

SCAR Fellowship Report 2006-2007

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Institution Visited

Università degli studi di Modena e Reggio Emilia
Modena, Italy

Host scientist: Dr. Alessandro Capra

Dates

May – July 2007

One additional visit planned for 2008

Work towards scientific objectives of the fellowship: “Detection of neotectonic motions in West Antarctica from GPS data: Combined analysis of the TAMDEF and VLNDEF regional deformation networks”

The primary objective of the fellowship was to jointly process GPS data from the U.S. Transantarctic Mountain Deformation (TAMDEF) network and the Italian Victoria Land Network for Deformation Control (VLNDEF) network. During the visit, this objective was met through collaborative work with scientists from Dr. Alessandro Capra’s research group both in Modena and Bologna, Italy. Results from the processing provide a data set to answer important scientific questions regarding the active state of the Terror Rift and regional strain accommodation in Victoria Land. In addition, other key objectives outlined in the original proposal, including gaining skills in GPS processing and establishing future collaboration, were achieved. Details regarding each objective are discussed below.

Joint Processing

The TAMDEF and VLNDEF GPS datasets were processed using the GAMIT/GLOBK software package. While the original plan proposed the use of the PAGES and Bernese software packages for processing, several convincing arguments warranted a change to the GAMIT/GLOBK suite, including 1) prior experience with GAMIT/GLOBK of researchers in Modena and Bologna is extensive, 2) the use of GAMIT/GLOBK provides an important validation of velocities and baseline results already obtained for TAMDEF and VLNDEF with PAGES and Bernese and 3) future research in my graduate studies involves GAMIT/GLOBK, emphasizing the importance of developing skills with this software suite.

A distributed processing approach was utilized, where the TAMDEF and VLNDEF GPS networks were each treated as a subnetwork, or cluster of stations. An identical set of Antarctic and peri-Antarctic sites were included in each cluster to enable combination of the data sets. Data processing covered a 7 year span, beginning with 1999 when both networks were active, and ending with the most recent 2006 campaign. The end result of processing is

a data set of horizontal and vertical crustal velocities spanning both southern and northern Victoria Land, Antarctica.

Experience Gained

In addition to the science objectives obtained, the experience gained during collaborative work for this fellowship far exceeded original expectations. Both strategic discussions involving many researchers as well as individual one-on-one sessions to address specific issues provided a broad range of learning opportunities. Of particular significance, Giuseppe Casula, with the Istituto Nazionale di Geofisica e Vulcanologia, Centro Nazionale Terremoti in Bologna, Italy, spent extensive time working with me individually, troubleshooting processing problems, discussing strategies, and furthering the progress of the project in general. The knowledge gained through these interactions was invaluable, and will have a direct impact on my future graduate studies.

Established Collaboration

Deformation velocities derived from the work completed during the fellowship will 1) be used to answer questions regarding the active state of the Terror Rift, 2) contribute to the understanding of strain accommodation within southern and northern Victoria Land, Antarctica, and 3) be further applied to modeling crustal rebound due to modern and ancient ice mass change. Results from this work will be presented at the 2008 SCAR Open Science Conference and subsequently in a jointly-authored manuscript. The original proposal listed the 2007 EGU meeting as the venue for presentation of fellowship results, however, because the fellowship time period was postponed to a May 2007 start, the 2008 SCAR meeting will serve as the new forum. Additional collaborative work on this project included a group meeting of involved researchers at the 10th International Symposium on Antarctic Earth Sciences (ISAES X). If funding permits, a return visit to Italy to complete the manuscript reporting on results obtained during the fellowship period is planned for 2008.

Milestones and Deliverables

The end result of the fellowship period is a valuable combined U.S. and Italian data set, providing better constraints on regional tectonics and strain accommodation in Victoria Land, with broader applications to crustal rebound models and ice mass change. In addition, the fellowship period has been invaluable for encouraging collaboration between the U.S. and Italy, specifically with regards to this project.

What SCAR funds were allocated?

\$7509 were awarded to the fellow.

How were the SCAR funds spent?

The budget of \$7509 was requested for travel, accommodation, food, insurance, and travel within Italy. The following table outlines the general allocation of funds:

Travel	\$1,000
Accommodation	\$3,000*
Food	\$1,600
Travel within Italy	\$600
Insurance	\$100
Miscellaneous expenses	\$400
Remaining funds*	\$300 (800)

*Of the \$3,000 for accommodation, a security deposit of approximately \$500 was returned after vacating the residence. However, these funds were stolen in Napoli while en route back to the United States. A police report documenting this event, and the stolen money, was obtained. After this loss, actual remaining funds are approximately \$300.

Use of remaining funds was intended to purchase a plane ticket for a return trip to Italy in 2008 to complete a jointly-authored publication. Unfortunately, the loss of \$500 in Napoli results in insufficient funds for the planned trip. It is hoped that additional funds to recover this deficit may be obtained. If not possible, the remaining \$300 will be used for publication expenses.

Future work plans

Work will continue with this project. Specifically, the next step is to derive deformation velocities from the processing results achieved during the fellowship period. These results will be presented in a jointly-authored publication. To complete work on this publication, a second visit to Italy in 2008 is planned if additional funds are provided.

Future talk detailing fellowship work:

Konfal, S.A., and others, Detection of neotectonic motions in West Antarctica from GPS data: Combined analysis of the TAMDEF and VLNDEF regional deformation networks, SCAR 2008 Open Science Conference.

Future publication detailing fellowship results:

Konfal, S.A., and others, Detection of neotectonic motions in West Antarctica from GPS data: Combined analysis of the TAMDEF and VLNDEF regional deformation networks, Antarctic Science.