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GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT INITIATION

Date: August 21, 1973

Project Title: "Studies of the Age and Diagenetic History of Argillaceous Sediments"

Project No: G-35-609

Principal Investigator: Dr. J. M. Wampler

Sponsor: Americal Chemical Society, The Petroleum Research Fund

Agreement Period: From September 1, 1973 Until August 31, 1975

Type Agreement: Grant No. PRF 6620 - AC2

Amount: $15,000 from ACS - PRF

Reports Required: Annual Technical Report
Final Technical Report

Sponsor Contact Person (s): Justin W. Collat
Program Administrator
ACS - PRF
1155 Sixteenth Street N. W.
Washington, D. C. 20036
phone (202) 874-4481

NOTE: $10,000 for period 9/1/73 - 8/31/74
$ 5,000 for period 9/1/74 - 8/31/75

Assigned to: Geo Phy Sci

COPIES TO:

- Principal Investigator
- School Director
- Dean of the College
- Director, Research Administration
- Director, Financial Affairs (2)
- Security-Reports-Property Office
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- Photographic Laboratory
- Project File
- Other

RA-3 (6-71)

INSERT DATE RECEIVED FROM ORIGINATING DEPARTMENT

August 21, 1973

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: October 28, 1976

Project Title: Studies of the Age and Diagenetic History of Argillaceous Sediments.

Project No: G-35-609

Project Director: Dr. J. M. Wampler

Sponsor: American Chemical Society - The Petroleum Research Fund

Effective Termination Date: 12/31/75

Clearance of Accounting Charges: 12/31/75

Grant/Contract Closeout Actions Remaining: None

_ Final Invoice and Closing Documents
_ Final Fiscal Report
_ Final Report of Inventions
_ Govt. Property Inventory & Related Certificate
_ Classified Material Certificate
_ Other _____

Assigned to: Geophysical Science (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
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CA—4 (3/76)

RESEARCH PROGRESS REPORT

Page 1 of 1 pages.

Date 29 September 1976

PRF# 6620-AC2

PRINCIPAL INVESTIGATOR(S)

J. M. Wampler

Please refer to instructions.

Fill in information requested above for each page.

The report heading, narrative, and all drawings must be prepared within the box.

Make copy (Xerox, carbon, etc).

6620-AC2 Ar^{40}/Ar^{39} Studies of the Age and Diagenetic History of Argillaceous Sediments

J. M. Wampler, Georgia Institute of Technology

We studied the thermal release pattern of radiogenic argon from fine-grained feldspar samples of varying size, and measured the $^{40}Ar/^{39}Ar$ thermal release spectrum of additional clay mineral samples. Although the thermal release pattern is different for different minerals, and is size dependent, there is a considerable overlap of the temperature ranges in which the constituents of argillaceous sediments release argon. Because of the lack of selectivity in thermal release of argon, and because of recoil-induced loss of ^{39}Ar from clay minerals, we look forward to selective release of argon and potassium by chemical reaction as the best way to study potassium-argon relationships in sedimentary samples.

A study of potassium-argon age relationships of diabase dikes in Georgia was continued. Extraneous radiogenic argon is present in the dikes in a portion of the state, so an extensive study of the potassium-argon systematics in these rocks will be necessary before the correct age pattern may be firmly established.

PERSONNEL STATEMENT

PRF# 6620-AC2 REPORTING PERIOD 1 Sept. 1975 TO 31 Aug. 1976

GRANTEE INSTITUTION Georgia Institute of Technology DEPARTMENT Geophysical Sciences

PRINCIPAL INVESTIGATOR(S) J. M. Wampler

GRANT PROJECT TITLE Ar^{40}/Ar^{39} Studies of the Age and Diagenetic History of Argillaceous Sediments

List undergraduate, graduate, and postdoctoral co-workers receiving stipends under the above named grant:

NAME	TITLE OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES*	COUNTRY OF PERMANENT RESIDENCE	PERIOD OF SUPPORT (MONTHS)	PERCENT OF SUPPORT FROM PRF	DEGREES RECEIVED (IF ANY) DURING REPORTING PERIOD
Robert E. Dooley	Research Asst.	B.S. Ga. State University	USA	3	40%/3 months	M.S. in Geophysical Sciences expected 12/76

List other co-workers on grant project not directly supported with ACS - PRF funds:

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT PROJECT

* For graduate students, indicate the College or University attended prior to graduate work. For postdoctoral fellows, give the name of the Ph. D. granting institution.

File: G-35-609

1 of 1

BRIEF ANNUAL REPORT

PRF # 6620-AC2

TITLE OF GRANT: Ar^{40}/Ar^{39} Studies of the Age and Diagenetic History of Argillaceous Sediments

PRINCIPAL INVESTIGATOR: J. M. Wampler

INSTITUTION: Georgia Institute of Technology

We built and established procedures for use of a system for release of argon from minerals under well controlled temperature conditions. We studied the adsorption of argon on cold trap ices (H_2O and CO_2) and established a procedure for cold-trapping these volatiles without significant adsorption or trapping of argon.[1] This work is important to our studies of argillaceous sediments because large amounts of H_2O and CO_2 may be released upon heating of such samples. Cold trapping is the most rapid way to handle these volatiles in an argon analysis system.

A variety of samples were irradiated for $^{40}Ar/^{39}Ar$ studies, including finely comminuted samples of pure minerals and natural sediment samples. Although the analysis of these samples is not complete, the following conclusions appear warranted at this time:

1. The $^{40}Ar/^{39}Ar$ method will be applicable for the determination of potassium argon ratios in sedimentary materials with grain size greater than approximately 1 micrometer, excepting materials which have a significant proportion of expandable layers or other structural features which will allow escape of ^{39}Ar.

2. Large fractions of ^{39}Ar will be lost from clay mineral samples with a significant proportion of expandable layers (e.g. glauconite). The loss is attributable to recoil of the ^{39}Ar to a site where it may readily diffuse from the crystal, as well as to recoil completely out of a crystal. The proportion of ^{39}Ar lost is related to the proportion of expandable layers in glauconite.

(1) J. M. Wampler and Yotaro Yanase, Argon Adsorption and Trapping by Cold Trap Ice (Abstract), EOS Transactions, American Geophysical Union 55, 472 (1974).

D. ANNUAL PERSONNEL STATEMENT

(One Copy Needed)

PRF # 6620-AC2 REPORTING PERIOD September 1, 1973 TO August 31, 1974

PRINCIPAL INVESTIGATOR J. M. Wampler INSTITUTION, Georgia Institute of Technology
ACADEMIC DEPT. School of Geophysical Sciences

TITLE OF GRANT Ar^{40}/Ar^{39} Studies of the Age and Diagenetic History of Argillaceous Sediments

UNDERGRADUATE SCHOLARS, PREDOCTORAL FELLOWS OR ASSISTANTS, AND POSTDOCTORAL FELLOWS RECEIVING STIPENDS UNDER ABOVE NAMED GRANT

NAME	TITLE, OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES[1]	COUNTRY OF PERMANENT RESIDENCE	FRACTION OF INDIVIDUAL'S TOTAL SUPPORT FROM PRF (IN REPORTING PERIOD)	DEGREES RECEIVED (IF ANY, DURING REPORTING PERIOD)
Yotaro Yanase	Postdoctoral Fellow	PhD U. of Toronto	Japan	3/4	None
Robert E. Dooley	Research Assistant	B.S. Ga. State U.	U.S.A.	1/12	None

OTHER PERSONNEL ENGAGED IN RESEARCH ON GRANT BUT NOT DIRECTLY SUPPORTED WITH ACS-PRF FUNDS

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT RESEARCH
J. M. Wampler	State of Georgia	Sept. 1,1973 - August 31, 1974

[1] For graduate students, indicate the name of College or University attended prior to graduate work; for post-doctoral fellows give the name of the Ph.D. granting institution.

Rev. 6/72