UTM UNIVERSITI TEKNOLOGI MALAYSIA	**RESEARCH MANAGEMENT CENTRE (RMC)**	**UTM/RMC/F0097/ (2009)** **6th Revision**

ACTIVITY APPLICATION FORM FOR ATTENDING CONFERENCE / MEETING TRAINING / WORKSHOP/ VISITING / FIELD WORK & DISCUSSION USING RESEARCH GRANT

☎ **07 – 55 37864** 🖷 **07-55 37811**

Note : Kindly submit to Research Management Centre at least **14 days for local** and **60 days (*E-science grant only*) and 28 days (*others grant*) for overseas** from the date of the event. Please fill Section **1 to 5** and *tick* ☑ *in the appropriate box*

1. APPLICANT'S PERSONAL PARTICULARS *(Note: Prior Public Disclosure Approval is compulsory for all forms of presentation in Conference/ Seminar/ Symposium)*

Name *(with designation)*	CIK NURLYANA BINTI OMAR		
Category	☐ UTM Permanent Staff ☐ Temporary ☐ Contract Personnel ☐ RO ☐ RA ☐ ARO RSG: ☐ Master Student ☒ PhD Student SPB: ☐ Master Student ☐ PhD Student ☐ Others		
NRIC / Passport No.	880429-14-5308	**Staff / Temporary & Contract Staff / Student Metric No.**	MS103012
Office Telephone No.		**Office Fax No.**	
Hand phone No.	013-7548934	**E-mail Address**	Double29lynn@gmail.com
Faculty	FAKULTI SAINS	**Nationality**	MALAYSIA
Research Alliance	☐ SUSTAINABILITY ☐ WATER ☐ BIOTECH ☐ MATERIAL & MANUFACRTURING ☐ TRANSPORTATION ☐ ENERGY ☐ INFOCOMM ☐ CYBERNETICS ☐ CONSTRUCTION ☐ K-ECONOMY ☐ NANOTECHNOLOGY		

2. TYPE OF PROGRAMMES

Type of programme	Conference		Training		Seminar		Workshop / Visiting / Discussion / Meeting / Field work / Others	
	☐ *National*	☒ *International*	☐ *Local*	☐ *Overseas*	☐ *Local*	☐ *Overseas*	☐ *Local*	☐ *Overseas*

Name of programme	SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY		
Date of programme	12-14 JULAI 2011	**Venue**	AWANA PORTO MALAI ,LANGKAWI,MALAYSIA

CONFERENCE & JOURNAL PARTICULARS *(Note: For conference's purpose, all items are compulsory. For journal publication, only item remarked * are required)*

Title of Paper *	NATURAL RADIOTRACER Pb-210 in SEDIMENTATION RATE STUDY			
Conference / Journal Status *	☒ Referred	☐ Non-refereed		
Type of Indexed *	☒ ISI	☐ SCOPUS	☐ Others *(please specify)*	☐ Non-indexed
Principal Author *	NURLYANA BINTI OMAR			
Co-Author (s) *	PROF.DR. NOORDDIN IBRAHIM			
Type of Paper	☐ Keynote Paper	☐ Invited Paper	☒ Full Paper	☐ Participant
Type of Presentation	☒ Oral	☐ Poster		
Name of Organizer / Publisher *	MALAYSIA RADIATION PROTECTION ASSOCIATE (MARPA)			

Note : If application is not approved, applicant is allowed to appeal within 3 days AFTER receiving notification from RMC

3. PROJECT PARTICULARS & SPONSORSHIP REQUIREMENT

Project Title	PARAMETERISATION OF THE SOLUTE KINETICS IN BODY FLUID FOR SIMULATING OPTIMAL DIALYSIS TIME OF KIDNEY PATIENT		
Vote No.	Q.J13000.7126.00J55	**Sub-Project No.**	
Type of Grant	☒ GUP *(Fast Lane)* ☐ SCIENCE FUND / TECHNO FUND ☐ INSTITUTIONAL / FAVF / NEW STAFF WITH PHD ☐ FRGS ☐ CONTRACT RESEARCH ☐ OTHERS		

Balance of budget under V21000 ***as at*** **……………………………………….** *(Travel and Transportation)*	**RM** 5,000	
Total Balance ***as at*** **…………………………………..**	**RM** 35,000	
Total Sponsorship Required	**RM**	*Section 3a For RMC purpose only*
• Registration Fee	RM 310	
• Accommodation	**RM** 290	
• Meal Reimbursement	**RM** 50	
• Flight	**RM** 300	
• Others *(Please specify)*	**RM**	
TOTAL	**RM** 950	

I have duly completed this form and attached the following supporting documents		
No	**Item** ***(please tick where appropriate)***	
(i)	Conference/ Training / Seminar / Workshop Brochure (info on date, venue, conference programme / course contents, registration fees)	☐
(ii)	Letter of Acceptance from Conference Organizer	☐
(iii)	Full Paper to be presented (acknowledgement to Funder & UTM)	☐
No	**Additional documents for overseas travel**	
iv)	Recommendation by Dean Research Alliance **(refer No.5)**	☐
(v)	List of publication in journal for the **last 2 years** including current year – **Indexed in ISI & SCOPUS with high impact journal only** ***(please specify)*** ***Format : title of papers, name of journals, volume and page***	☐
(vi)	***Form A / Borang A***	☐
(vii)	Paper work, letter of invitation and *slide presentation if attending **Seminar / Training / Workshop / Field work / * Visiting / * Discussion / * Meeting**	☐
I hereby declare that the particulars in this application are true to the best of my knowledge and belief		

Signature of Applicant		**Date : 10 JUN 2011**

4. RECOMMENDATION BY PROJECT LEADER

(Project Leader to fill in if the applicant is a member of or RO/ ARO/RA/ RSG /SPB employed under the project - please ensure funding agency allows members /RO /ARO /RA /RSG/SPB to attend overseas conference/training/seminar)

Name	**NOORDDIN IBRAHIM**	■	**Recommended**	**Signature :**
Designation	**PROF.DR.**	☐	**Not Recommended**	**Date : 11 JUN 2011**
Remarks	**SILA COP BAGI TUJUAN/BUKTI PNGESAHAN. EMAIL PENGESAHAN JUGA DIBENARKAN SEKIRANYA KP BERADA DI LUAR UTM**			

FOR OVERSEAS TRAVEL

5. RECOMMENDATION BY DEAN OF RESEARCH ALLIANCE

Name		☐	**Recommended**	**Signature :**
Designation		☐	**Not Recommended**	**Date :**
Remarks				

6. RECOMMENDATION BY DEPUTY DIRECTOR OF RMC (RESEARCH PUBLICATION)

Type of Indexed	☐	**ISI**	☐	**SCOPUS**	☐	**Others** *(please specify)*	☐	**Non-indexed**
Journals Publication	**Numbers of paper in indexed journals** *(for the past 2 years including current year)*						☐	**No**
	Numbers of paper in non-indexed journals *(for the past 2 years including current year)*						☐	**No**

Name		☐	**Recommended**	**Signature :**
Designation		☐	**Not Recommended**	**Date :**
Remarks				

7. APPROVAL / RECOMMENDATION BY DIRECTOR OF RMC

Fund Availability	☐	**Yes, recommend the sponsorship according to *Section 3a***	☐	**No**
Name		☐	**Approved/Recommended**	**Signature :**
Designation		☐	**Not Approved/Not Recommended**	**Date :**
Remarks				

SAMPLE: CONFERENCE BROSHURE

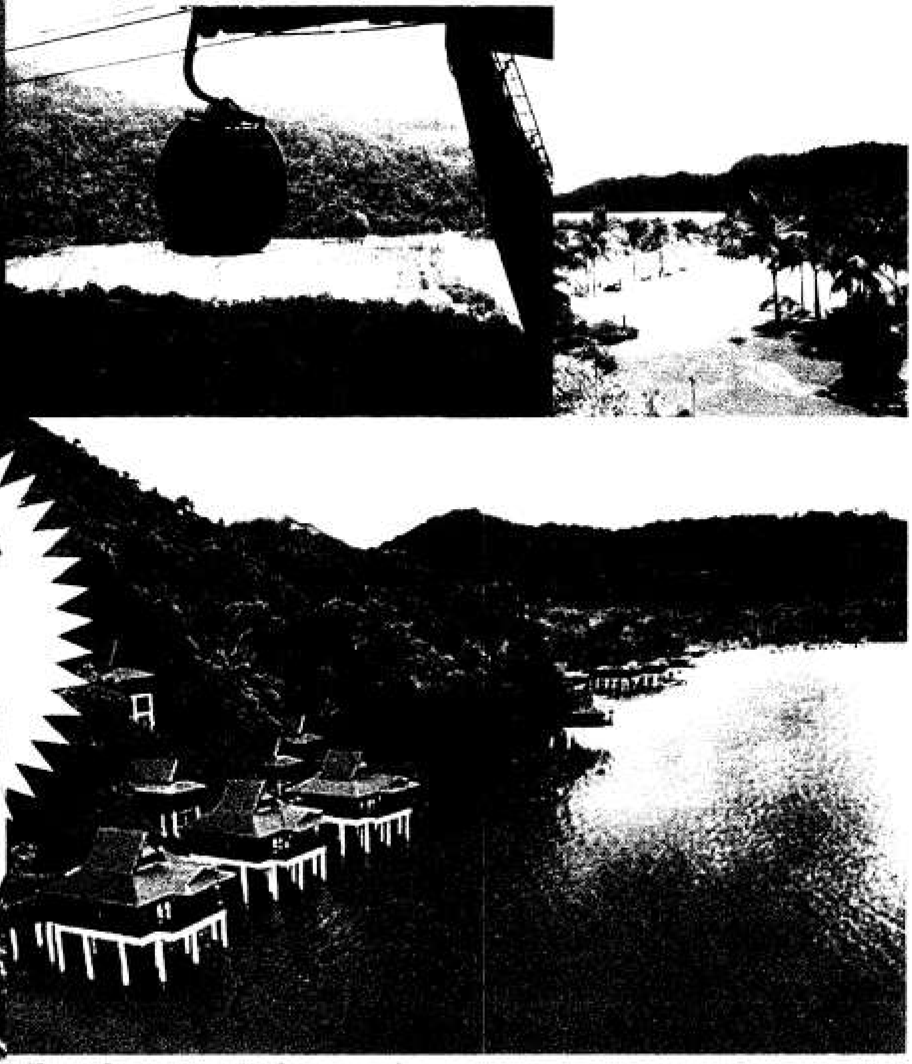
ISORD-6

SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY

12-14 JULY 2011

Key Benefits

- Better understanding on the current issue on radiation safety and detection
- Networking between expert, researcher, scientist and radiation protection practitioner
- Newly emerging technologies



For further information:

ISORD-6 Secretariat
MARPA
Tel: 603-89250510 ext 1771
Fax: 603-89112264
Website : www.isord-6.org.my (to announce soon)
Dr. Noriah Mod Ali (noriaha@nuclearmalaysia.gov.my)

ISORD-6

SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY

12-14 JULY 2011

The broshure should include name of conference, date, venue & organizer

LANGKAWI, MALAYSIA

ANNOUNCEMENT

Organisers :

Malaysian Nuclear Agency
(Nuclear Malaysia)

Malaysian Radiation Protection Association (MARPA)

Langkawi Development Authority (LADA)

Sponsorships :

Kor... Ra... rotection, K...

Japan Health Physics Society, J...

Chinese So... Radiation P...

Hong Kong Radiation Protection Society

Preamble

We are honoured to announce that the sixth International Symposium on Radiation Safety and Detection Technology (ISORD-6) will be held in the legendary island, Langkawi, Malaysia. It will be a great time as for the first time this prestigious event will be organised in a new place, after Korea (2001,2007), China (2005) and Japan (2003,2009). ISORD-6 is expected to draw more than 400 participants from all over the world especially from the Asian and Oceanic Association in Radiation Protection (AOARP). It will serves as a conducive scientific platform dedicated for radiation scientists and researchers to address the state-of-the-art technologies on radiation safety and detection technology.

Areas of interest include:

- Radiation transport and shielding
- Radiation dosimetry
- Radiation detection and sensor technology
- Environmental radiation measurement and assessment
- Radiological risk management
- Radiation protection philosophy
- Policy and current radiological issues.

ISORD-6

SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY

12-14 JULY 2011

LANGKAWI, MALAYSIA

1st ANNOUNCEMENT

Organisers :

Malaysian Nuclear A[illegible]cy (Nuclear Malay[illegible])

Malaysian Radiation Protection Association (MARPA)

Langkawi Development Authority (LADA)

Sponsorships :

Kor[illegible] Radiation Protection, K[illegible]

Japan Health Physics Society, [illegible]

Chinese So[illegible] Radiation P[illegible]

Hong Kong Radiation Protection Society

Preamble

We are honoured to announce that the sixth International Symposium on Radiation Safety and Detection Technology (ISORD-6) will be held in the legendary island, Langkawi, Malaysia. It will be a great time as for the first time this prestigious event will be organised in a new place, after Korea (2001,2007), China (2005) and Japan (2003,2009). ISORD-6 is expected to draw more than 400 participants from all over the world especially from the Asian and Oceanic Association in Radiation Protection (AOARP). It will serves as a conducive scientific platform dedicated for radiation scientists and researchers to address the state-of-the-art technologies on radiation safety and detection technology.

Areas of interest include:

- Radiation transport and shielding
- Radiation dosimetry
- Radiation detection and sensor technology
- Environmental radiation measurement and assessment
- Radiological risk management
- Radiation protection philosophy
- Policy and current radiological issues.

MAIN MENU

- Home
- What's new
- Venue
- Proceedings
- Presentation Guide
- Registration
- Booth
- Abstract Submission
- Hotels
- Local Information
- Contact Us
- Q & A

What's new

NEW!

Confirmation on Reception /BBQ Dinner and Social Tours form

Air Travel - Malaysia Airlines (MAS)

Malaysia Airlines the country's main airline carrier will be providing special assistance to all participants and accompanying persons in making arrangements for their flights. MAS will provide special discounts for participants and accompanying persons to attend the 6th International Symposium on Radiation Safety and Detection Technology 2011 (ISORD-6) as per attached. For further information please click :

(i) Discounted Fares n Term & Conditions
(ii) MAS World Wide Offices

For any enquiries, please contact the nearest local Malaysia Airlines office closest to you.
ISORD-6 proceeding will be published in the Progress of Nuclear Science and Technology, Atomic Energy Society of Japan.

ISORD-6 registration is open!

Important Deadlines:

Registration : **30th June 2011**
Submission of abstract : **31st May 2011**
Notification of acceptance : **16th May 2011**
Submission of full paper : **12th July 2011**

Registration fees:

Fees to be Paid

(i) Ordinary participant: USD 200 (RM 620)
(ii) Student: USD 100 (RM 310)
(Fee covers abstract, conference materials, morning and afternoon coffee breaks, lunch and reception dinner)

Participants may pay the registration fee in advance through telegraphic transfer to the ISORD-6 bank account as follows:

Bank Name : CIMB BANK BERHAD
Account Number : 1232-0004195-05-0
Bank address: Country Heights, Kajang, selangor
Swift: CIBBMYKL

The registration fee will be accepted at the registration desk during the ISORD-6 Symposium. Participants are required to pay registration fee by CASH.

ISORD-6

SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY

Awana Porto Malai Langkawi, Malaysia

12-14 July 2011

DAY 1: TUESDAY 12th JULY 2011

Time	Room A	Room B	Room C	Multi Purpose Hall
09:00-17:00	Refresher Course*/Social Tour**			
16:30- 18:30	Registration (Foyer, Ballroom)			
18:30-20:00	Welcome Reception/Cocktail (Awana BoardWalk)			

DAY 2: WEDNESDAY 13th JULY 2011

Time	Room A	Room B	Room C	Multi Purpose Hall
08:00- 18:30	Registration (Foyer, Ballroom)			
09:00- 09:45	Opening Ceremony (Room A + B)			
09:45-10:45	(Room A + B)	Invited Talk I (Japan) Invited Talk II (Korea)		
10:45-11:00	Coffee Break			
11:00 -12:00	(Room A + B)	Invited Talk III (China) Invited Talk IV (Malaysia)		
12:00-12:30	Group Photograph (Awana BoardWalk)			
12:30-14:00	Lunch (Awana Seagull Coffee House)			
14:00-16:00	Special Session : Accident of Fukushima Daichi Nuclear Power Plant			
16:00-16:20	Coffee Break			
16:20 -17:30	Radiation Transport & Shielding 1 O1_1 O1_2 O1_3 O1_4 O1_5		Radiological Risk Management 1 O5-1 O5-2 O5-3 O5-4 O5_5	PO1; PO2,PO3, PO4, PO5, PO6, PO7, PO8 Exhibition
20:00-22:30	BBQ Dinner (Meritus Pelangi Beach Resort & Spa)			

DAY 3: THURSDAY 14th JULY 2011

Time	Room A	Room B	Room C	Multi Purpose Hall
08:30- 09:40	Radiation Transport & Shielding 2 O1_6 O1_7 O1_8 O1_9 O1_10	Radiation Dosimetry 1 O2_1 O2_2 O2_3 O2-4 O2_5	Radiation protection Philosophy 1 O6-1 O6_2 O6_3 O6_4 O6_5	PO1; PO2,PO3, PO4, PO5, PO6, PO7, PO8 Exhibition
09:40-10:50	Radiation Transport & Shielding 3 O1_11 O1_12 O1_13 O1_14 O1_15	Radiation Dosimetry 2 O2_6 O2_7 O2_8 O2-9 O2_10	Policy and Current Radiological issue 1 O7-1 O7_2 O7_3 O7_4	
10:50-11:10	Coffee Break			
11:10- 12:20	Radiation Detection and Sensor 1 O3_1 O3_2 O3_3 O3_4 O3_5	Environmental Radiation Measurement 1 O4_1 O4_2 O4_3 O4_4 O4_5	Training and Education 1 O8_1 O8_2 O8_3 O8_4 O8_5	PO1; PO2,PO3, PO4, PO5, PO6, PO7, PO8 Exhibition
12:40-14:00	Lunch (Awana Seagull Coffee House)			
14:00-15:10	Radiation Detection and Sensor 2 O3_6 O3_7 O3_8 O3_9 O3_10	Environmental Radiation Measurement 2 O4_6 O4_7 O4_8 O4_9 O4_10	AOARP meeting	
15:10-16:20	Radiation Detection and Sensor 3 O3_11 O3_12 O3_13 O3_14 O3_15	Environmental Radiation Measurement 3 O4_11 O4_12 O4_13 O4_14 O4_15	AOARP meeting	
16:20- 16:40	Coffee Break			
16:40 – 17:15	Closing (Room A & B)			

Room A : Ballroom 1 | Room B : Ballroom 2 | Room C : Bilik Dayang

marpa

MALAYSIAN RADIATION PROTECTION ASSOCIATION

SAMPLE: ACCEPTANCE LETTER (via LETTER/EMAIL)

marpa
MALAYSIAN RADIATION PROTECTION ASSOCIATION

Our file: MARPA/TAD/02(139)
Date : 2 June 2011

Mrs. Nurlyana Omar
Malaysia

Dear Mrs. Nurlyana,

SIXTH INTERNATIONAL SYMPOSIUM ON RADIATION SAFETY AND DETECTION TECHNOLOGY (ISORD-6)

Thanks for your interest to participate and present paper in ISORD-6. On behalf of the Organising Committee, I am glad to inform you that your paper entitle **"Natural Radiotracer ^{210}Pb In Sedimentation Rate Study"** had been selected for Oral presentation.

Acceptance Full Paper by Organizer

2. Hence, let me have the privilege of formally inviting you to this conference that is to be held at Awana Porto Malai, Langkawi on 12-14 July 2011. Your attendance is greatly appreciated and will definitely contribute to the success of this conference.

3. Please note that you may be requested to apply for a visa, if necessary please do so in your own country.

Looking forward to seeing you in Langkawi soon, thank you.

Yours faithfully,

Dr. Noriah Mod Ali
ISORD-6
Secretariat

Suite 30003, Building 32,
Malaysian Nuclear Agency (Nuclear Malaysia)
Bangi, 43000 Kajang, Selangor, Malaysia
Tel:603-89282961 Fax:603-89112164

SAMPLE: FULL PAPER TO BE PRESENTED

Natural Radiotracer ^{210}Pb In Sedimentation Rate Study

Nurlyana Omar*,Noorddin Ibrahim,
Department of Physics, Science Faculty, Universiti Teknologi Malaysia
81310 UTM Skudai Johor, Malaysia

Natural radiotracer ^{210}Pb (half life 22.2 years) can be use in gaining the important information about the environment in 100 years scale. The isotope ^{210}Pb occurs naturally as part of ^{238}U decay which decays through a series of non-volatile intermediates to ^{226}Ra (half life 1.6x10^{3} years) and ^{222}Rn an inert gas with 3.8 days of half life. Total ^{210}Pb concentrations present in lake or ocean sediments consist of two origins, one brought down by the wet precipitation and dry fallout process from the air and another derived from ^{226}Rn through ^{222}Rn in the soil. The former is often called unsupported ^{210}Pb or excess ^{210}Pb (referred to as $^{210}Pb_{ex}$) and the latter is called supported ^{210}Pb. This study overview the theoretical concepts and techniques used in determining the sedimentation rate based on radiotracer ^{210}Pb. Results from several studies will be presented and discussed.

Keyword – ^{210}Pb, ^{226}Ra, sedimentation rate

Introduction

One of the most promising methods for estimating sedimentation rate is by using naturally occurring radionuclide such as ^{210}Pb and also anthropogenic radionuclide like ^{137}Cs. They have been used in sedimentation rate studies since 1960 and ^{210}Pb was initially used by Goldberg in 1963. ^{210}Pb with half-life 22.3 years can be used to study the sedimentation rate on a time scale of 100 – 150 years whereas for ^{137}Cs with 30 years half-life is a common practice for it to be used as an independent tracer to support ^{210}Pb dating methods. The application of the ^{210}Pb dating analysis is based on the assumption of a steady supply of unsupported ^{210}Pb to the site over the time interval being studied. ^{210}Pb radionuclide occurs naturally as part of the radioactive decay chain of ^{238}U. It decay through a series of non-volatile intermediate to ^{226}Ra (half-life 1.6x103 years) which in turn decay to ^{222}Rn (half-life 3.38 days)

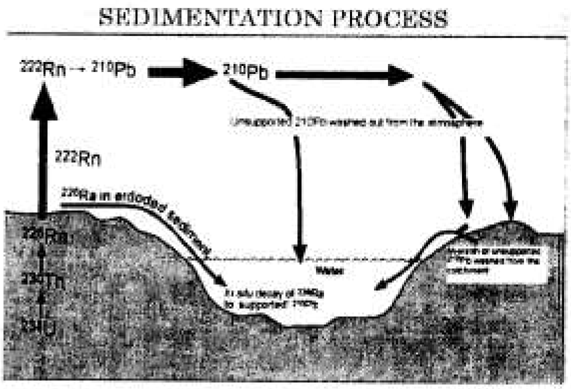


Figure 1.1 ^{210}Pb decay Chain

It decays via a series of short-lived daughter to ^{210}Pb. This decay happened in the soils at the ground level from the radium decay scheme. Total ^{210}Pb in the soil at the ground surface therefore contains two types of ^{210}Pb, one brought down by the wet precipitation and dry fallout process from the air and another derived from ^{226}Rn through ^{222}Rn in the soil. The former is often called unsupported ^{210}Pb or excess ^{210}Pb (referred to as $^{210}Pb_{ex}$) and the later is called supported ^{210}Pb. (Kanai, 2000). The activity of this supported ^{210}Pb were assumed to be equilibrium with the parent ^{226}Rn and to measure ^{210}Pb activity, it can be determined by measuring ^{226}Rn whereas, the unsupported ^{210}Pb, can be measure by subtracting the supported from the total ^{210}Pb activities.

2.0 Theory

Lots of research such as, Humpheries et. al, 2010, or Mizugaki et. al, 2006, was been done to study the sedimentation rate or also known as accumulation rate in the ocean and river area. Natural radionuclide had become a powerful tracer that can provide basic insights into the marine processes. Sediments are known to be a good archive of environmental processes since it is easy to find natural radionuclide in the soils. There are few mathematical model that can be used to calculate sedimentation rate, which is the Constant Rate of Supply model (CRS), the Constant Initial Concentration model (CIC), Shukla-CIC model and Advection-Diffusion Equation (ADE) that are used to calculate the sedimentation rate based on the unsupported ^{210}Pb activity profiles on a sediment core. (Wan Mahmood., et, al., 2010).

2.1 Constant Rate Supply (CRS)

In constant rate supply (CRS) as initiated by some scientist it assumes that there is a constant ^{210}Pb flux at water-sediment interface and requires both the integrated activity and the differential activity to yield a variable sedimentation rate. Thus, this model is used when the supply of unsupported ^{210}Pb is constant and the sediment deposition rate is variable. (Wan Mahmood., et, al., 2010).

From radionuclide activity equation,

$$A_x = A_o e^{-\lambda t}$$

$$\mathbf{A_x = A_o e^{-\lambda(x/s)}}$$

$$\mathbf{s = \lambda x / \ln [A_{co}/A_{cx}]}$$

A_{co} = calculated as the average of several cumulative $^{210}Pb_{ex}$

A_{cx}=cumulative $^{210}Pb_{ex}$ activity in sediment of depth x

s = sedimentation rate (cm/y)

x = depth (cm)

t = sediment age

λ = decay constant

There is some research that used this model to calculate the sedimentation rate such as the research that has been done by M.S Humpheries et. al., 2010 in ^{137}Cs and ^{210}Pb derived sediment accumulation rates and their role in the long-term development of the Mkuze River floodplain, South Africa. Since each mathematical model used different type of constant, not every model is suitable for each situation. As stated in

J.Miralles et. al., 2005, this model is not suitable in her research study because most of the published data do not concern the cumulative mass depth value that necessary for the calculation.

2.2 Constant Initial Concentration (CIC)

The most convincing mathematical calculating model is the Constant Initial Concentration (CIC) model. Constant Initial Concentration (CIC) model was originally developed by Goldberg in 1963, although its first application to lake sediments was by Krishnaswamy et. al.,(1971). The CIC model assumes that, each stage of sediment accumulation has a constant initial unsupported ^{120}Pb concentration.

From radionuclide activity equation,

$$A_x = A_o e^{-\lambda t}$$

$$A_x = A_o e^{-\lambda(x/s)}$$

$$A_x = A_o e^{-\lambda(x/\lambda a)}$$

$$\mathbf{A_x = A_o e^{-(x/a)}}$$

s = sedimentation rate

= λa

x= depth (cm)

a = slope of the line

A_x= is the unsupported ^{210}Pb activity at layer x

A_o= is the unsupported ^{210}Pb at the surface layer

2.3 Advection-diffusion Equation (ADE)

The other mathematical model is, Advection-diffusion equation (ADE). This model is use to calculate the sedimentation rate based on 210Pb activity profile in sediment core.

Fron radionuclide activity equation,

$$A_x = A_o e^{-\lambda t}$$

$$\mathbf{A_x = A_o e^{-\lambda(x/s)}}$$

$$\mathbf{s = \lambda x / [\ln (A_o/A_x) - D_b / x (\ln (A_o/A_x))]}$$

Ao = activity of unsupported ^{210}Pb at an upper sediment level

Ax = activity of unsupported ^{210}Pb at a lower level with the distance x below Ao

D_b = biodiffusion coefficient (cm^{-2} $year^{-1}$)

2.4 $^{228}Ra/^{226}Ra$ ratio

One alternative approach would be to utilize the expected ingrowths of ^{228}Ra to secular equilibrium with its parent ^{232}Th to provide a new geochronometer. With time (and burial) radium isotopes will grow into secular equilibrium as a function of their half-lives, providing a potential means of determining sediment accumulation rates. In growth of ^{228}Ra (5.8y) relative to longer half-lived ^{226}Ra (1600y) with depth in the seabed could be a viable geochronometer on about a 30 year time scale. Calculations of accumulations rates are made using the general ingrowths equation, applied to activity ratios (Dukat, and Kuehl,1995)

Let x = ratio ^{228}Ra / ^{226}Ra

y = ratio ^{232}Th / ^{226}Ra

From $x = y\,(1 - \exp^{-\lambda t})$

Where

λ = decay constant for ^{228}Ra (0.121 y)

t = time (y)

If accumulation rate is constant, then;

$t = d/R$

Where d = depth and R = accumulation rate

Substituting into the general equation gives;

$$\mathbf{Ln\,[\,1 - (x/y)]\,/\,d = -\lambda\,/\,R}$$

Plotting Ln [1 – (x/y)] versus depth, d, the slope of the line $m = -\lambda / R$ can rearranged to obtain the sedimentation accumulation rate, R.

3.0 Discussion

There are two method that can be use to study the sedimentation rate. One is by using alpha spectrometry and another is by using gamma spectrometry. There are question on which method need to be use or which one is better. This section will explain about the basic concept both of the method.

By using alpha spectrometry, we will be detecting ^{210}Po. ^{210}Po release 5.3MeV alpha energy which can be considers a high energy. All nuclide that decay through alpha decay will decay spontaneously and transform into an atom that have less two unit of atomic number and also less four unit of mass number.

The second method is by using gamma spectrometry. We will be detecting ^{210}Pb with 46.5Kev gamma energy. As we can see, 46.5KeV are low energy compared to ^{210}Po. Because of the easily detected factor, some researcher use 210Pb as the radiotracer in sedimentation rate study. In sedimentation rate study, we assume that there is constant supply of excess ^{210}Pb from the atmosphere to the site of experiment. Gamma ray is an electromagnetic radiation or high frequency. Gamma rays actually comes alongside with other form of radiation which is alpha or beta decay and are produce after the other type of decay occur. The mechanism is that when a nucleus emits an alpha or a beta particle, the daughter nucleus is usually left in excited state. It can be move to the ground state by emitting gamma ray. Emission if gamma ray from an excited nuclear state typically requires 10^{-12} sec and it almost instantaneous.

As example, in alpha decay of ^{241}Am to ^{237}Np,

$$^{241}_{95}\mathrm{Am} \longrightarrow {}^{237}_{93}\mathrm{Np} + {}^{4}_{2}\mathrm{He} + \gamma$$

Figure 1.0 Alpha Decay

Since emission of gamma ray is almost instantaneous, it can be detected easily compare to alpha decay.

Acknowledgement

The authors would like to thanks the MOHE and Universiti Teknologi Malaysia (UTM) for GUP grant that have been supported this research.

Acknowledgement to Funder ,vot no & UTM

Reference

1. Walling, D.E and He, Q., (1993) Towards improving interpretation of 137Cs profiles on lake sediment. In Geomorphology and sedimentatology of Lakes and Reservoirs, et J.Mc Manus and R.W Duck pp31-53. Wiley, Chichester.
2. Robbins, J.A., Edgington, D.N., (1975) Determination of recent sedimentation rates in Lake Michigan using 210Pb and 137Cs. Geochemical et Cosmochimica Acta 39, 295-304.
3. Dibb, J.E and Rice, D.L (1989) The Geochemistry of Beryllium in Chesapeaks Bay. Estuarine Coastal Shelf Sc1.,28: 379-394
4. Durham, R.W and Joshi, S.R (1980) Recent sediment rates ^{210}Pb flux and particle settling velocities in lake Huron Great Lakes, Chem. Geo 31, pp53-66
5. Krishnawamy et al (1971) Geochronology of lake sediments. Earth Planet Sci Lett., 11, pp407-414.
6. Koide, M et al (1972) Marine geochronology with ^{210}Pb. Earth Planet Sci. Lett., 14:442-446.
7. Edgington et al (1991) Sedimentation rates, residence time and radionuclide inventories in Lake Baikal from ^{137}Cs and ^{210}Pb in sediment cores, Nature 380, pp 601-604.
8. Goldberg, E.D., (1963) Geochronology with ^{210}Pb in "Radioactive Dating". International Atomic Energy Agency Symposium Proceeding, Vienna 1962, 121-131.
9. Kanai, Y., (2000) A studies in lead-210 dating. Chikuyukagaku (Geochemistry) 34, 23-29 (in Japanese, with English abstract)
10. Chakrabarty, A et al (2006) Sedimentation rate of Nargajuma Sagar Dam using natural radiotracer in Application of radiotracers in chemical, environment and biological sciences, Pub. Saha Institute of Nuclear Physics, Kolkata, Vol 2, 148-150.
11. Dukat, D.A and Kuehl, S.A (1995) Non steady state ^{210}Pb flux and the use of ^{228}Ra/^{226}Ra as geochronometer on the Amazon continental Shelf. Marine Geology 125, 329-350.
12. Wan Mahmood, Z.U et al (2010) Intercomparison of technique for estimation of sedimentation rate in the Sabah and Sarawak coastal water.
13. M.S Humpheries et. al., (2010) ^{137}Cs and ^{210}Pb derived sediment accumulation rates and their role in the long-term development on the Mkuze River floodplain, South Africa.
14. J.Miralles et. al.,(2005) ^{210}Pb sedimentation rates from the Northwestern Mediterranean margin