

本年度のF T研究会の講演会は12月15日に姫路工業大学において開催した。昨年度2日間の講演会を開催したのに対して本年度は1日だけとなり、会員の皆様には申し訳なく反省しております。来年度以降は少なくとも2日間の会が開催されるよう皆様と共に努力するよう務めたいと思っております。

この講演会では15の一般講演が行われ、F T年代測定法の基礎的な実験、熱史の解明への応用、国内年代標準試料候補などについて活発な討論がなされた。また、特別講演として、姫路工業大学の寺澤倫孝先生にP I X Yを中心に「高エネルギーイオンによる物質のキャラクタリゼーション」という題目で講演いただき、予定の時間をオーバーして質問質疑がなされた。

講演会の後、総会が開かれ、次のような討議議決がなされた。

1. 金 詰 佑、森永速男両氏入会が承認された。
2. 西村 進会員から1992年度のIGCと1991年4月の地球惑星科学関連学会合同大会に対する準備の現状について紹介があり協力の要請がなされた。
3. 年代標準候補試料について各試料の世話人はできるだけ早く配布して頂くように要請した。また、これまで候補に上がっていないものでも、適当と思われる試料があれば随時紹介していただき、F T研究会として検討していく旨を確認した。
4. 本多照幸、西村 進両会員からそれぞれ武蔵工業大学と京都大学の原子炉の現状および将来の見通しについて紹介があった。

総会終了後、会場を姫路市内にうつし特別講演者を交え、懇親会を持った。

参加者：会員17名（岩野英樹、糟谷正雄、河合 廣、雁沢好博、角井朝昭、檀原 徹、西村 進、橋本哲夫、本多照幸、升本眞二、松田高明、水上海奈江、森永速男、森本祐一郎、山下 透、渡辺公一郎、弘原海清）、会員外9 + α 名：能美洋介、日野 健、北田奈緒子、ギェム ヴィ カイ（大阪市大）、野村 聡、黒木宏治（九大）、野毛勇二（武蔵工大）、寺澤倫孝、後藤 篤（姫路工大）

" O N T R A C K "

(Newsletter of the International Fission-Track Community)

渡辺公一郎会員のもとへ David A. Coyle から " O N T R A C K " に関する手紙 (下記) と Volume 1 が送られてきましたので掲載致します。御一読ください。

At an evening session of fission-trackers at ICOG 7 in Canberra, it was decided that a semi-annual newsletter for the international fission-track community should be established. The provisional title of "ON TRACK" was chosen, although other suggestions are welcome. The primary purpose is to allow everyone to keep in touch with what is going on in our expanding community — new labs opening, labs closing, people moving around, that sort of thing. Another purpose is to let the community know of any new developments which don't merit publication on their own: a low Na glass you may have found, a better way to hold the micas while etching, and so on. It would also be helpful to know about new projects starting up, to avoid duplications of effort.

I volunteered to be editor for the first year, but the plan is to rotate the responsibility every year or so, to ensure a balanced viewpoint, although with the foreseen format, I can't imagine the content becoming unbalanced. There is no estimate of cost yet, but I can't imagine it going beyond the cost of the postage, because I won't be charging for my time. I'll be sending the first issue free to every lab that was represented at ICOG.

If you would like to contribute *anything* to the first issue, get it to me by November first. If you are interested in getting a copy either for yourself, or for your lab if it wasn't represented at ICOG, then let me know by November 15. This first issue will have an ICOG report, so if you didn't attend, then I urge you to get a copy so that you'll know what happened.

I would prefer that if you have any text to send, it be done through our computer. My address here is: GEODAC@lure.latrobe.edu.au . If you haven't got electronic mail, then FAX is OK, or even old fashioned post.

Cheers,

David A. Coyle
Department of Geology
La Trobe University
Bundoora VIC 3083
Australia
FAX: (49) 3 479 1272

October 5, 1990

December 1, 1990

1 ICOG 7, CANBERRA, 1990

This September, the Seventh International Conference on Geochronology, Cosmochronology and Isotope Geology was held on the campus of the Australian National University in Canberra. It was well attended with some eight hundred participants, between them representing all corners of the Earth and all fields of geochronology from the origins of the Solar System to the technical development of mass spectrometry. Consequently, there was a niche here for the fission track community to have their say, and they said quite a lot!

The conference was organised so that there was a larger bias towards poster sessions than is the norm, with probably two thirds of work presented in this way. Poster sessions took up the Monday and Tuesday afternoons and all day Thursday, with talks on the Monday, Tuesday and Saturday mornings with an all-day session on Friday. So in theory everybody would get to see everything they wanted.

The talks were run in three parallel sessions, divided up into six symposia and general sessions. Fission track work fell under the category of 'The thermal his-

stories of rocks' and was presented on the Monday and Tuesday mornings, with Andrew Gleadow and Peter Zeitler as convenors. This session was kicked off by Martin Dodson, the keynote speaker, with a review of 'kinetics and thermochronometry'. The first fission track paper was given by Paul Green, giving a review of fission track sensitivity in apatite, zircon and sphene, which highlighted the fact that there is still a great deal of work to be done on the annealing kinetics of zircon and sphene. This opened the field for Günther Wagner on the possibilities of projected track lengths. Unfortunately this interesting paper did not provoke quite the discussion that was anticipated, especially with the interesting information on the Deep Continental Drilling project (KTB), where a time-temperature path has been constructed from project track lengths. After coffee, the remaining fission track talk of this morning's session was from Tony Hurford, who has used fission tracks from the unusual angle of modelling the stability of prospective nuclear waste sites. It is good to see that in this age of ecological awareness that fission tracks have another valuable use. Fission tracks go green!

The following Tuesday morning there were again just the three fission track talks, Phil Gans started the show with an

*edited by David A. Coyle, La Trobe University, Internet:Geodac@lure.1atrobe.edu.au

interesting little number on thermal modelling of tilted fault blocks, using fission track 'ages' to give timing to the rotation of the blocks, using a case history from the Basin and Range Province, followed by Gomaa Omar on the Gulf of Suez rift, showing there had been a succession of phases of uplift with the FT ages representing the different periods. This provoked lively discussion on data interpretation methods. The final talk of the oral sessions was from Barry Kohn, who presented a paper on the central Appalachian Piedmont, using apatite, zircon and sphene to constrain rifting and hydrothermal events.

Tuesday afternoon was the first of the poster sessions to feature fission track work, under the general title of 'Fission Track Methods' with your host, Dr. Paul Green. There were eleven presentations in this session, but before I give you a (brief) rundown, it is worth describing how the posters worked. They were exhibited in the Melville Hall which is a big, high ceilinged room with chronic acoustics. Remember this fact when you conjour up in your imagination (if you weren't there) just what the poster sessions were like. We were all to give a five minute presentation on our posters and take questions thereafter, so we were all allocated a time at which anyone who wanted to know all about your poster could come along. This would have worked quite well, except that it was very difficult to hear what was being said over the noise of the general chatter from other people in the room, and the accumulated noise from the other three parallel sessions. Some people even resorted to using megaphones! So the posters given on Tuesday were as follows: First of all was Andy Gleadow on apatite fission track 'stratigraphy,' look-

ing at FT age and track length in the crust. Alain Chambaudet, Michel Mars and Michael Rebetz wrote, and between them presented, three posters on surface track length distributions, tracks in crystallographic sections and length distributions with the crystal respectively. Taka Tagami presented his work on the etching anisotropy of zircons and K. Watanabe looked at the effect of heavy ion irradiation to reveal confined tracks in crystals with low track densities. I (Ruth Siddall) gave a poster on determination of apatite composition using infra-red spectrometry, followed by Masao Kasuya's work on using nuclear track detectors to date aragonitic corals with alpha radiation. The final poster of the day was Tracey Paul's interesting work using TEM to look at the *in situ* annealing of latent fission tracks in apatite.

Wednesday was a day off, and so the conference participants hit Canberra. Canberra is not a terribly big place, and as you wandered around there was this strange feeling that the only people there were conference participants. The things to do and to be seen doing were the Telecom Tower which yielded up incredible views of the City and surrounding countryside and the botanical gardens. Most of the fission trackers met by sheer coincidence during the afternoon in the War Memorial and Museum, which is certainly recommended viewing. The evening had been put aside for a thermal history "working-group:" this was held in the Research School of Earth Sciences. All the fission track and Argon people wandered around the School for about twenty minutes trying to find the meeting and then crammed themselves into a tiny room. It was obvious from this moment onwards that things were not going to work out.

Martin Dodson proposed that the talks should be written up as papers and published in *EPSL*. This was unfortunately met with nothing less than galloping apathy on all sides and the proposal was very quickly abandoned. This event somewhat set the scene! It was decided that the fission trackers and the Argonauts should go their separate ways, so we left, Andy Gleadow leading us to this room he knew upstairs. We arrived. It was big and empty, in spite of the rumours abounding that it was to be used by the crustal growth folk for similar reasons to ours. However these rumours were ignored. We all sat down and the discussion worked its way to the location of the next fission track conference and the inevitable clash with the IGC in Kyoto in 1992. Taka had hoped that a fission track session would be in evidence, but it looks like we will be represented at this conference by only a few aficionados of the technique and anyone else who can afford it. The successor to Besançon will be Philadelphia, PA! We will all be relieved to hear that hiring a security force to protect us from the locals should not prove too much of a problem. Bring your pens, notebooks and semi-automatic assault rifles. During this debate, it was noticed that the occasional person that none of us knew wandered into the room, sat down began to look confused, then worried and finally got up and left. This peculiar behaviour was accompanied by knowing nods from the members of our group who had perpetrated the rumours about the crustal growth-ers. Finally a stranger came in and had the nerve to inform Professor Gleadow that we had to move. There was no option but to adjourn to the nearest Chinese Restaurant. The conversation in The Great Wall of China degenerated from the higher planes of sci-

ence (well it did on our table anyway) although the idea for this publication was first mooted by Dave Coyle at that time—and the food was excellent!

Thursday was an all-day poster session. Fission track work was presented as a follow up to the talks in the Thermal Histories symposium, chaired by Tony Hurford. The posters in this session were associated with case histories and thermal modelling. The first paper was from Ed Stump who had worked in the Transantarctic Mountains with Paul Fitzgerald, collecting samples and using the prerogative of first ascent rock climbers to name their routes. His samples from Fission Wall (and the name is no coincidence) showed evidence of late Cretaceous uplift in this region. Paul Fitzgerald followed with his poster on the FT profile of the extensional evolution of the Gold Butte region, Nevada, which fitted Phil Gans' tilted block model perfectly, and thus Paul's poster was quickly adorned in the nick of time with Phil's diagram. Elizabeth Miller's poster followed looking at the evolution of mylonites beneath normal faults in the basin and range province. Kirsten Hansen presented some of the work she has recently been doing on the evolution of the Danish North Sea basins, while her co-worker Peter Jensen outlined his interpretation of modelling in relation to the work he has done with Kirsten. Peter Kamp illustrated the uplift and erosion which lead to heating and consequential hydrocarbon potential in the Taranaki Basin, New Zealand. Rod Brown contributed to the modelling techniques with his poster and rather nifty little aquatic 'device' demonstrating the relative movements of horizons with denudation and its links to cooling. In the next poster, Paul O'Sullivan demonstrated his evidence for Tertiary

uplift in the Brooks range, Alaska. It is interesting that so much fission track work has revealed evidence for events of this age. The Tertiary was obviously a time of global importance. Giulio Bigazzi looked at the FT dating of the Northern Apennines, unfortunately the absence of track length measurements left this data unconstrained. Dave Coyle presented some of the work he had done in Europe on the thermal evolution of the Periadriatic Lineament, with yet more Tertiary age events. The penultimate poster of the conference was from Steve Bergman looking at the spreading of hotspot events in the North Atlantic which tied in very nicely with the final poster from Cherry Lewis on the Tertiary (of course!) uplift of the British Isles and its link to hotspot evolution.

This was all in all a very interesting session, showing that uplift and erosion (or even uplift and erosion) (that's uplift cooling erosion---ed.) is a very important feature in geological evolution and that the apatite fission track method is only too well suited for the further unravelling of these events, many of which have gone on relatively unnoticed by workers in other fields. Many of the posters of this session demonstrated much greater amounts of uplift than has been expected, and the larger scale effects of hotspots and continental rifts. All gave totally new insights into the geology of the regions in question, and there is tremendous scope for much more work to be done in the many areas that have been untouched by fission track workers.

Friday was very much a non-day for fission track interest, so many people went to 'do' Canberra again. (This time the Art Galleries and Science Museum if you hadn't already done them on Wednes-

day). The conference dinner at Parliament House was held in the evening. The event was somewhat marred by the very late arrival of the buses arranged to collect people from the halls of residence which meant many went without their champagne reception. Apart from this the dinner was very good, considering it fed some 800! Well rounding up an on the whole, successful and entertaining conference. But it wouldn't have been the same without the souvenir boomerang!

Ruth Siddall

From the Editor

Welcome to the Gala Premier Issue of *Track*, the semi-annual newsletter for the international fission-track community. The name highlights the purpose of this publication, which is communication. This also means that you readers out there are the ones who are responsible for the content—without your input, there would be no *Track*.

What is included is:

The ICOG report by Ruth Siddall of the FTRG London. I think that Ruth's light style effectively sets the informal tone that I want this newsletter to adopt.

News from the Labs These are items sent in from the various labs around the globe, keeping you informed of their activities.

Forum A way to introduce topics for discussion throughout the fission-track community.

Technical Developments Any hints or tips on making life easier in the lab.

Simple stuff, but small things can have big effects.

Short Tracks Small items of the Who, What, Where, When variety.

Continuing the theme of communication, it is my intention to publish in the next issue a complete and up to date mailing list (with FAX numbers and Email addresses, where available) of world fission-trackdom. So if you consider yourself to be a serious fission-tracker, then let me know, so that you'll be included. Also, if you know of someone that I don't know of, or have missed in compiling my initial *Track* list, then have them get in touch with me too. I'll have the list nicely formatted, suitable for you to simply cut and paste the addresses into your Rolodex, Filofax, or even onto sticky-backed paper, so you can start your own direct mail campaign. There is also the option of providing it on disk, but don't count on that becoming reality unless there is considerable demand.

Finally, it was originally agreed that the editorship of *Track* should be shifted around every year or so. That means that the next issue (June 1991), will be my last issue. If anybody out there would like to take over the job, let me know sometime in the next six months, so that I can put the details in the next issue. If there are more than one applicant, then I will decide autocratically who gets the honour. On the other hand, if there are no volunteers, I will appoint someone, whether they like it or not.

I'm sure that you are as excited about *Track* as I am, so don't delay, and send me your news for the next issue as soon as possible.

2 ARCO Update

Steve Bergman, James Talbot, Anya Fayon and Kip Cerveney of the ARCO Oil & Gas Research Lab, Dallas, are currently investigating etching and annealing properties of fission-tracks in seldom studied minerals such as carbonate minerals, halides (fluorite), feldspars, epidote group minerals, amphiboles, zeolites, sulphates, and oxides (rutile, perovskite) using ^{252}Cf fission fragments. Novel methods and apparatus are being utilised to refine mineral separation techniques (yes, Magstream *does* work). Various microanalytical techniques (scanning tunneling microscopy, scanning acoustic microscopy, transmission electron microscopy) are being used to image fission tracks in various minerals to constrain the microstructural character of tracks. We are routinely using apatite and zircon fission-track data as well as other thermochronologic data in our regional studies research. Fission track collaborators include Shari Kelly, John Decker, Ian Duddy, Paul Green, Paul O'Sullivan, Elizabeth Miller, John Murphy and Mary Roden. Feel free to call 214-754-6264 for more information.

Steve Bergman

3 News from the U.S.G.S.

We are just wrapping up work on the International Union for Quaternary Research Inter-Congress Committee on Tephrochronology (INQUA-ICCT) Field Conference and Workshop on Tephrochronology that was held at Yellowstone National Park, June 17-22, 1990. The conference was attended by 51 geologists from seven countries. The program included papers on a wide range of topics in tephrochronology, but of pri-

mary interest to fission-track analysis was a series of papers given by John Westgate and his students from the University of Toronto on isothermal plateau fission-track dating of hydrated glass shards. This technique has produced glass ages concordant with zircon fission-track, K-Ar, $^{40}\text{Ar}/^{39}\text{Ar}$, and thermoluminescence ages on co-existing minerals as old as the Cretaceous. A volume of papers from the conference is in preparation and will be published as a separate volume of "QUATERNARY INTERNATIONAL". Work is also in progress on an interlaboratory comparison of geochronological data, which will be generated using fission-tracks, single grain laser fusion $^{40}\text{Ar}/^{39}\text{Ar}$ dating, etc., on Quaternary tephra from Yellowstone collected during the meeting and post-meeting field trip.

In my lab, fission-track analysis is continuing on a number of basins, including the Los Angeles, San Joaquin, and Santa Maria Basins (California), the eastern Great Basin (Nevada and Utah), and Powder River and Green River basins (Wyoming); on volcanic rocks (primarily tephra) from various parts of the Western United States and Gulf of Mexico; and, in a co-operative study (also involving Chuck Naeser) with the Geological Survey of Norway, on basement rocks in Norway.

Nancy Naeser

4 New Fission Track Lab at Stanford

The Geology Department at Stanford University begins setting up a new fission track laboratory in December 1990. Trevor Dumitru, who received his Ph.D. from the University of Melbourne in 1989

and who was a post-doc at La Trobe University in 1989-90, has been given a post-doctoral position to set up and operate the facility. Financial support has come from new ventures funds of the Stanford School of Earth Sciences and Department of Geology, and from a profit fund from patents developed by Stanford researchers. Stanford has ordered a new Zeiss Axioskop microscope specially configured for fission track work and a Kinetek computer-automated locating stage that allows moving from a grain to its mica print in less than one second. Mineral separations will use existing equipment that supports Stanford's new $^{40}\text{Ar}/^{39}\text{Ar}$ thermochemistry facility.

Trevor plans to continue fission track studies of geothermal gradients, uplift, and faulting in the Franciscan subduction complex (Tectonics, 1988, 1989) and the Sierra Nevada magmatic arc (J.G.R., 1990), and studies of faulting and uplift along the San Andreas fault (Geology, in press). He also hopes to initiate a major new project on uplift and geothermal gradients in the Colorado Plateau and their relation to Laramide tectonics and Basin and Range extension.

Elizabeth Miller and Phil Gans of Stanford made extended visits to the La Trobe fission track laboratory during their studies of extension in the Basin and Range province of the western U.S. They plan to use the new laboratory in their continuing work in the Basin and Range and in studies of extensional processes on the Seward Peninsula, Alaska. It is also expected that the Stanford Chinese tectonics program and other groups will find uses for the facilities.

Any fission trackers passing through the San Francisco area are warmly invited to stop by for a visit. Enquires from po-

tential students and collaborators are also keenly sought.

Contact Address: Department of Geology, Stanford University, Stanford, California 94305, U.S.A.; telephone 415-725-1328; FAX 415-725-2199.

Trevor Dumitru

FORUM

Length "Standards"

One of the few disappointments at ICOG, for me anyways, was that the informal fission-track session became a bit *too* informal. By this I mean that it was not practical to initiate and discuss subjects that would have been of interest to the entire group. One idea that has been passed around the lab here at La Trobe has been to create, through oven annealing, *large* batches of apatite samples with different length distributions, for the purposes of standardisation, so that we students would have some to take with us when we graduate. Of course, these could by no means be considered standards in the strictest sense, because as we know, we cannot have an age standard which would have anything other than a boring $15.5\mu\text{m}$ mean length. Virtually all labs today have their own internal length standards—short, long, bimodal, skewed—but to my knowledge, there is no diverse selection available in sufficient quantity for all labs to examine (and keep). Our plans to make such a set could easily be expanded, if there is sufficient demand, so, my question to all of you is: do you think that such a collection of length "standards" is desirable, if not absolutely necessary?

Dave Coyle

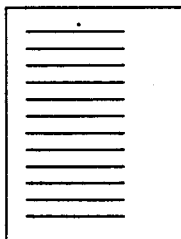


Figure 1: Specifications for a simple mica holder. The slits are just that: slits—don't remove any material here. The size is approximately 1.5 by 2.5 cm.

5 Technical Developments

5.1 New Improved Mica Holder

The most frustrating thing about etching micas is the fact that often (in my experience, always), the little beasts fall out of the rubber tube and sit quite contentedly at the bottom of the dish of HF while they are being etched. It's bad enough trying to pick up a mica that's lying flat on a benchtop, but in the bottom of a dish of HF, it's a problem that I'd rather do without. The basic flaw with the tube method is that, because it's only cut halfway through, any flexure at all causes it to open up, and the micas drop out. I realised that if we had something that was cut all the way through, when it flexed and one side opened up, the other side would be forced together more firmly, holding in all the other micas. So what cheap, flexible, HF resistant material did we have lying around the lab in copious quantities? Teflon, of course. If you take a piece of Teflon and slice it up as shown in Figure 1, then your micas will *never* drop out again. When you flex it to insert the next mica, the ones

that are already in will just be clamped in more firmly, and the space between micas is also smaller, so that you can etch more micas simultaneously. I have found that it does require a very steady hand, and a firm grip on the mica to get them in without trouble. While I can't do anything to steady your hand, I can suggest that you throw away your forceps and buy a decent pair of hæmostats (from your local surgical supply house, or if you want to save money, the nearest head shop or hospital emergency room). Just slip a bit of flexible plastic tubing of the appropriate diameter over the tips, and no matter how tightly you grip the mica, it will never slip and get scratched. As for picking a mica up off the benchtop, just use a bit of 3M ("Scotch") 'removable' magic tape (it comes in a blue pack).

6 Short Tracks

Where's Barry? Barry Kohn *was* at La Trobe Uni, but right now, if you want to reach him he's back in Israel. But you'd better hurry if you want to contact him, because he'll be back down under in March of '91, where he'll be staying for an indeterminate period of time.

Penguin tracks? Rod Brown, of La Trobe FTRG is on his way to Antarctica where he'll be continuing Dennis Arne's work on the upliftcoolingerosion of the Prince Charles Mountains.

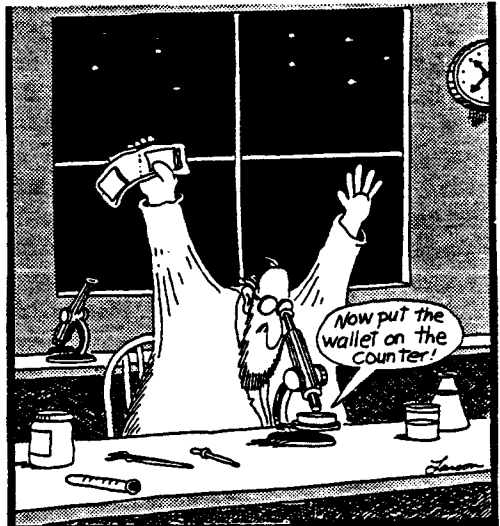
'Bye Ingrid: It looks like Ingrid Michalski (Bern) is out of the fission-track game for good. She's married a Swiss banker, and rumor has it she

now spends most of her time shopping in Tokyo.

Deep drill hole in Germany: No, it's not the KTB. Russel Korsch (BMR Canberra,) Andreas Schäfer (Bonn Uni.,) and David Coyle are looking at the thermal history of the Saar-Nahe Basin, including detailed sampling from the 5687 metre deep well "Saar-1."

No more FTRG Bern: With Matthias Giger soon to complete his dissertation and the retirement of Emilie Jäger, it looks as though the fission-track lab at Bern, which Tony Hurford worked so hard to establish, will be closing its doors for good.

Das Alpen-kiwi: The rare kiwi has invaded the Swiss Alps. Diane Seward is setting up in Zürich, filling the vacuum left by the closing of the Bern lab.



Working late, Dr. Green stumbles upon a few bad grains.