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# rPlum fechado con plomo para el usuario común.

## rPlum lead dating for the common user

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@article{Appleby1978, author={Appleby, P.G. and Oldfield, F.}, title="The calculation of lead-210 dates assuming a constant rate of supply of unsupported 210Pb to the sediment", journal={Catena}, year={1978}, volume={5}, number={1}, pages={1–8}, doi={10.1016/S0341-8162(78)80002-2}, document_type={Article}, source={Scopus}, }

@article{Aquino2018, doi = {10.1007/s13253-018-0328-7}, url = {https://doi.org/10.1007%2Fs13253-018-0328-7}, year = 2018, month = {jun}, publisher = {Springer Science and Business Media {LLC}}, volume = {23}, number = {3}, pages = {317–333}, author = {Marco A. Aquino-L{'{o}}pez and Maarten Blaauw and J. Andr{'{e}}s Christen and Nicole K. Sanderson}, title = {Bayesian Analysis of 210Pb Dating}, journal = {Journal of Agricultural, Biological and Environmental Statistics} }

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# What is Plum?

- Plum is a Bayesian age-depth model for $^{210}Pb$
- It is a tool which allow us to obtained integrated chronologies without the need of pre-modelling $^{210}Pb$ dates.
- It is just simple and cool.

**What differenciates Plum from other 210Pb dating methods?**

# CRS

This model assumes a constant rate of supply of 210Pb to the sediment in the period of interest.

$$t(x) = \frac{1}{\lambda} \log \left( \frac{A_0}{A_x} \right)$$

Appleby & Oldfield (1979)  Robbins (1979)

# Plum flexible age-depth function

On the other hand, *Plum* works by implementing a statistical approach to creating the chronology. *Plum* defines the toral measured $^{210}Pb$ as

$$y_i \sim \mathcal{N}\left(\mu_i^s + \mu_i^U\right)$$

# Plum flexible age-depth function

Where $mu_i^s$ is the "true" levels of supported $^{210}Pb$ and $\mu_i^u$ the unsupported levels in sample $y_i$. By assuming a constant supply of $^{210}Pb$ ($\Phi$) we get that,

$$\mu_i^u = \frac{\Phi}{\lambda}\left(e^{-\lambda t(x_i-\delta)} - e^{-\lambda t(x_i)}\right)$$

# Plum flexible age-depth function

Function $t(x)$ is define as the autoregressive gamma process presented by Blaauw & Christen (2011) also known as *Bacon*.

# Benefits of *Plum*

1. Accurate age depth model
2. Realistic uncertainties
3. It is a Bayesian approach
4. Native integration of other dating information

# Accuracy