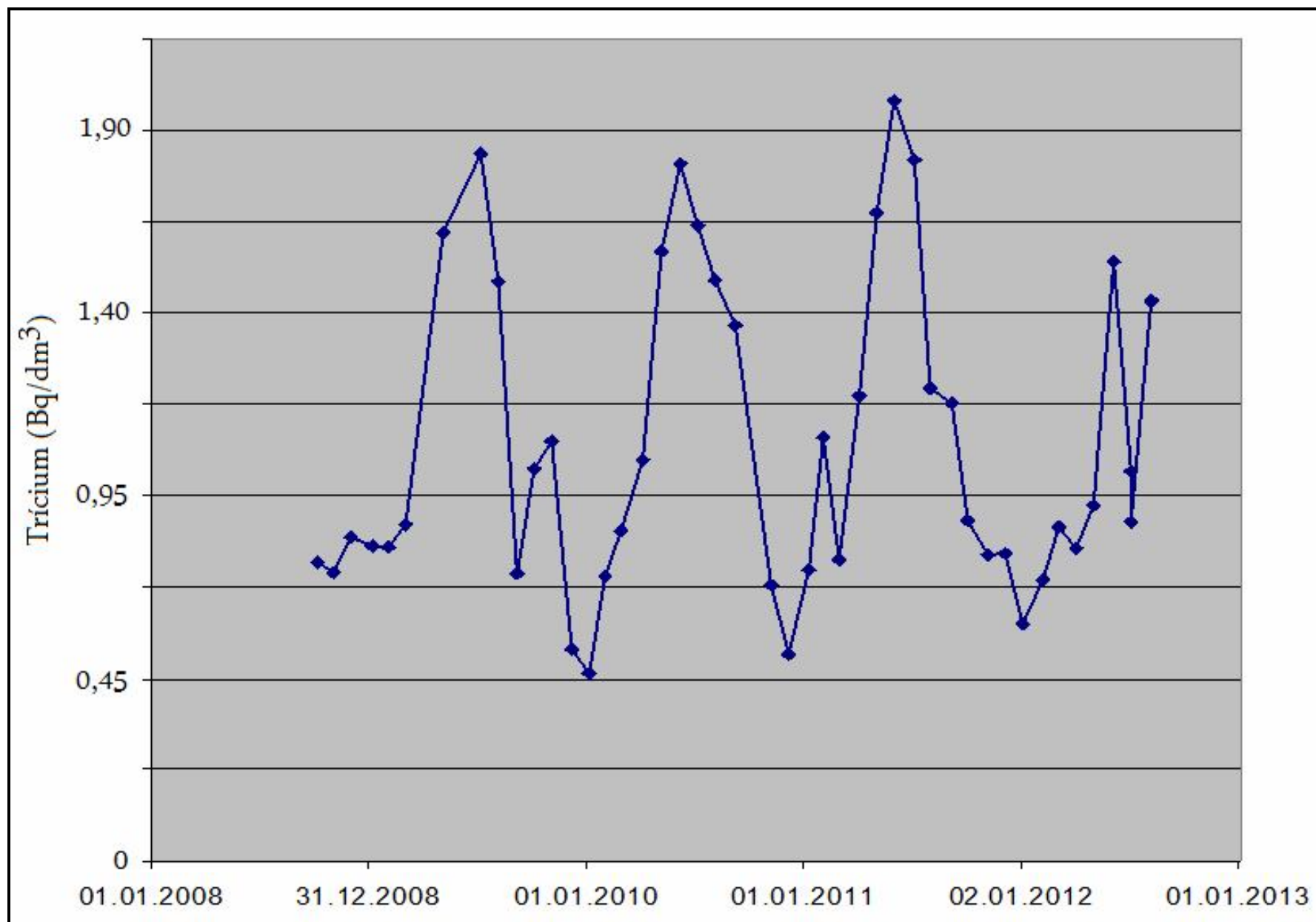
Springwater sampling with diffusion samplers for noble gases

TDGP not measured

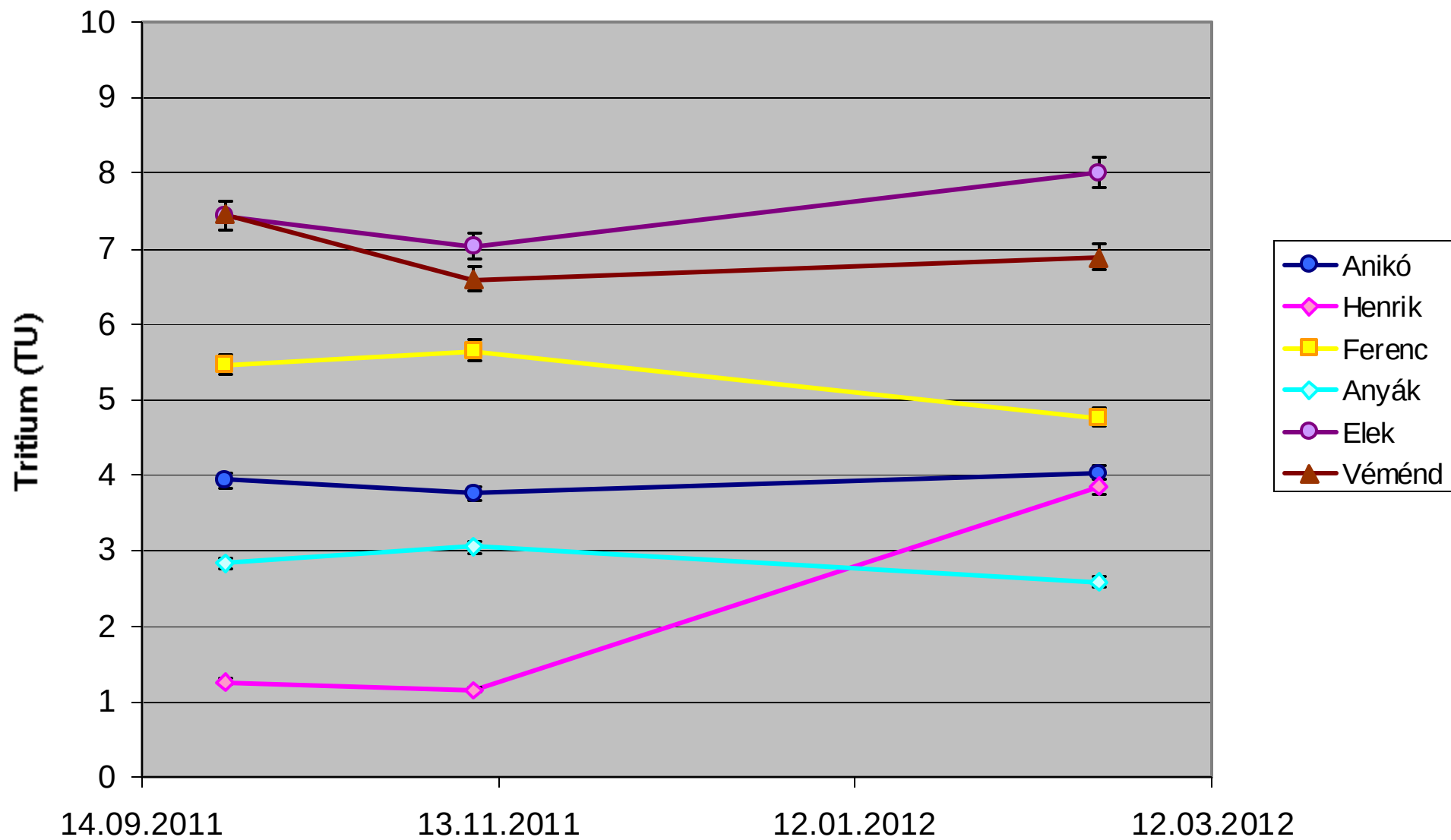
But after the
measurement the
pressure has been taken
into account in the
evaluation



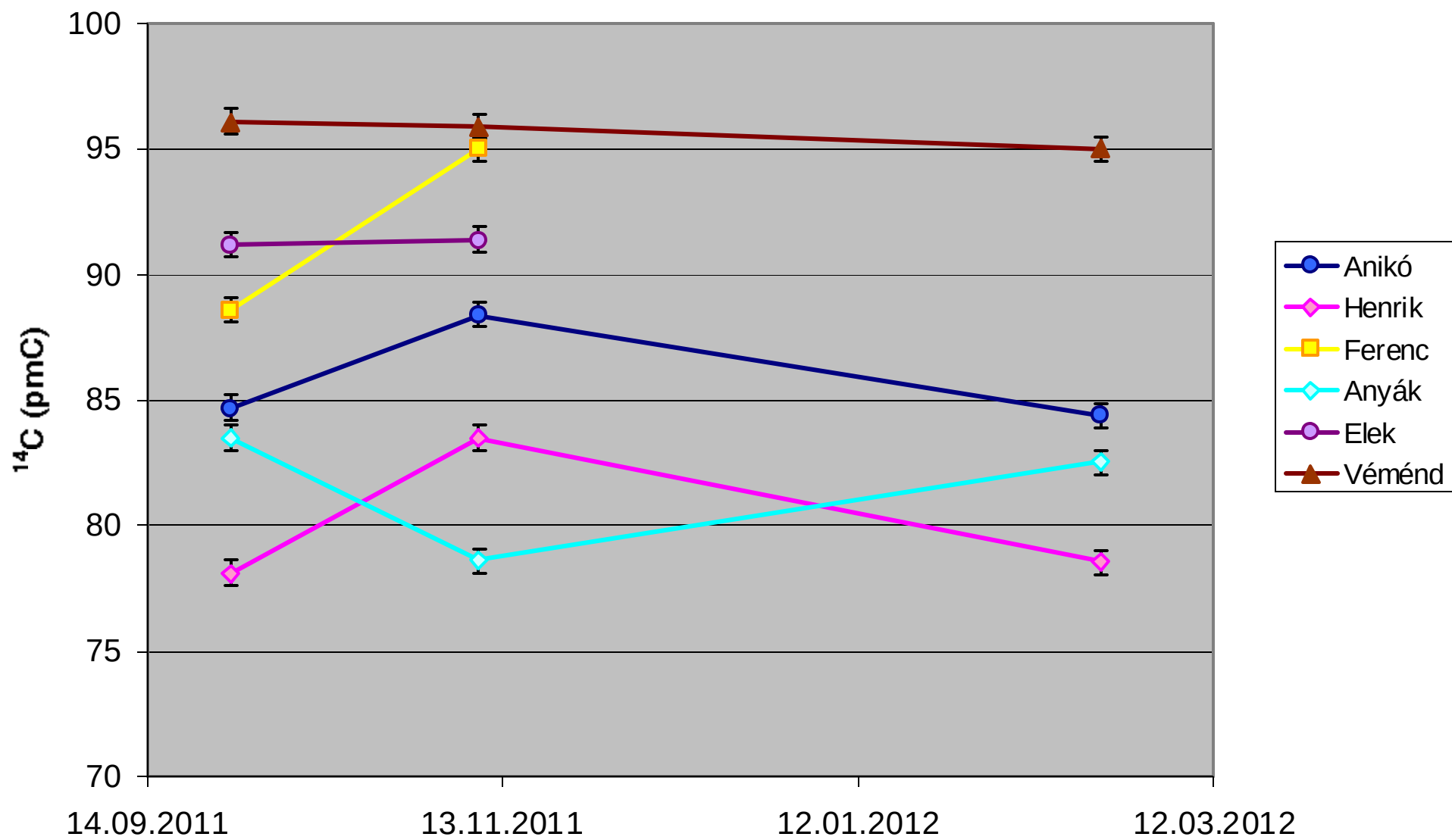
Csapadékvíz tríciuma (Bátaapáti)



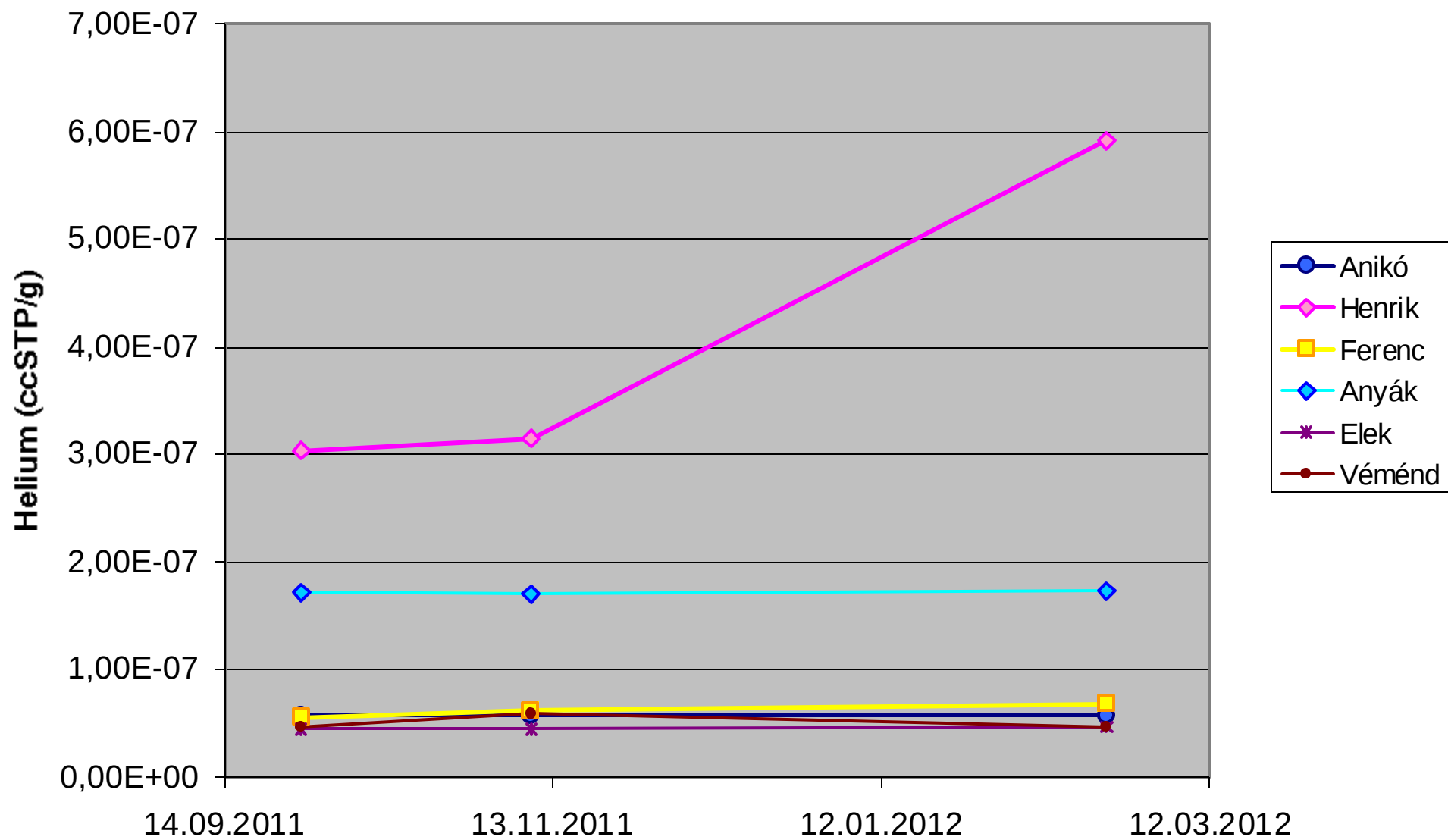
Tritium in time



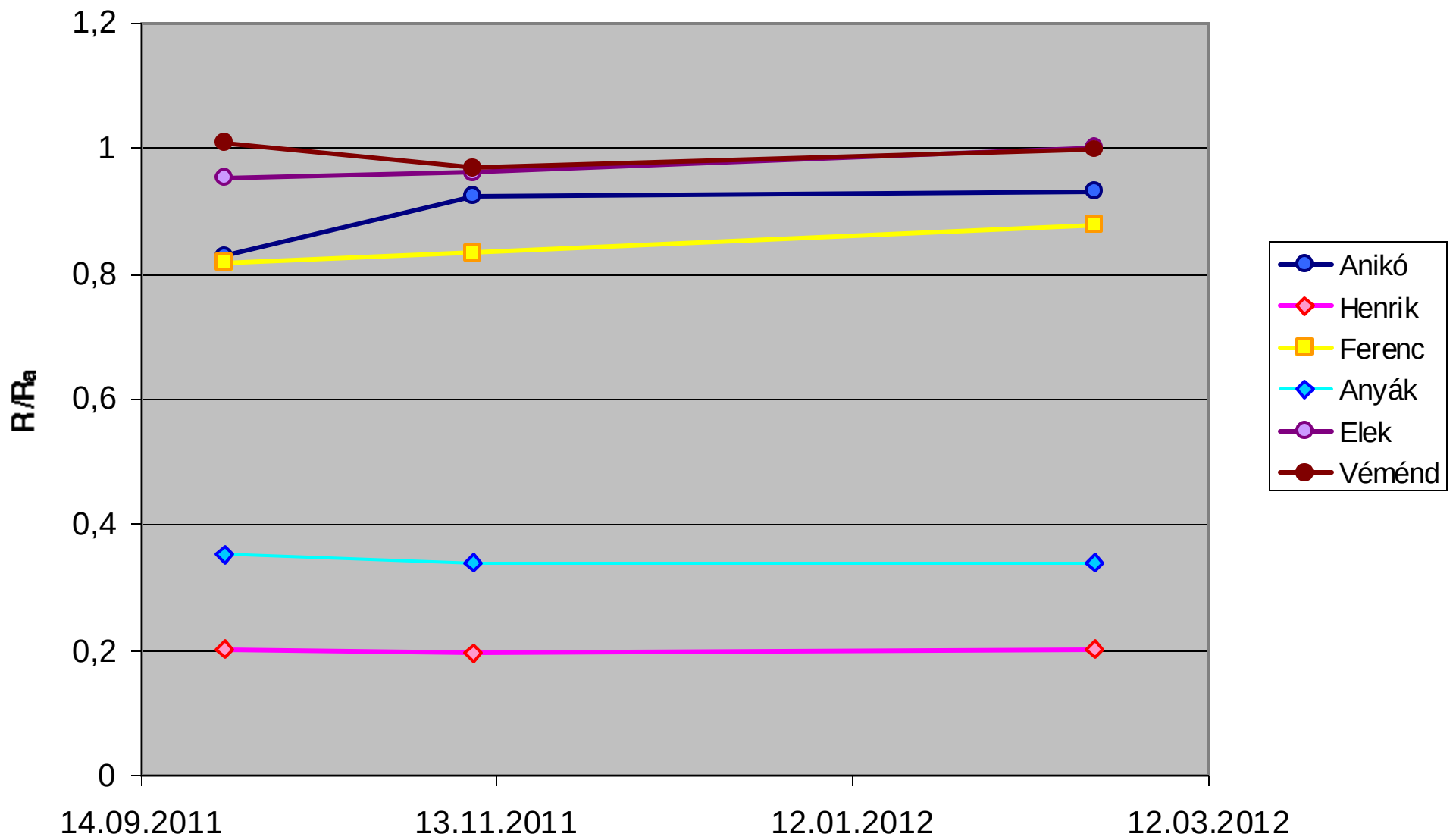
Radiocarbon in time



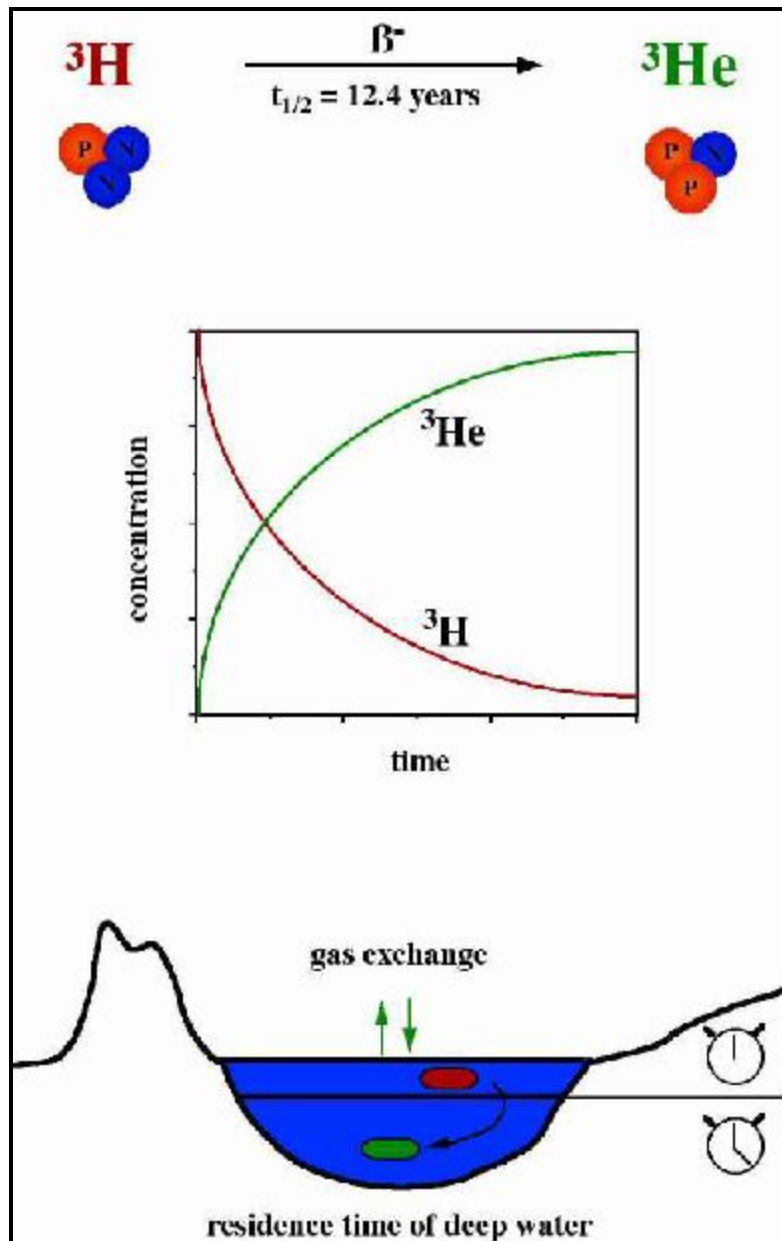
Helium concentration in time



$^3\text{He}/^4\text{He}$ in time

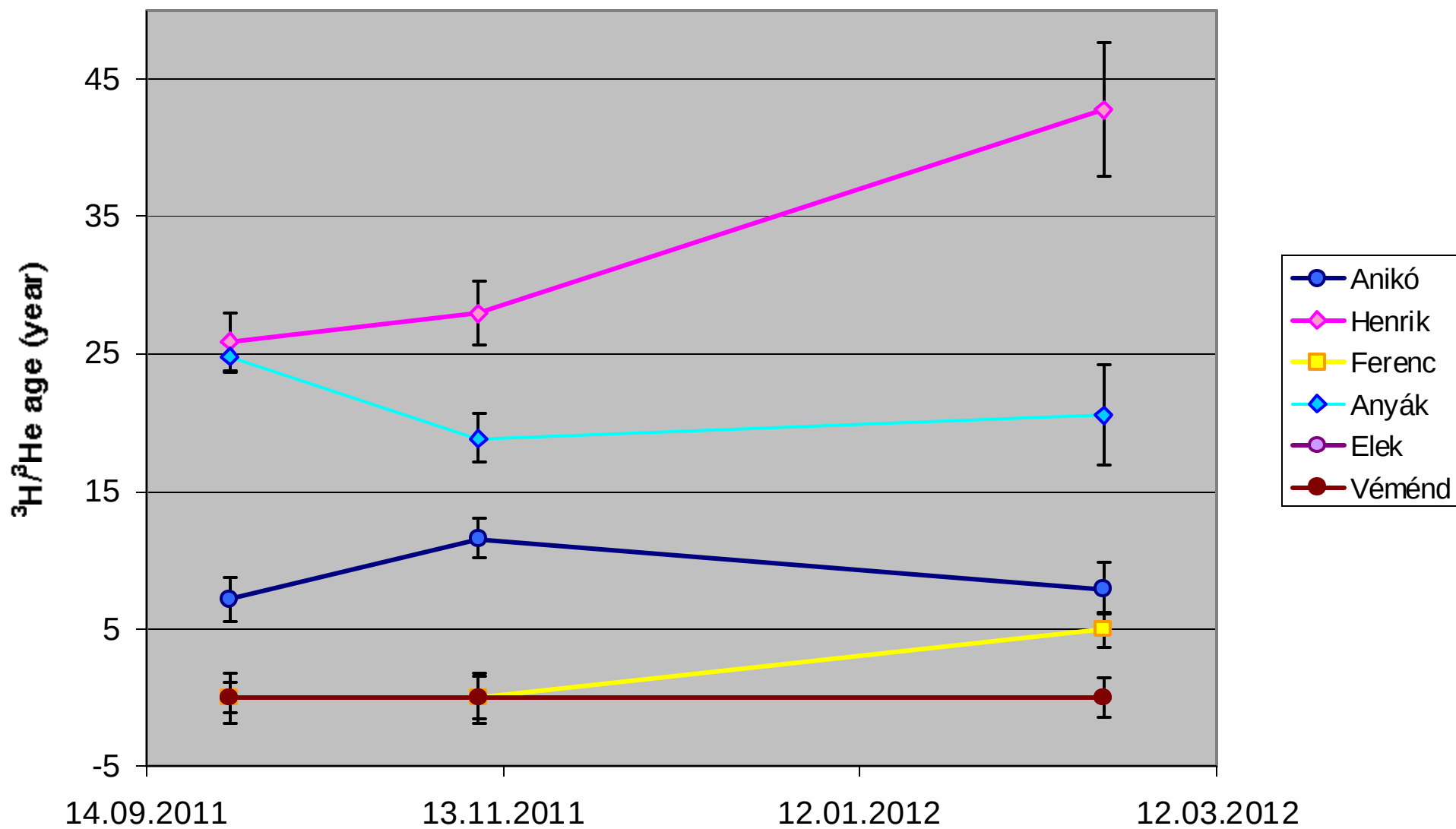


$^3\text{H}/^3\text{He}$ kormeghatározás

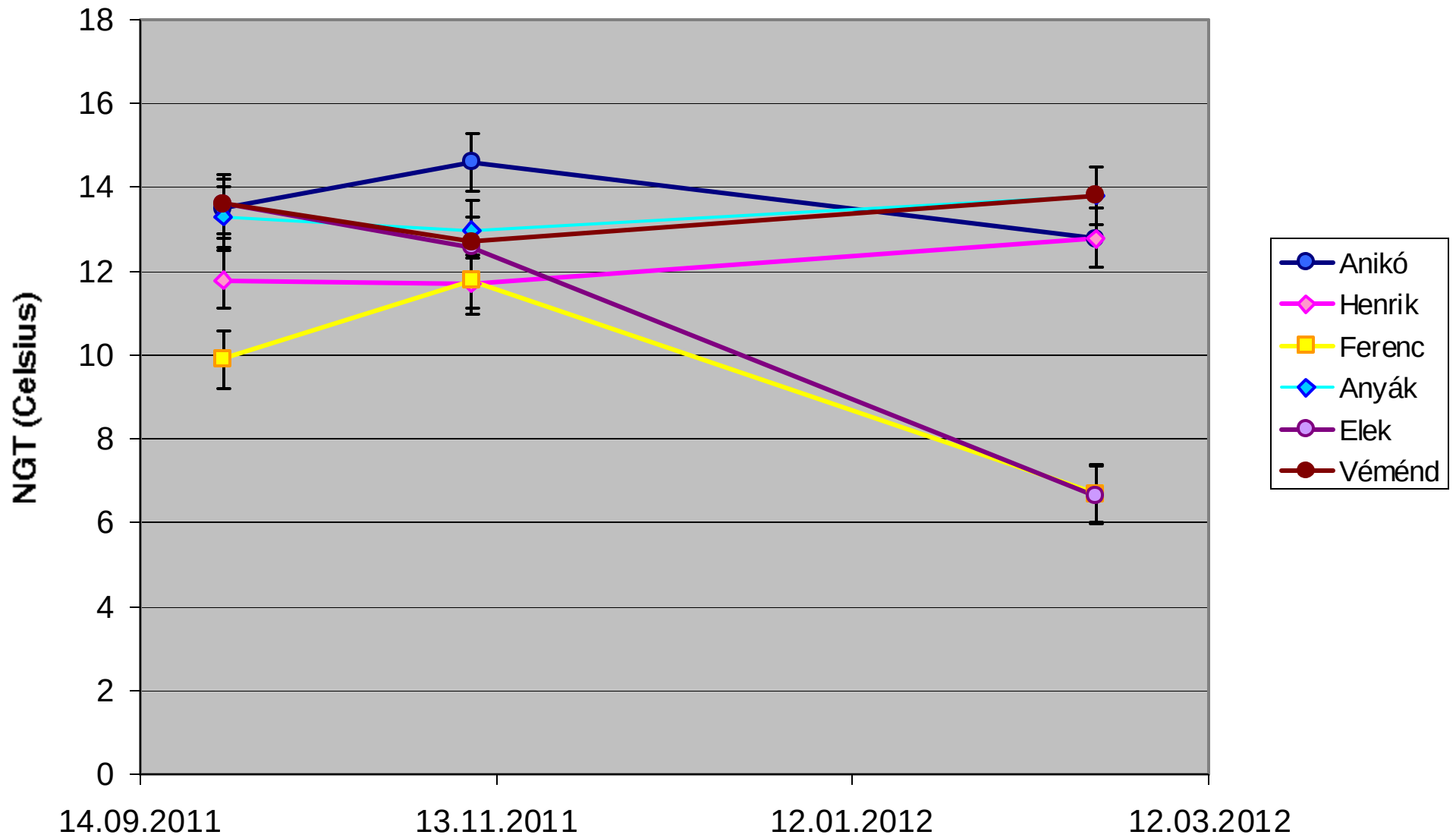


$$t = \frac{T_{1/2}}{\ln 2} \times \ln \left(1 + \frac{^3\text{He}_{\text{trit}}}{^3\text{H}} \right),$$

$^3\text{H}/^3\text{He}$ ages in time

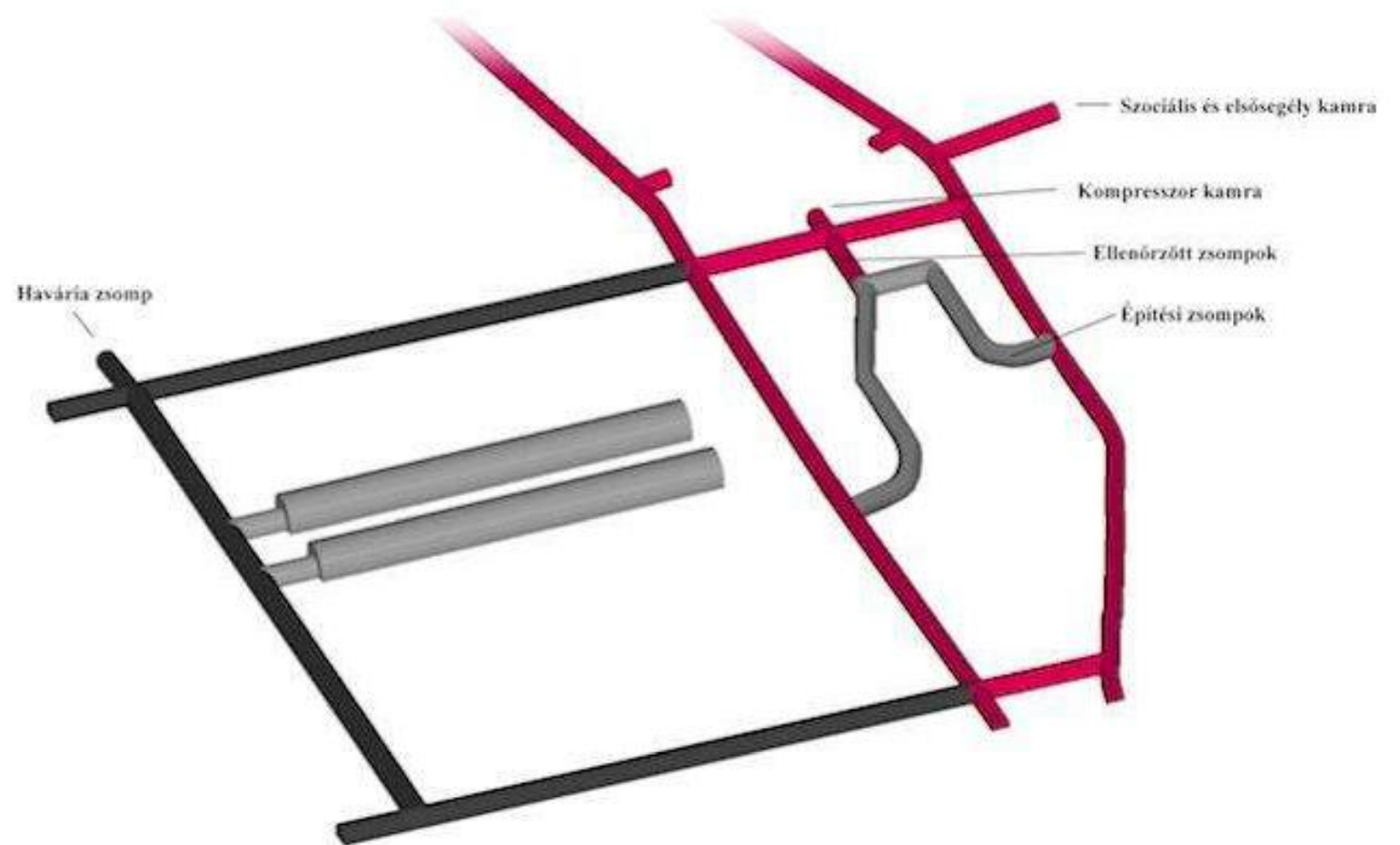


Noble gas recharge temperatures in time



A hulladéktároló belülről









Mi történik a leszivárgó vízzel...?



Hidrológiai és szennyeződésterjedési modellek validálásához

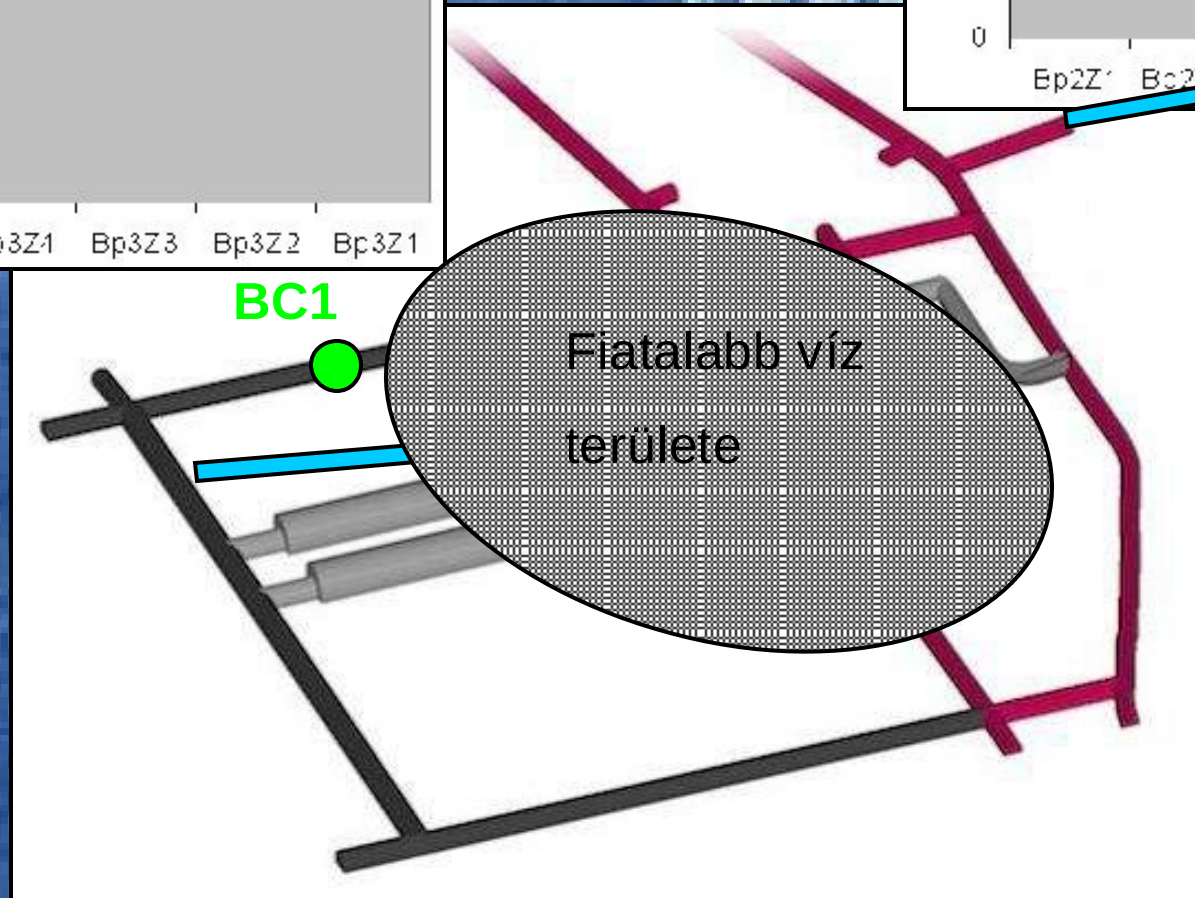
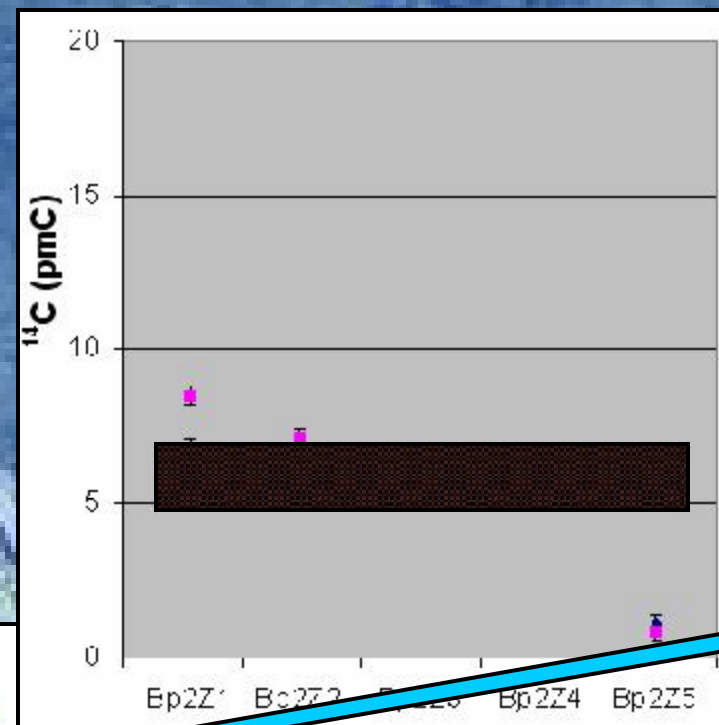
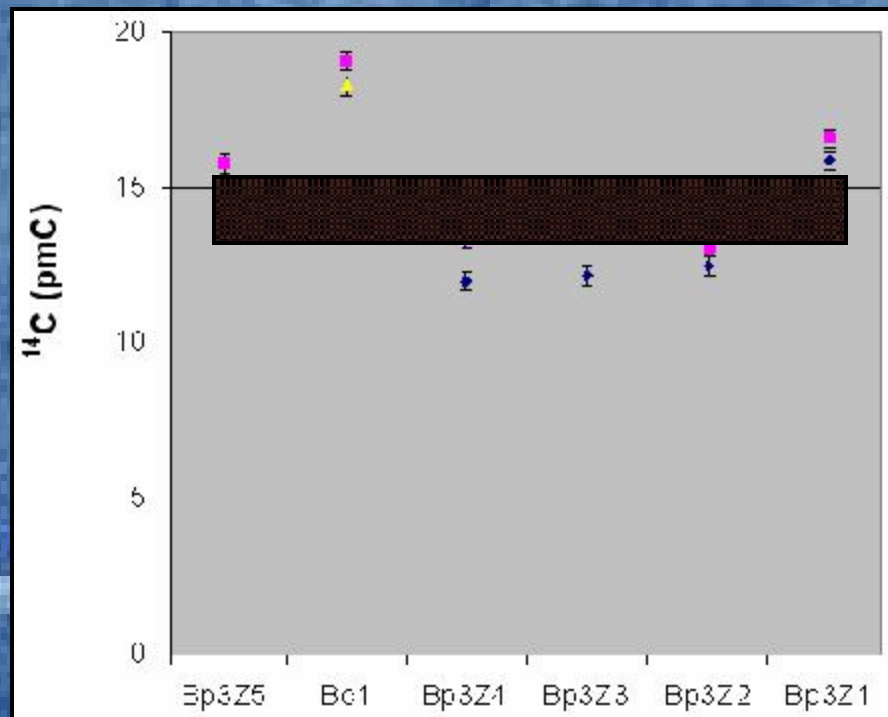
Pontosabb vízkorok, azok változása, visszacsatolás a hidrológiai modellbe

Leürülés becslése, jobban tervezhető mérnöki gátak

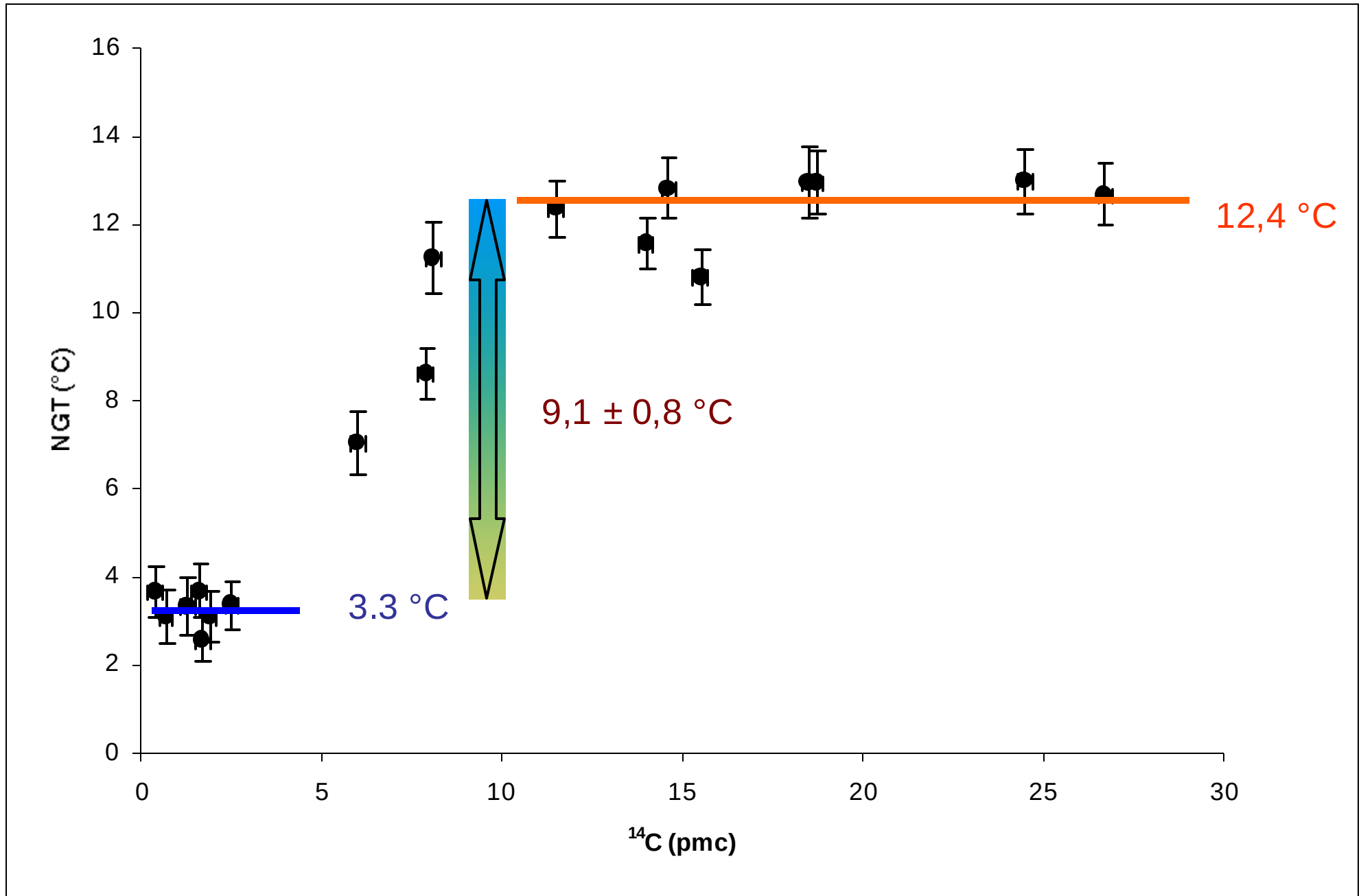
Pontosabb biztonsági elemzés

Jobb hazai és nemzetközi megítélés

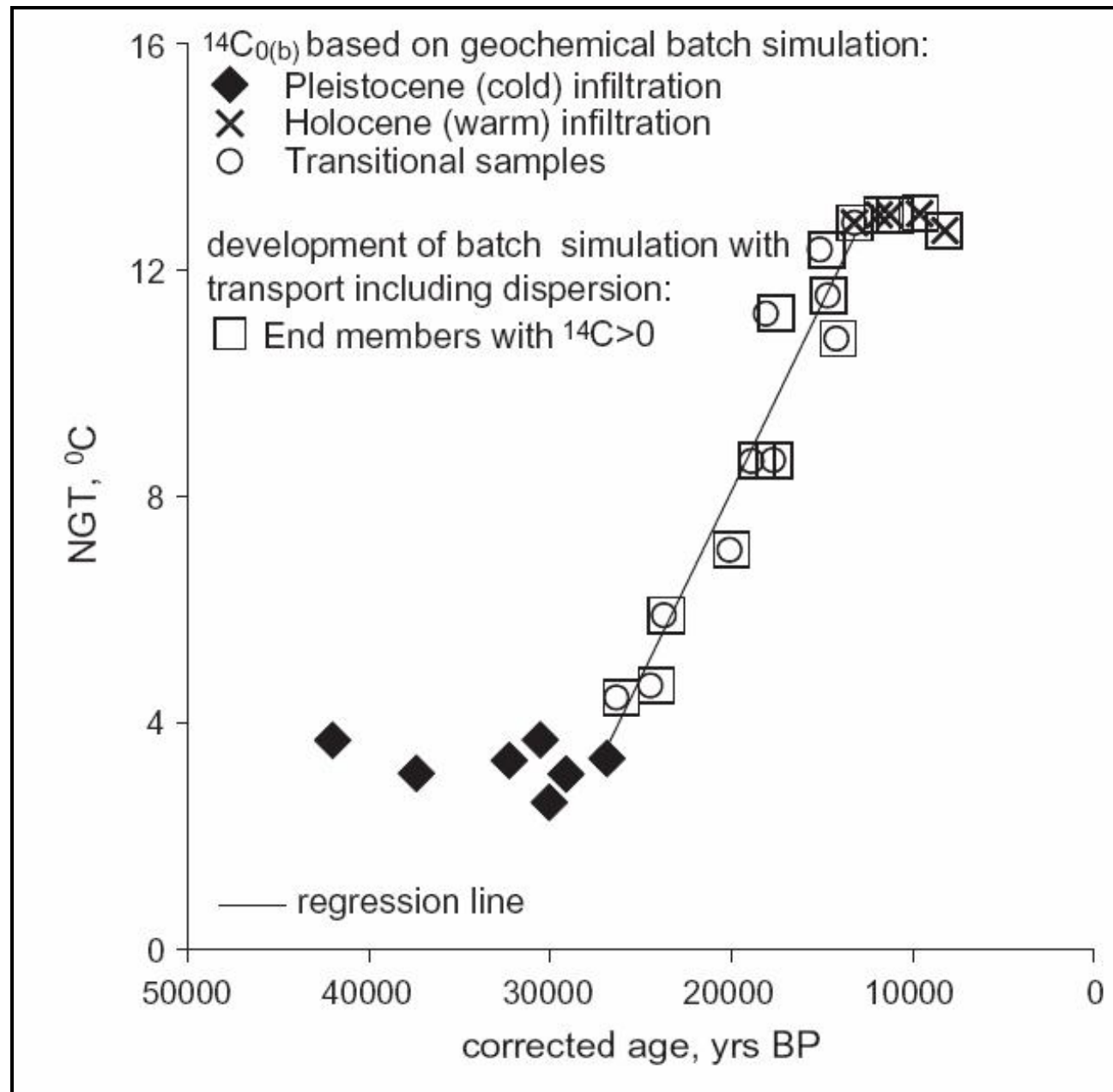
...milyen korú a víz?

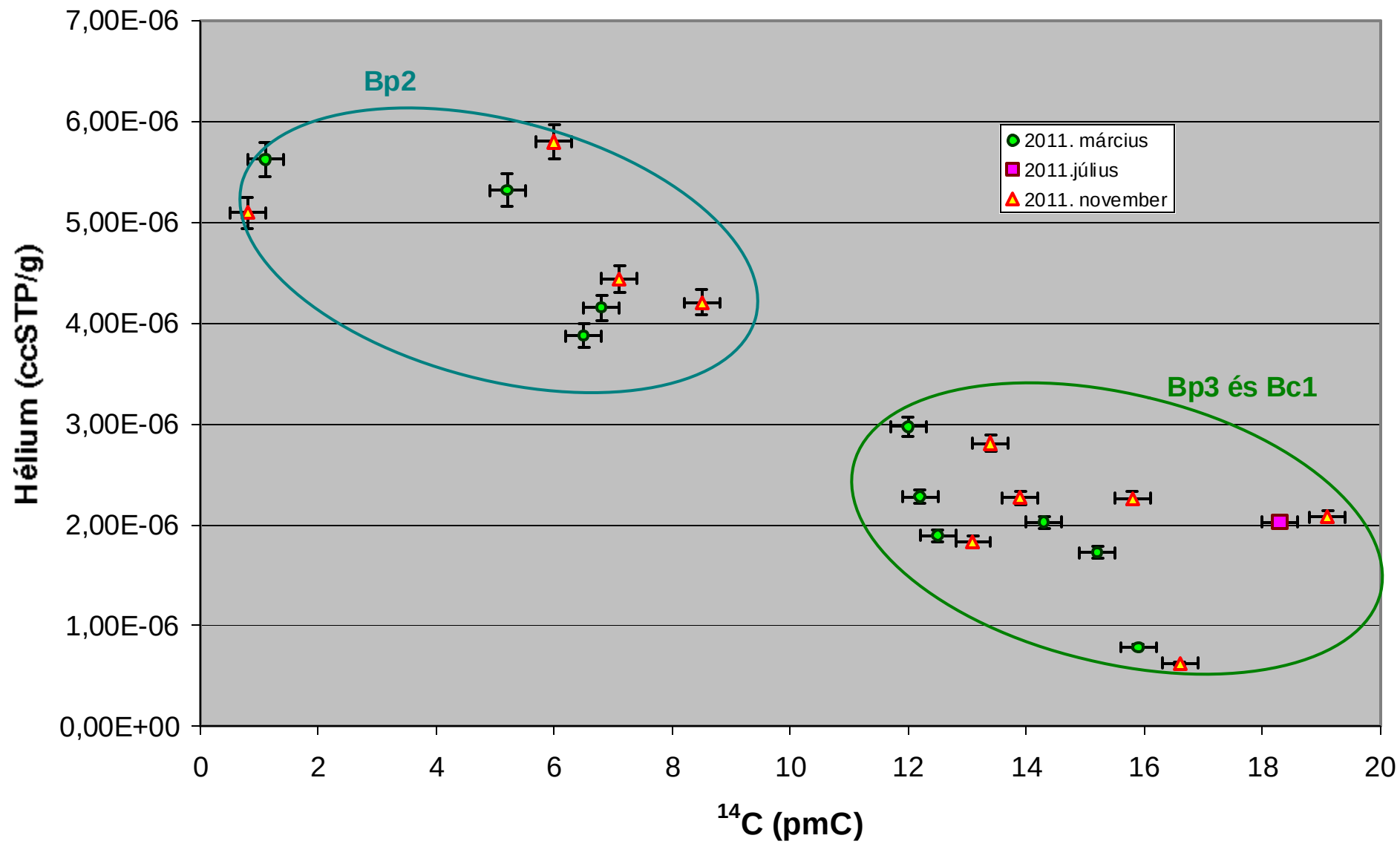


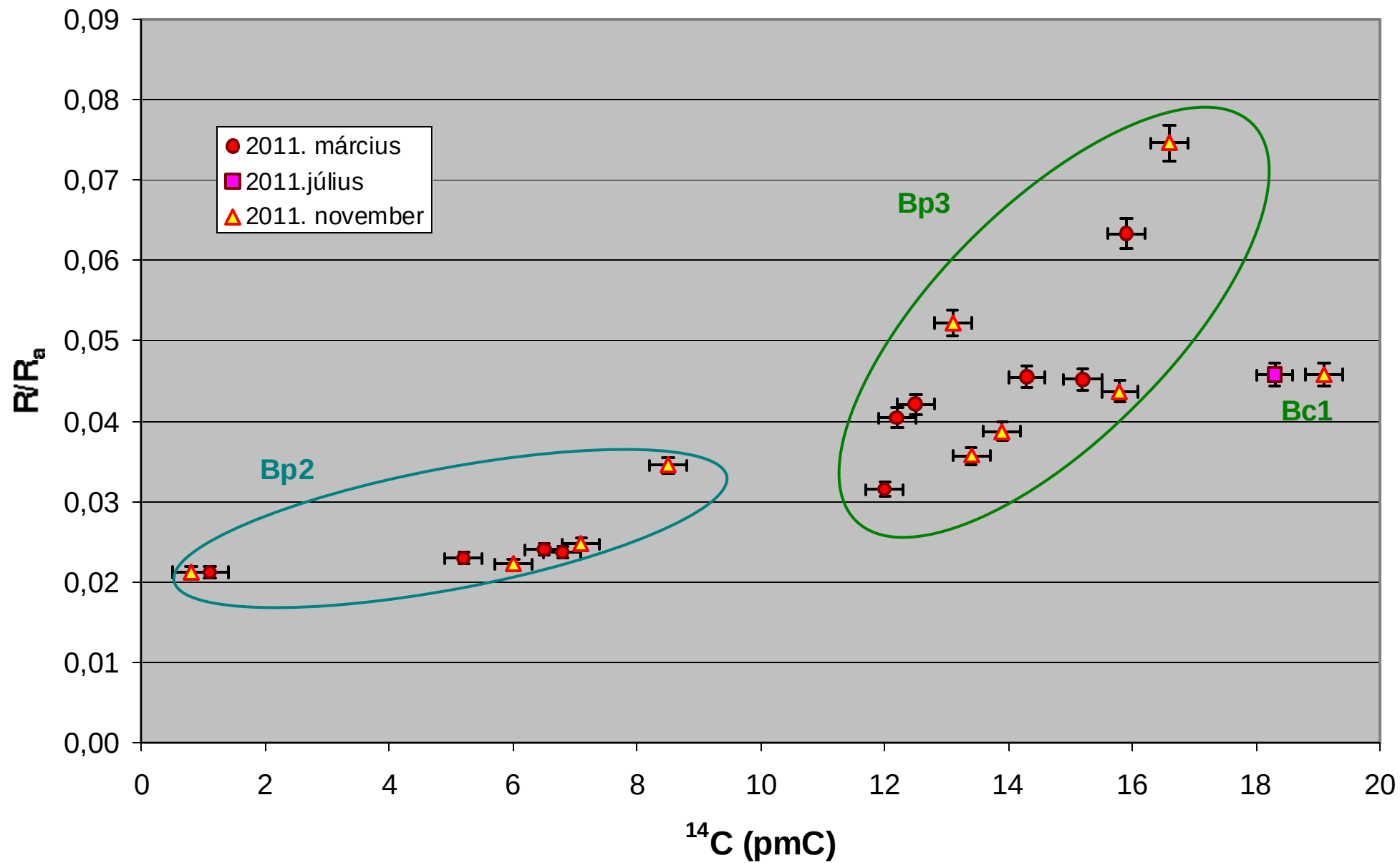
Dél-alföldi vizek nemesgáz-hőmérsékletei a ^{14}C -tartalom függvényében

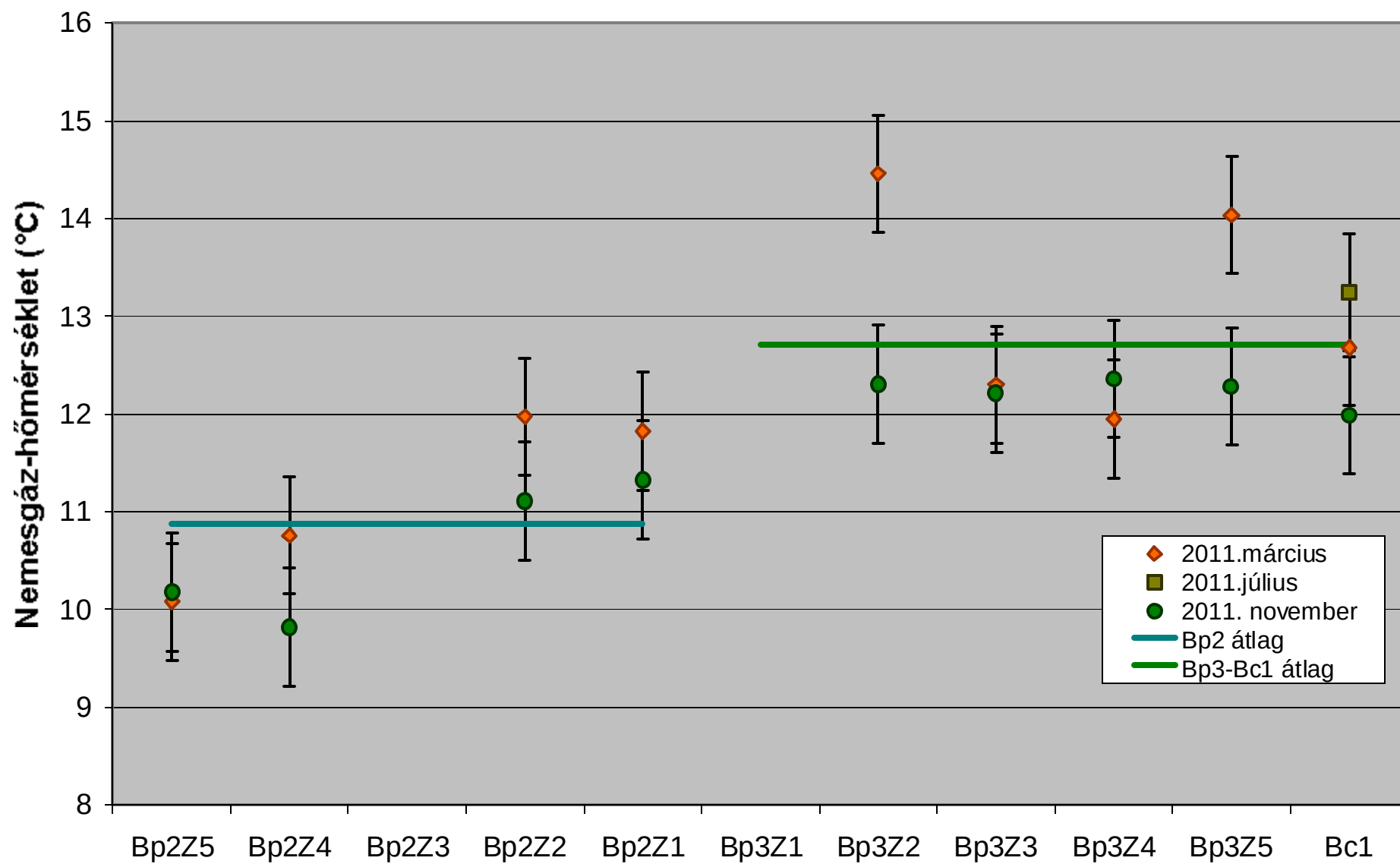


NGT a vízben oldott inorganikus szén radiokarbon korának függvényében

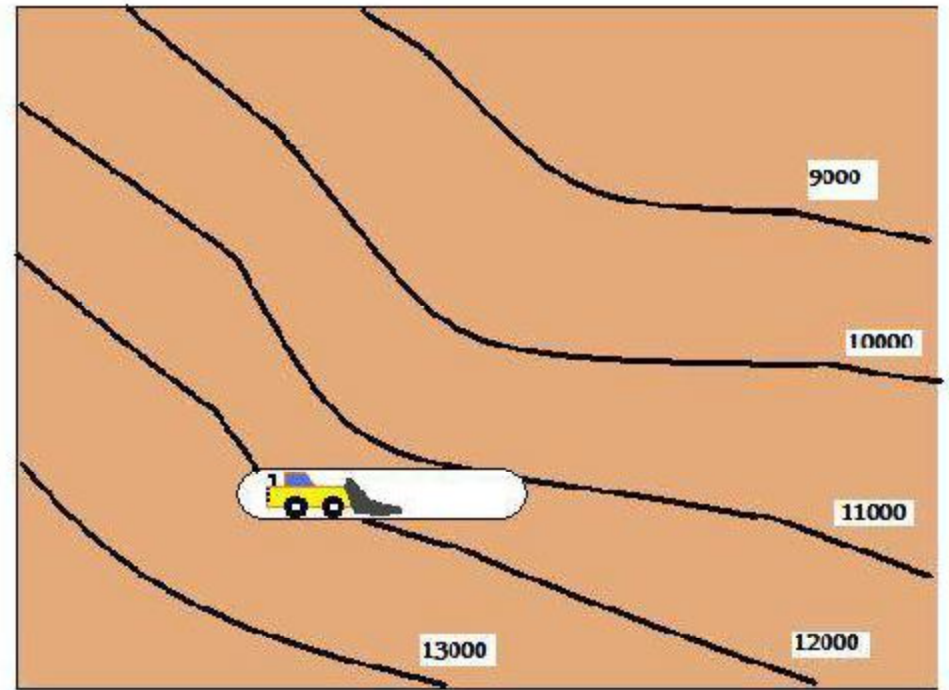
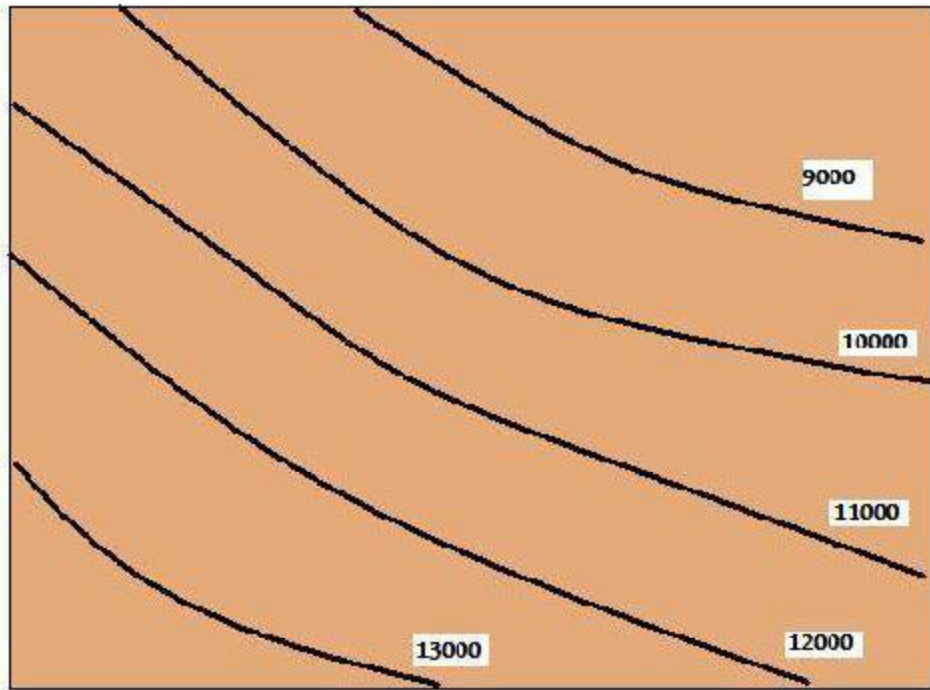








Izokrónok



A mintázás jó móka...



A mintázás jó móka... ...még télen is!



Köszönöm a
figyelmet

