Contribution ID: **5** Type: **not specified**

Development of novel radiotracers for climate change

The purpose of this LOI is to study the production method of a new radiotracer, within the framework of the REMO/ ClimOcean project, dedicated to developing a novel methodology for monitoring the effects of climate change on marine species using radioisotopes. Radio tracer applications are essential instruments in evaluating the changes in some key biological processes, e.g. primary production, growth and calcification rates. This knowledge is also essential for the risk assessment of coastal ecosystems and the management of the stock of commercial species and to understand the responses of organisms to pH changes. Radiotracers are used to study the main changes of biological processes in selected marine organism (mollusks, crustaceans, seagrasses etc.), e.g. calcifications using 41,45Ca.

The REMO/ClimOcean project aims monitoring the adaptation of marine species to Climate Change. Goal is the study of

the influence of the acidification of the seas and oceans on the growth of various species of coral, bivalves and echinoderms, as they are organisms that build their skeleton or their shell through the production of calcium carbonate. The uptake of isotopes of Ca (41Ca, 45Ca) into the exoskeleton is used to determine the growth of those species, exposed to present and time projected (50-100 years) climatic conditions. Isotopic composition is determined by direct determination of the emitted radiation (45Ca) or by the mass measurements performed with accelerator mass spectrometry (41Ca). In the first case (45Ca) self-absorption of the radiation in the exoskeleton represent a serious limitation for precise assessment of the growth rate. In the second case, since successive measurements on the same individuum are not possible, genetic variability is affecting the results.

A new radio tracer of potential interest is 85Sr, having a similar chemistry to Ca and with a half-life of 64.849 D, compatible with the animal growth. The complementarity here is that, being a gamma emitter, it allows a determination of the growth of the animal not affected by

the uncertainties discussed above, potentially allowing measurements without removing the animal from water.

85Sr could be produced using the SPES cyclotron through the reaction 85Rb(p,n) 85Sr. The production cross section is relatively large, being at 11.5 MeV of 794.6 mb. The idea is to use the 40 MeV proton beam of SPES, degrade it to the required energy using an appropriate Pb foils (thicknesses 2mm), and direct it onto a target of pressed RbCl.

Therefore, with the starting of the operation/tests of the SPES cyclotron, we propose a short exploratory run in which we test the 85Sr production at energies close to the maximum production cross section (with the intention to minimize the contaminants).

Assuming an intensity of the proton beam of about 10 micrAmp, we estimate that about 2 day of irradiation would be sufficient.

Primary authors: RUBIO, Berta (CSIC Valencia); NACHER, Enrique; ZHENG, Fanfei; DE ANGELIS, Giacomo (Istituto Nazionale di Fisica Nucleare); MONTAGNOLI, Giovanna (Istituto Nazionale di Fisica Nucleare); ROCCA, Simone (Istituto Nazionale di Fisica Nucleare)

Session Classification: Fourth Session: Nuclear Physics