# An approach to radionuclide time series reconstruction based on autoregressive analysis.

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***MAIN OBJECTIVES***

- Defragmentation the time series.
- Developing the ability to apply advanced mathematical methodology.
- Improving information about the data the IDC offers.

# Introduction

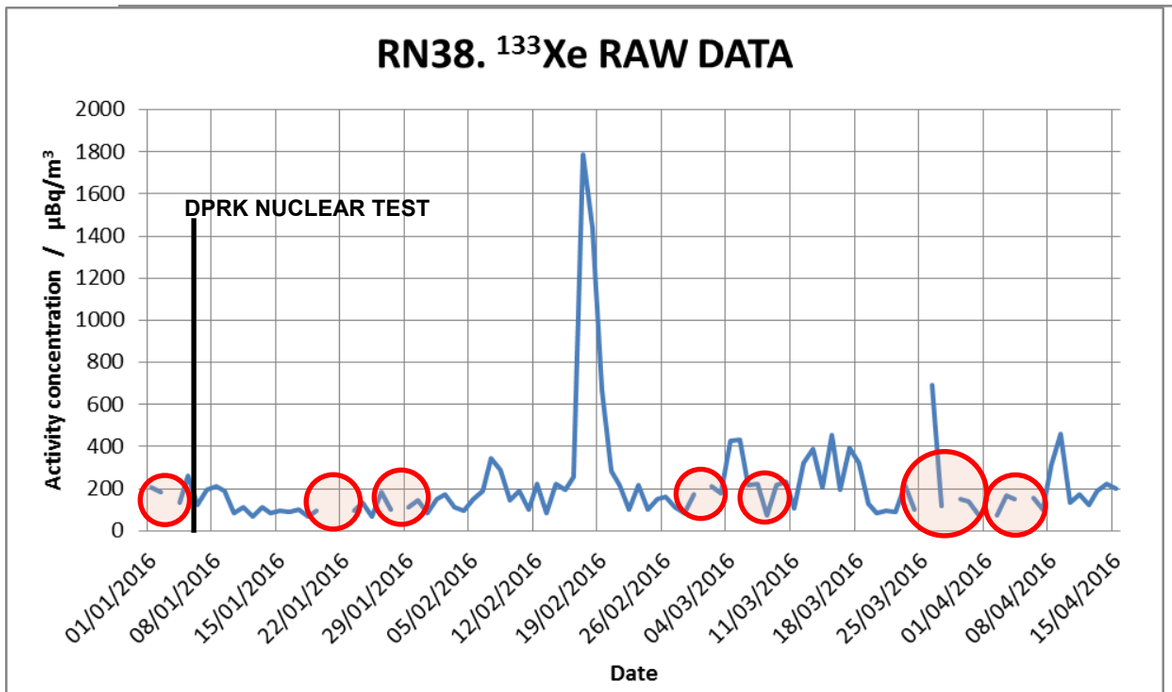
**Article IV: VERIFICATION**

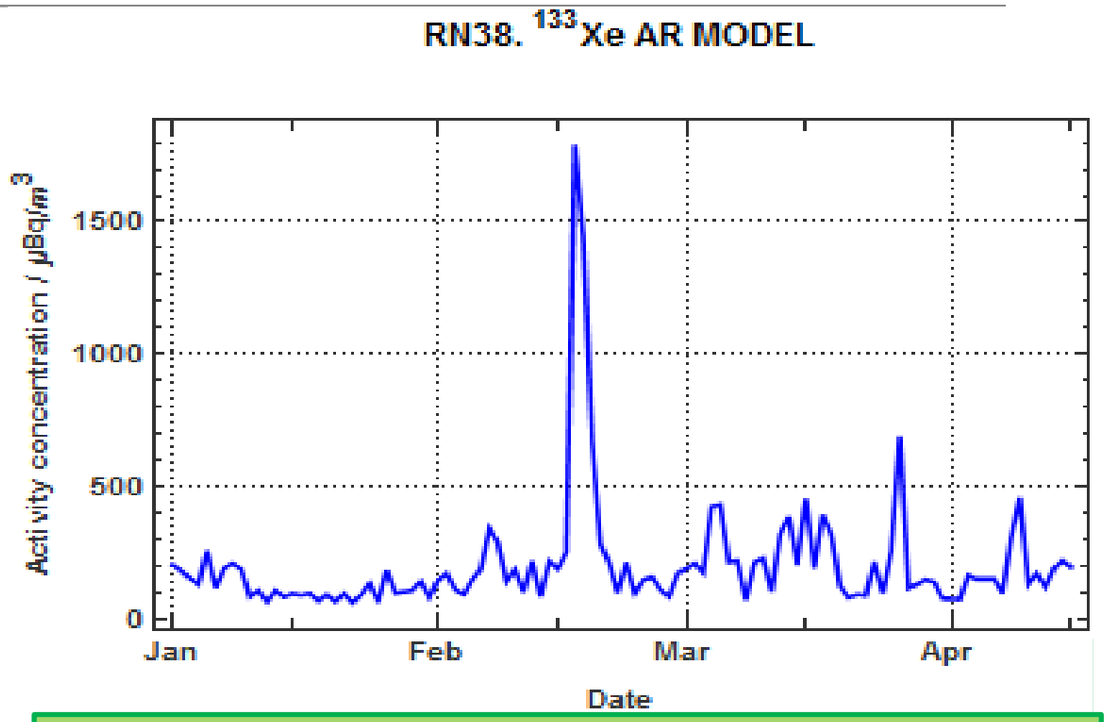
**B. The International Monitoring System**

*16. The International Monitoring System shall comprise facilities for seismological monitoring, radionuclide monitoring including certified laboratories, hydroacoustic monitoring, infrasound monitoring, and respective means of communication, and shall be supported by the International Data Centre of the Technical Secretariat.*

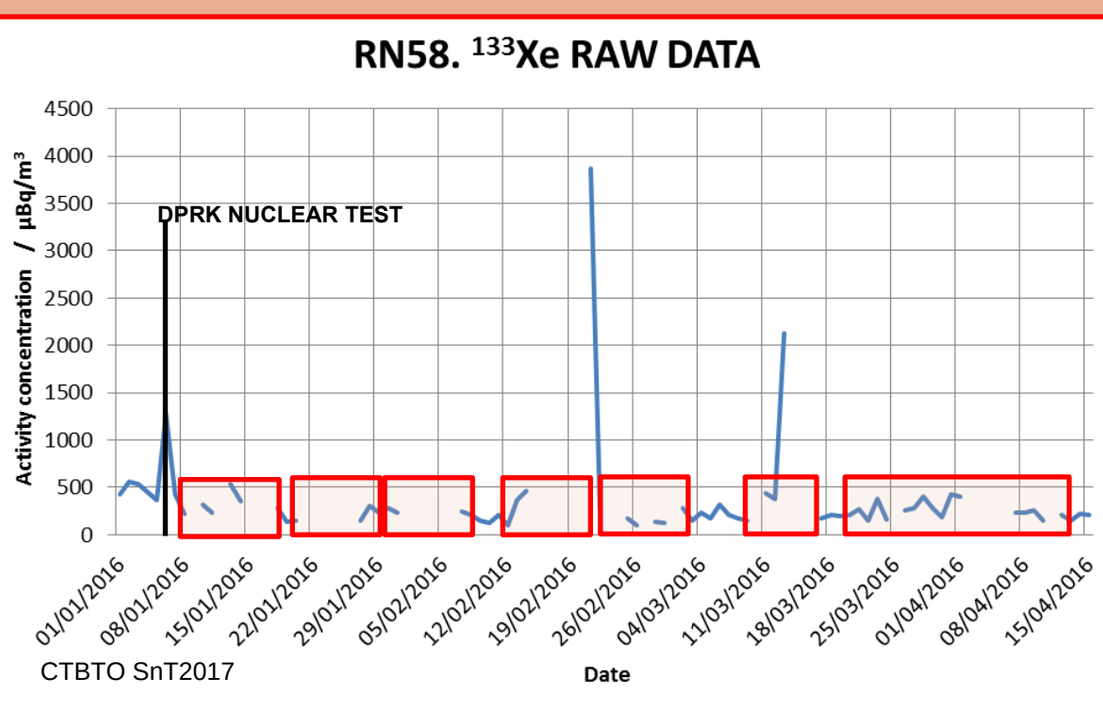
*17. The International Monitoring System shall be placed under the authority of the Technical Secretariat. All monitoring facilities of the International Monitoring System shall be owned and operated by the States hosting or otherwise taking responsibility for them in accordance with the Protocol.*

# Reconstruction of the time series: AR model.

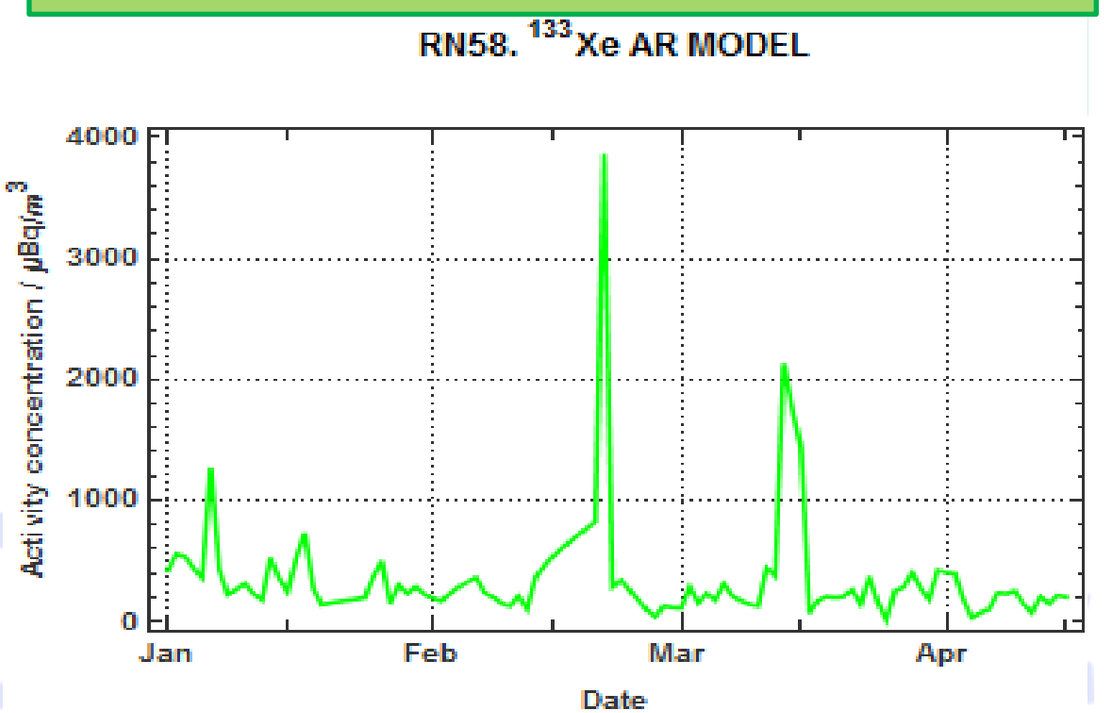


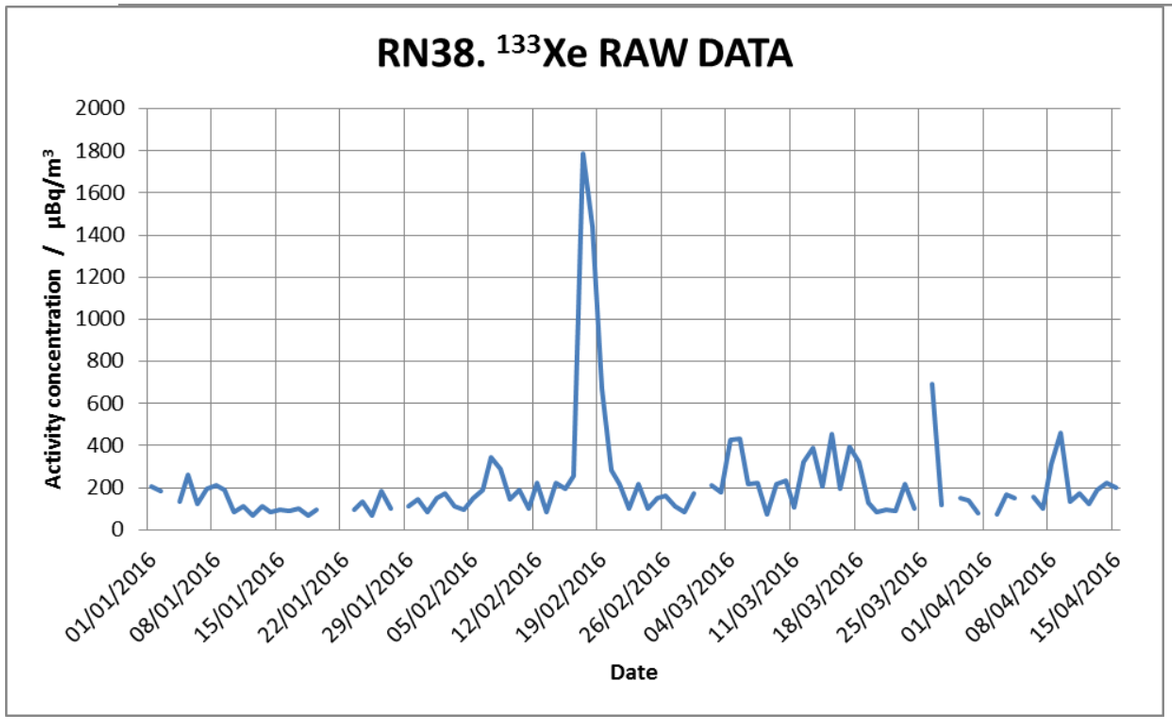

**FRAGMENTED TIME SERIES**

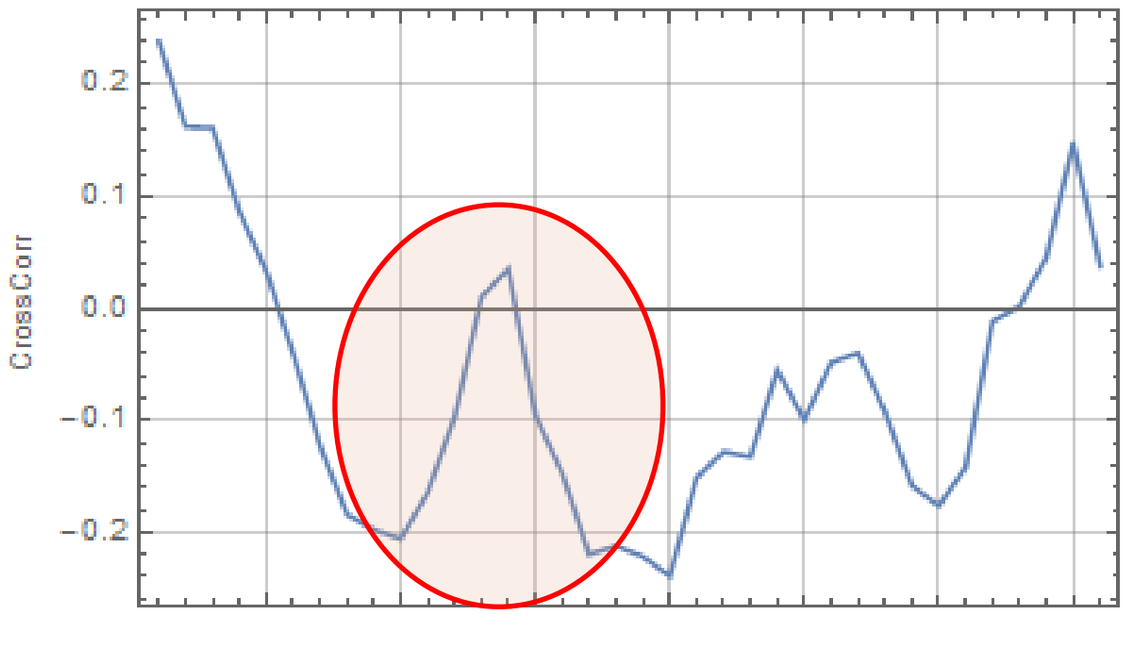


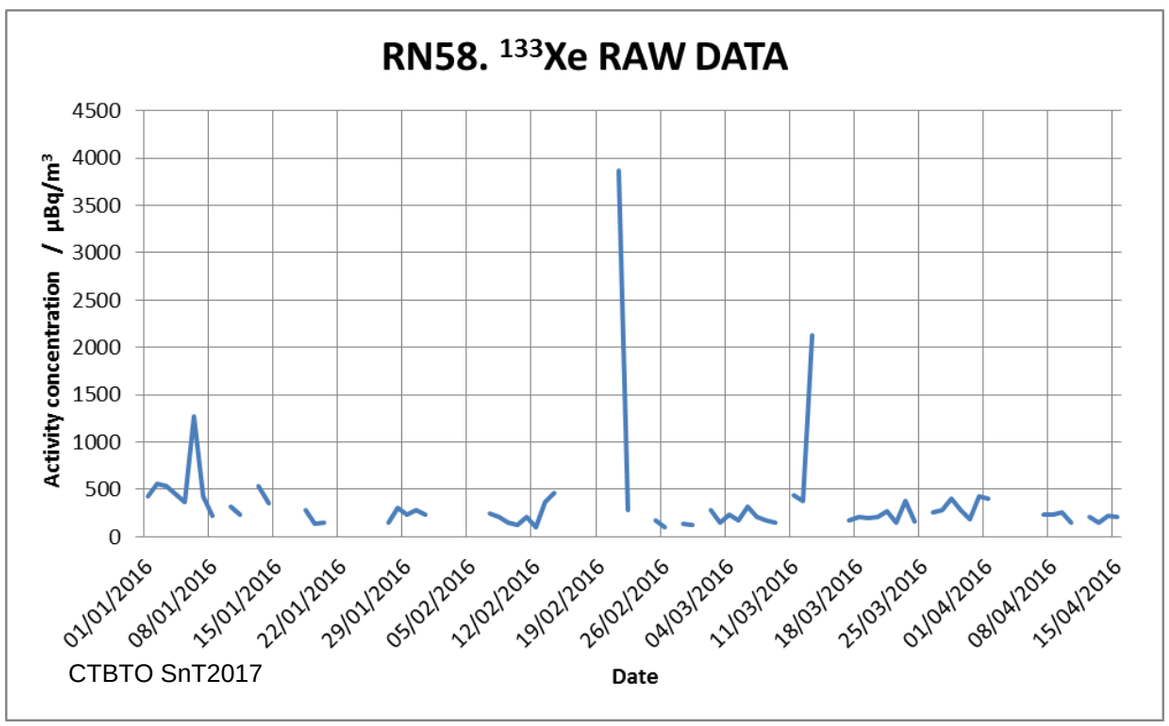

**COMPLETED TIME SERIES**



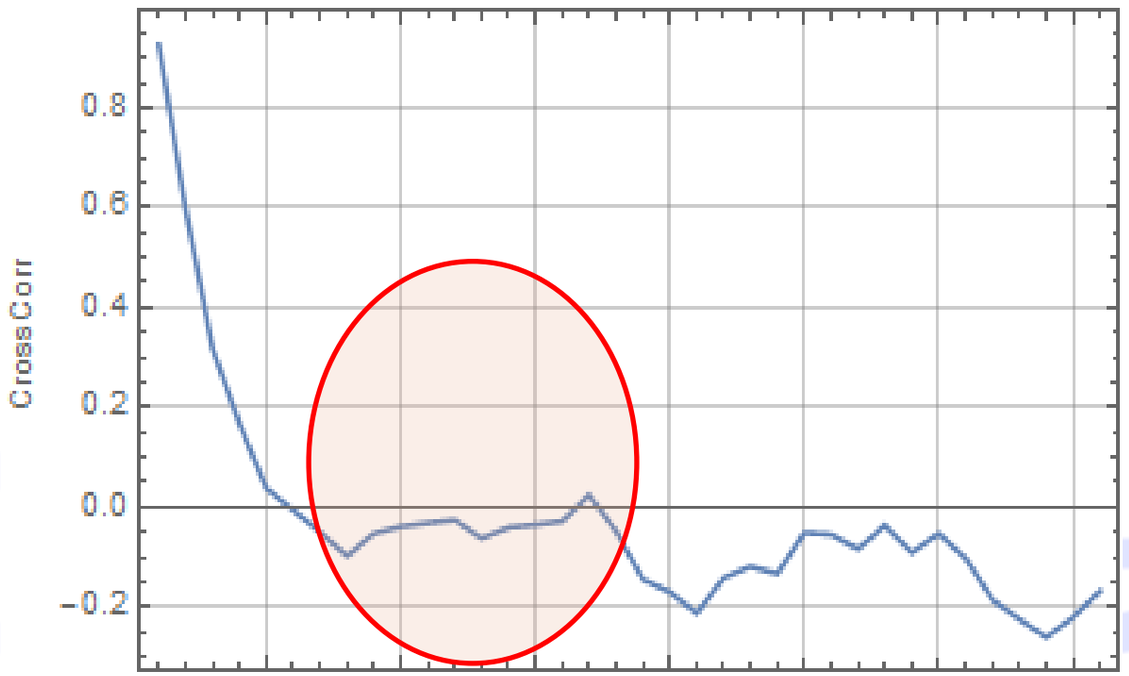
# Advanced analysis techniques: Hilbert's Transform & Cross correlations




**CROSS CORRELATION**



# Conclusions

- The time series is properly reconstructed by the AR model.
  - It preserves the basic statistical descriptors: the average and the standard deviation.
  - The reconstruction provides a continuous series with a significant number of data, allowing the use of more advanced analysis techniques.

- The Hilbert's transform allows to highlight the most significant peaks of the time series.
  - It does not lose information as it does with the use of a signal filter.

- Cross-correlations reveal a possible common causality between time series measured at two stations.
  - It improves the surveillance of the IMS and consequently the compliance with the CTBT.
  - This technique linked to the Hilbert transform leads a more obvious resolution of results.

# Acknowledgements

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