

TIME SERIES RECONSTRUCTION AS A PREVENTIVE MAINTENANCE TOOL FOR THE RADIONUCLIDE IMS DATA

Benito G., Sáez J.C., Blázquez J., Quiñones J.

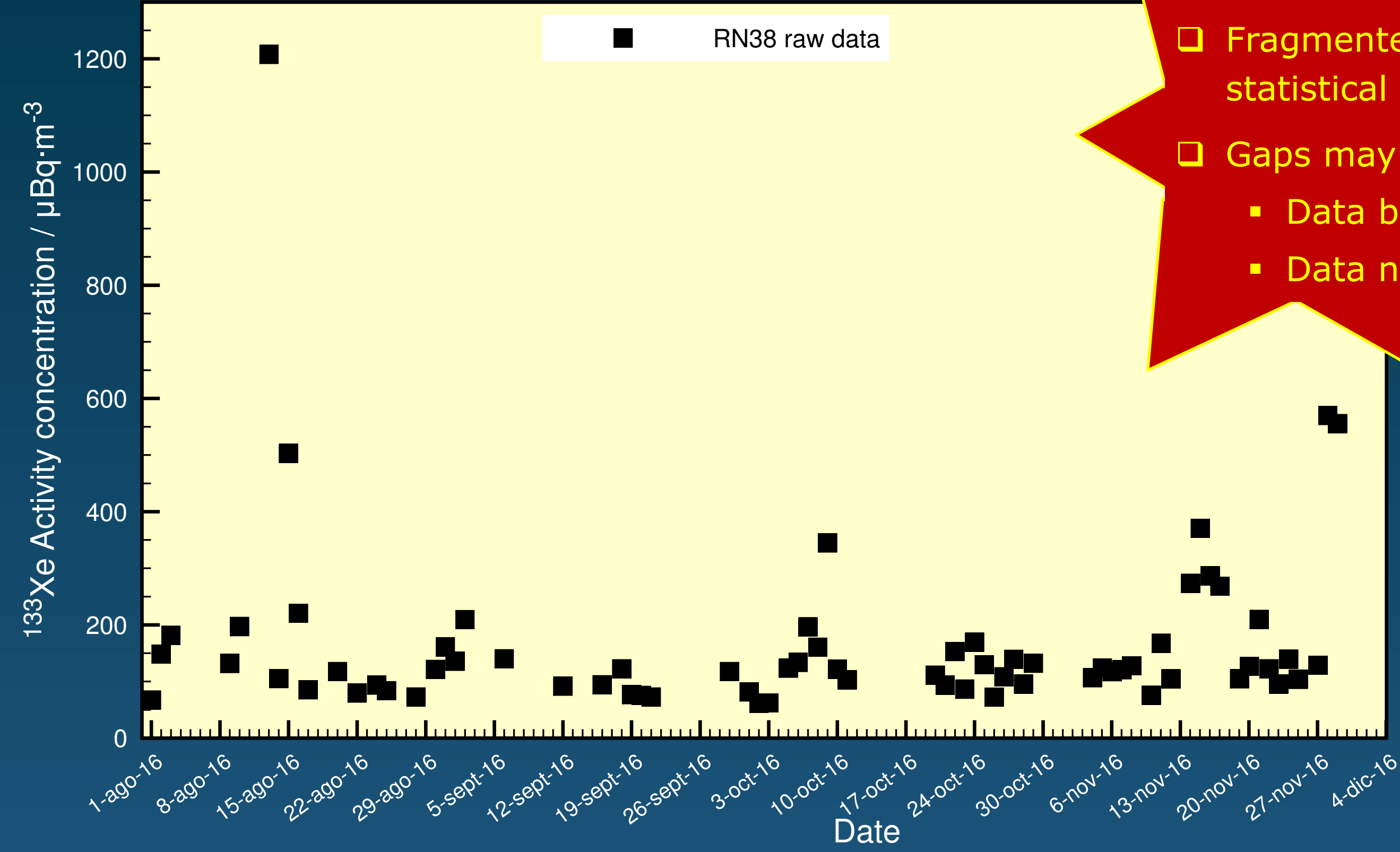
CIEMAT. Avda. Complutense 40. 28040 Madrid. Kingdom of Spain.

gonzalo.benito@ciemat.es, jc.saez@ciemat.es, juan.blazquez@ciemat.es, javier.quinones@ciemat.es

CTBTO
IV ARTICLE SECTION B



¹³³Xe since 1st August to 31st October 2016

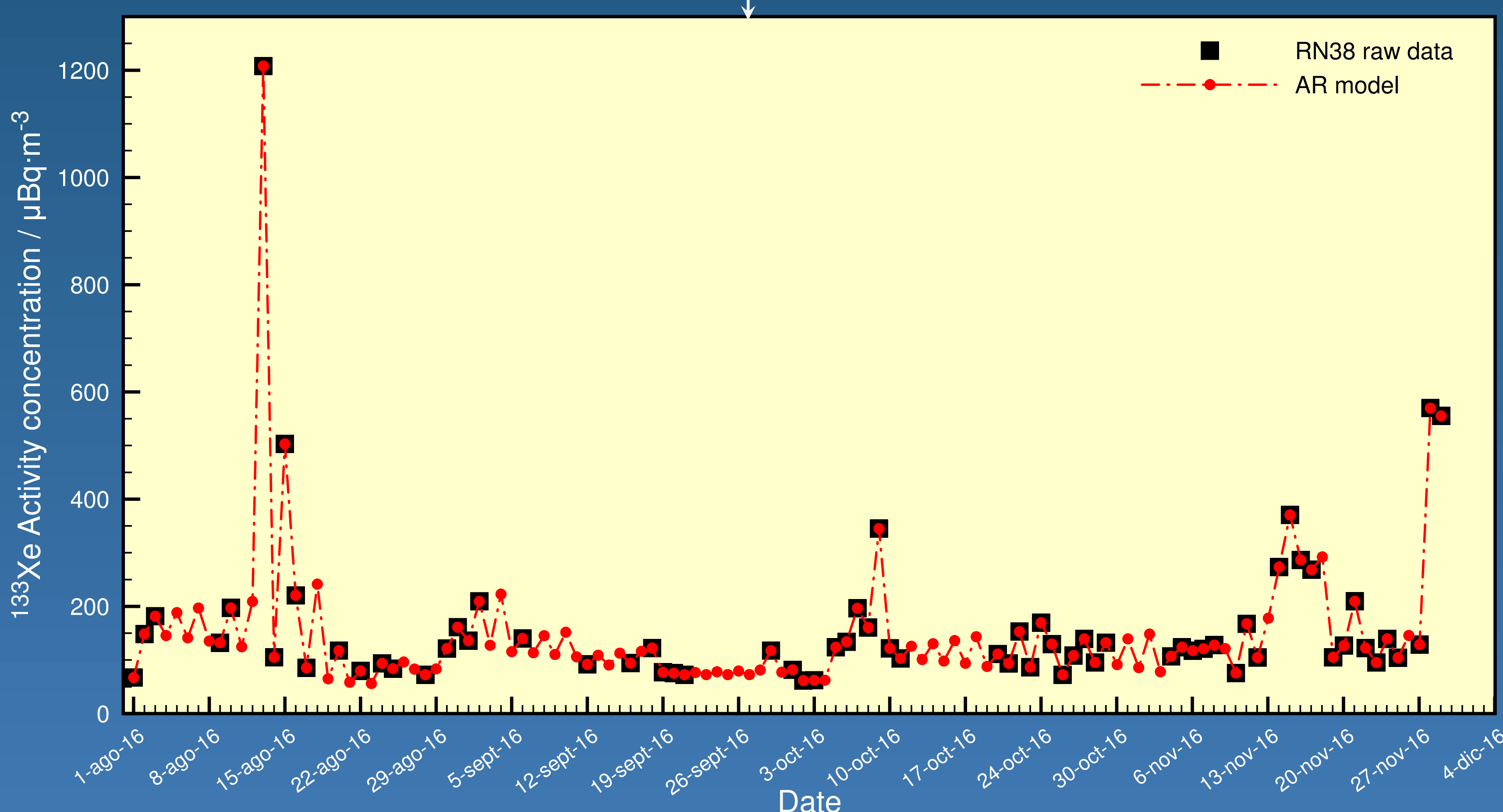


PROBLEMS

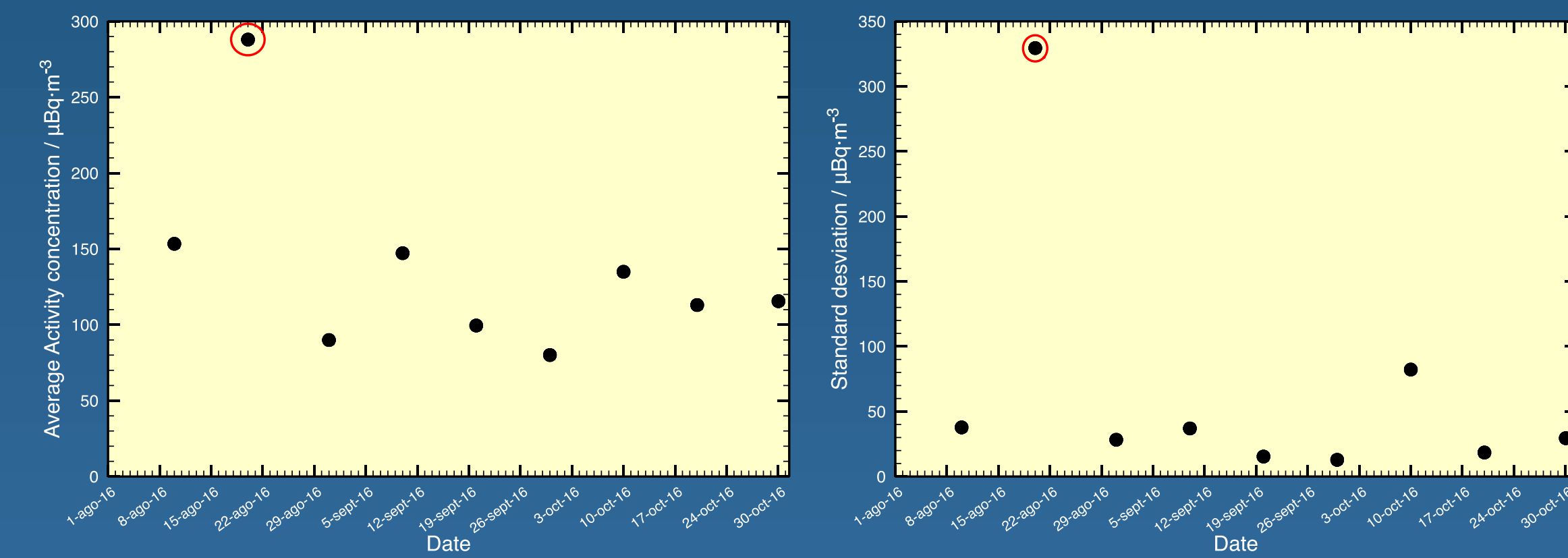
- Fragmented series with poor statistical analysis capacity.
- Gaps may be due to:
 - Data below Detection limit
 - Data not available

Results reviewed interactively by analysts in IDC

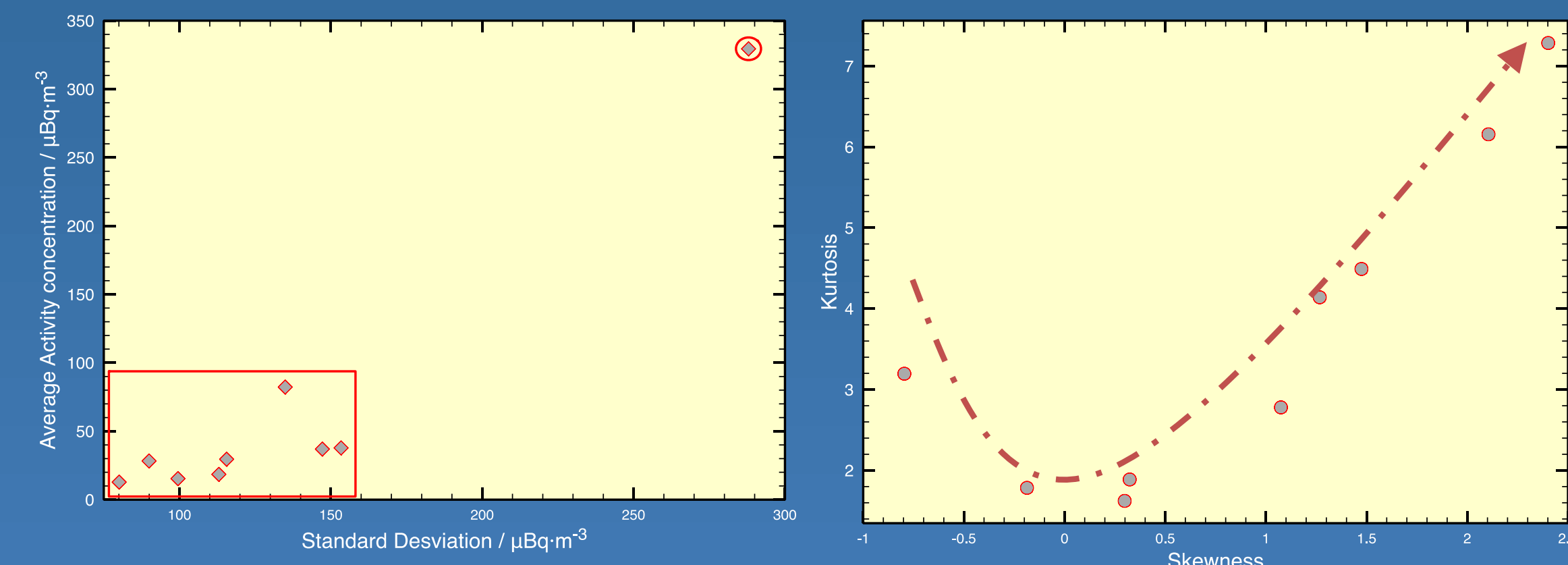
AR model eq.- $x_j = a_0 + a_1x_{j-1} + a_2x_{j-2}$



¹³³Xe RN38. Reconstruction using the Autoregressive Model



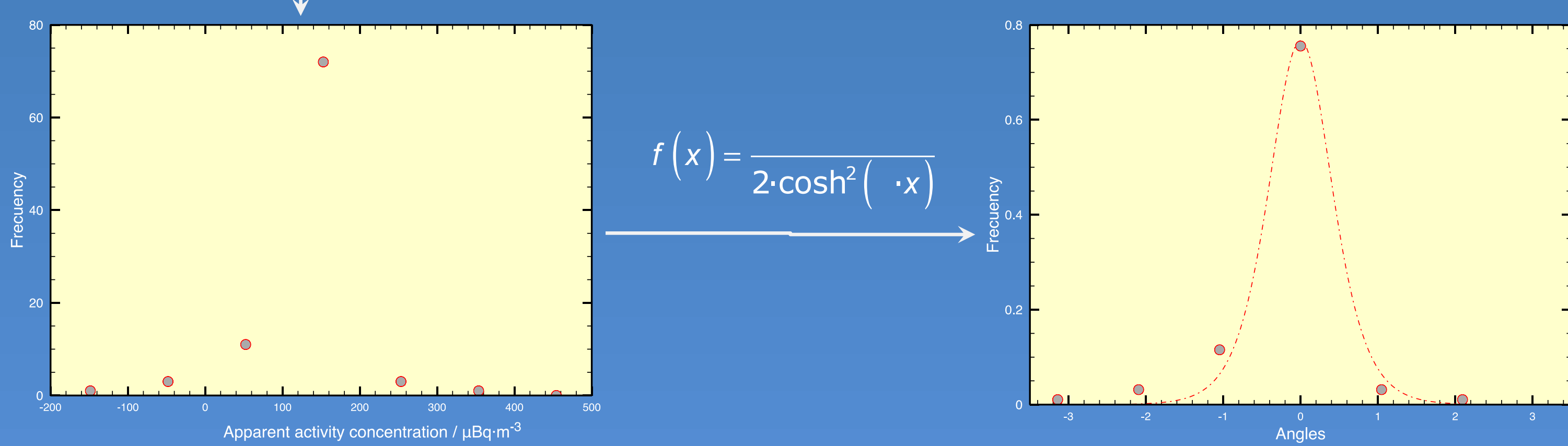
BASIC STATISTICS



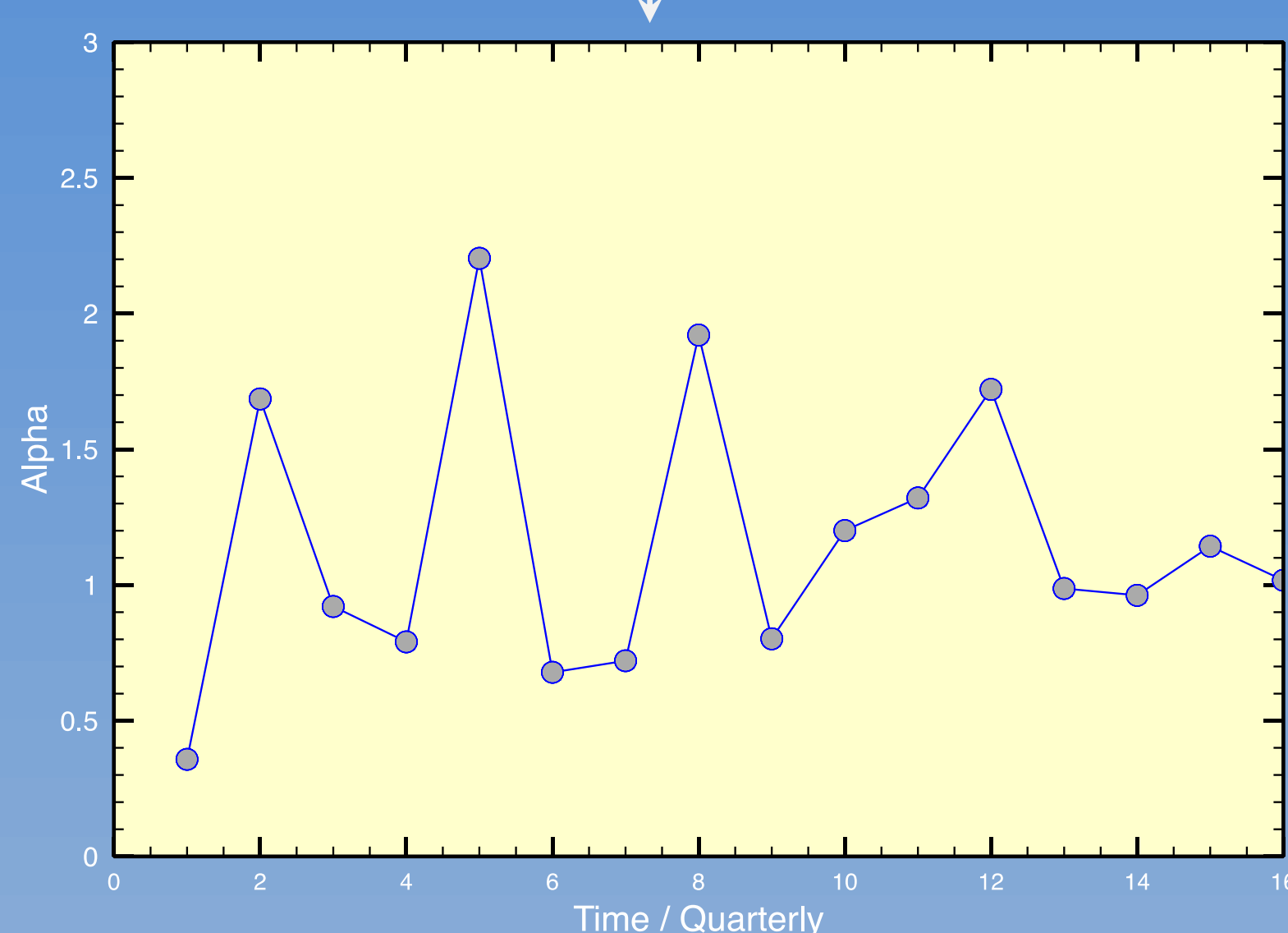
Conclusions

- ✓ AR model allows to reconstruct a fragmented temporal series and to develop basic or advanced statistical techniques.
- ✓ Basic statistic reveals anomalous peaks due to a possible malfunction or an incorrect measurement. In addition, it provides more temporal information on the distribution of the isotope.
- ✓ Advanced statistics are more sensitive and shows a possible background malfunction due to electronic devices, bad connections or other circumstances.
- ✓ AR model is proposed as alternative monitoring methods and quality control of the recorded data.
 - Allowing a better observation and control of the data, besides to perform an predictive maintenance of a station.

HIGH PASS FILTER



ADVANCED STATISTICS



¹³³Xe background at RN38 in the period 2013 - 2016.

Acknowledgements

This work has been performed under the Collaboration Agreement signed between the Spanish Foreign Affairs Ministry and CIEMAT. The authors would like to recognise to Subdirectorato of Non Proliferation and Disarming of the Spanish Foreign Affairs Ministry and Spanish Embassy for International Organisations in Vienna