

**International Seismological Centre**

**Director's Report**

**2004**

Thatcham, UK  
2005 August

# Introduction

<i>Introduction</i>	1
<i>Operations</i>	2
<i>Finance</i>	9
<i>Other Activities</i>	14

---

## **DIRECTOR'S REPORT 2004**

The Director's report for 2004 is a compilation of the individual reports prepared by the ISC staff. During the year 2004, the ISC staff included the following people:

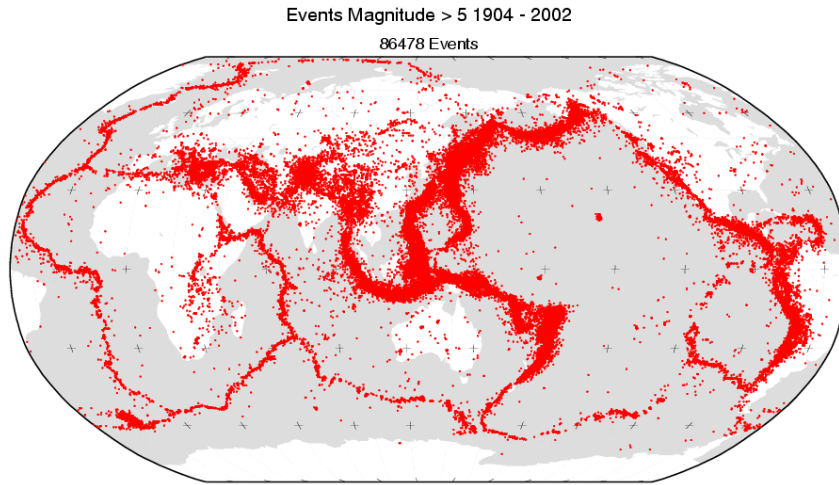
Mr. Avi Shapira (Ph.D.) – Director  
Mrs. Maureen Aspinwall – Administration and Finance Officer  
Ms. Maiclaire Bolton (M.Sc.) – Seismologist  
Mr. Peter Dawson (Ph.D.) – Data Collection Manager and Applications Developer  
Mr. Mathew Evans (M.Sc.) – Ph.D. student (Leeds University associate)  
Mr. James Harris (B.Sc.) – System and Data Base Administrator  
Mr. Richard Lockett (Ph.D.) – Seismologist and Applications Developer  
Mrs. Nurcan M. Ozel (Ph.D.) – Seismologist  
Mr. Dmitry Storchak (Ph.D.) – Senior Seismologist  
Mr. Robin Adams (Ph.D.) – Honorary seismologist

### **Introduction**

The year 2004 was again a period of significant improvements and new developments in the main fields of operation of the ISC namely; Seismological data collection, analysis and editing, data archiving and publication of the ISC *Bulletin* and *Catalogue*. New developments were made in parallel to maintaining the old software. By the second half of 2004, after 3 years of intensive development work, we were proud to announce that testing and verification has been completed and ISC has begun to routinely use the new ISCloc software in its full capacity and replace much of the out-dated software that ISC used for more than 20 years.

During 2004, the ISC published 3 printed issues of 4-monthly *Bulletins* for the year 2002, an annual *Bulletin* for 2002 on CD and an updated earthquake catalogue for 1904-2002 (see seismicity map in Fig. 1). The financial audited report for 2004 is attached as a complementary document. This and additional information is reported in the following.

# Operations



*Fig. 1* : World Seismicity 1904-2002 (M>5).

## Data Collection

During 2004, normal operational aspects were carried out i.e., inspecting the automated e-mail data acquisition through the Internet and dealing with unknown stations, data entry mistakes, changing of e-mail formats etc. These have been associated with correcting and writing parsers and with extensive correspondence with station operators and data providers. In 2004 the ISC received 6,859 data files from over 120 active agencies (see map in Fig. 2), of these – 6,257 (91%) were processed automatically. The remaining 9% required manual intervention. During 2004, 9 new parsers were written and there were 70+ modifications to existing parsers. In comparison to the year 2003, we had a growth of 3.3 Gigabytes of data, which is about 10% of all the data volume (34 Gb). In all, we have 17 million new rows of data entered into the database tables.

Data has been received from 358 new seismic stations and from 8 new agencies (seismological data centres) from Thailand, Iran, Oman, Kazakhstan, Venezuela, Russia, Algeria and Georgia. Stations reporting data to the ISC during 2004 are depicted on the map in Fig. 3.

A number of key agencies have now moved to using ISF as their data-format. ISC welcomes the move to standard formats.



# Operations

## ISC Data Collection

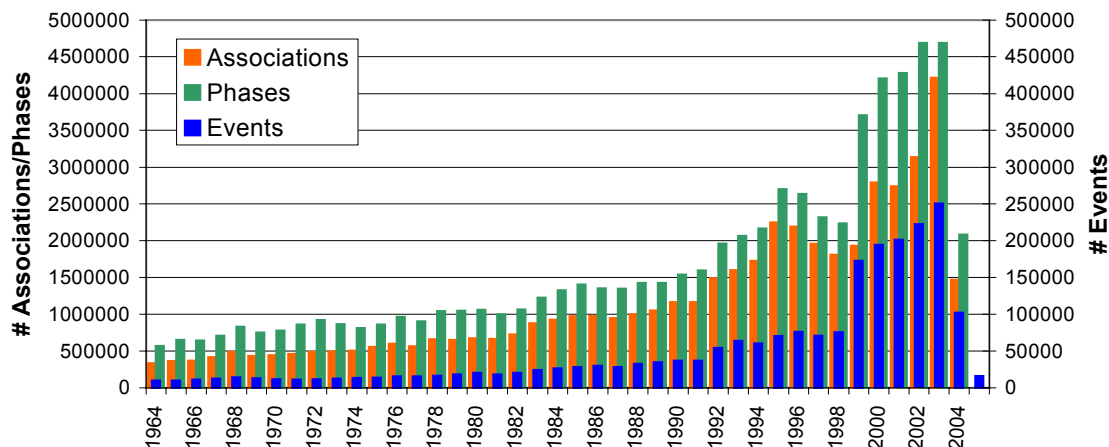


Fig. 4. The annual number of events (blue – Scale on right ordinate), associated phase readings and the total number of phase readings (red and green, respectively, - Scale on left ordinate). Updated on May 2005.

The development efforts included the automated processes that parse the incoming data, insert the information to the relational data base, detect duplicate readings, group reported epicentre of the same event, and select a primary location and associate phase reading. These processes generate the automated on-line comprehensive ISC *Bulletin* and prepare the data to be edited. Richard Luckett, James Harris, Peter Dawson and Dmitry Storchak carried out this development work until the old *REVISER* could be safely dropped. In October 2004, Richard Luckett left ISC to join the British Geological Survey team on the island of Montserrat in the Caribbean Sea.

## Bulletin Review

During 2004 the ISC seismologists reviewed the data covering the period Feb.-Dec., 2002. All events with maximum reported magnitude of 3.5 and larger, along with events with multiple network reports or stations reports at distances greater than 10 degrees, were analysed and where possible relocated. By completing the review for 2002, 214,683 seismic events have been added to the ISC *Bulletin*. 37,543 of them were reviewed and edited by ISC seismologists. The map in figure 1 shows the seismicity of the Earth for the period 1904-2002. The volume of seismological data around the world is still increasing and consequently we again experience an increase in the number of detected and located seismic events and an increase in the number of arrival time measurements (see Fig. 4) from which we determine earthquake locations. Note that data from earthquakes that occurred in 2003 and onward are still streaming into the ISC database. As demonstrated in the frequency-magnitude distribution (Fig. 5), the 2002 ISC Catalogue of earthquakes seems to be complete for all events at about magnitude 4 and above, for most of the globe. As expected, there is a slightly lower detection

# Operations

threshold for continental earthquakes (including the off-shores) as compared with oceanic earthquake foci.

## Earthquakes (2002, mb)

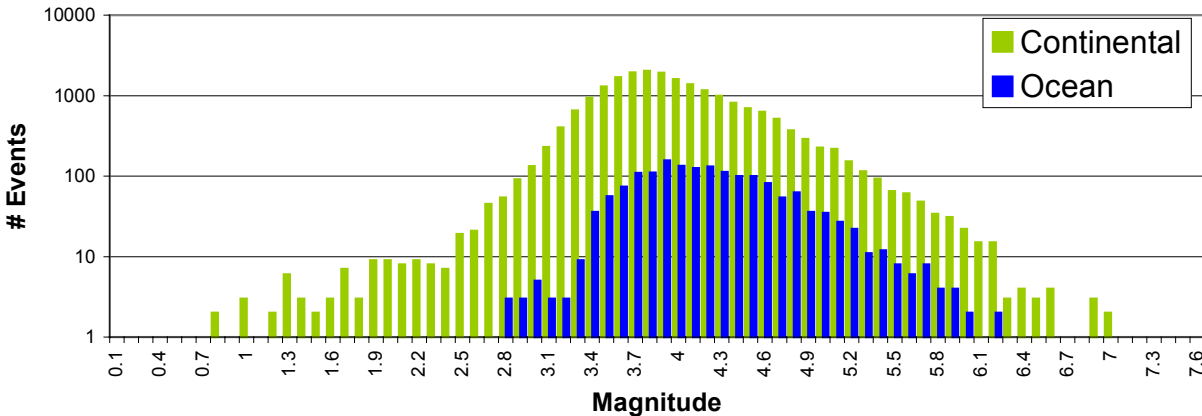


Fig. 5 : Frequency-magnitude distribution of earthquakes in ISC *Bulletin*.

The implementation of new software has seriously slowed the analysis as the *Bulletin* editors were constantly involved in computer bug eradication. As a result, the accelerated editing schedule became irrelevant as seismologists tried very hard to keep with the flat 2 year deadline, last used before 1998. In July 2004 Dr Nurcan Ozel completed her term as seismologist and returned to her home institute in Turkey.

## ISC website and FTP service

In 2004, there were over one million accesses to the ISC website, which is 24 % more than the year before and about 3 times more than in the year 2000. There were more than 70,000 entries to the ISC website, searching for earthquake information. A breakdown of usage proportions by country or domain is shown in Fig. 6.

In addition to providing earthquake information, the ISC website provides information about the seismic stations around the world (about 10,000 inquiries), bibliographical data (5,000 inquiries), documentation and program codes (~11,000 downloads). Figure 7 shows the distribution of entries and inquiries for data from the on-line ISC *Bulletin* since Jan. 2000, showing also the steady increase in retrieving ISC data over the Internet.

An anonymous FTP server, <ftp://ftp.isc.ac.uk>, is used to allow prompt distribution of the results of the ISC's monthly analysis. These files are available very shortly after the completion of each month's editing and allow access to the results much more rapidly than the annual CD.

# Operations

About 18,000 FFB or ISF files were downloaded with significant amount of downloads of other files, all showing a large increase of approximately 25% on previous year.

## Website Usage 2004

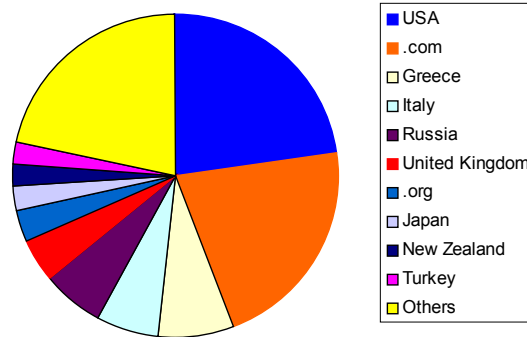
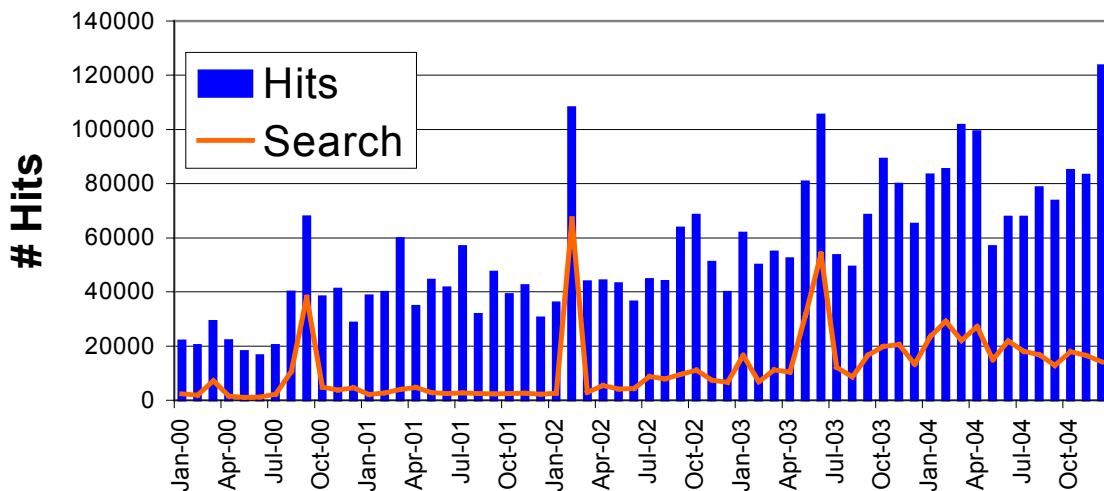


Fig. 6: Distribution of entries to the ISC website

ISC data is directly accessible and available at the ISC website [www.isc.ac.uk](http://www.isc.ac.uk). It should be noted that data are available to the scientific community as soon as it is made available to the ISC. Thus, information about strong earthquakes that are reported rather quickly to ISC by local and regional seismological centres is available on the ISC webpage long before it is added to the published *ISC Bulletin*.

The typeset monthly *Bulletins* and the semi-annual *Regional Catalogues* are also available as PDF documents. Users who browse the listings may find these typeset documents easier to use, and they include the separate lists of explosions and major events that have long been included in the *Regional Catalogue*.

## ISC Website Usage



# Operations

Fig. 7: ISC website usage

## **International Registry (IR) of Seismic Stations and station book**

The International Registry of Seismic Stations facilitates exchange of data between networks by identifying seismic stations anywhere in the world with a unique 3 to 5 character code. The Registry is maintained jointly by the ISC and by the World Data Center for Seismology, Denver, which is operated by US National Earthquake Information Center (NEIC). The ISC, NEIC and the European-Mediterranean Seismological Centre encourage registration of all stations, regardless of whether or not the data seem likely to be widely distributed. The Federation of Digital Seismograph Networks recognises identification of parametric data with station codes from the International Registry and network code 'IR'.

On the ISC website, the form at <http://www.isc.ac.uk/IR/reg.htm> makes it convenient for network operators to add stations to the Registry. When a station operator submits the registration form, computer programs at the ISC compare the new information with previously registered stations. By immediately prompting users when information is incomplete and by suggesting alternative station codes in real time, the new system reduces the effort required of both station operators and Registry maintainers.

When the on-line form is used to register a station, the ISC promptly e-mails a registration record to both the operator and NEIC, and amends the ISC's copy of the Registry. Thus, the new code can be used in parametric data reports to both the ISC and NEIC as soon as the operator receives a registration record.

To January 2005, 521 station codes have been registered through the on-line registry.

An on-line station book was developed as a new service for the International Registry of Seismograph Stations at the ISC. This service complements the on-line station registration service added during 2003. The station book was developed to be similar to the station book of the International Registry on-line at the NEIC. The web based station book is in addition to the existing distribution of an ASCII text file of the station book through the FTP site and on the ISC CDs.

It was expected that this would be an important addition to the ISC's web services and this has been proven with around 10,000 searches for station data carried out during 2004.

## **Shear Wave Splitting Of SKS Phases**

We have finished processing data for the automated shear wave splitting project undertaken in collaboration with the University of Leeds. The global results from this project were presented by Matt Evans at the Fall AGU in San Francisco.

A paper outlining the method with an example data set of Canadian stations is in the final stages of preparation for submission. A second paper is planned to include our global results and a detailed comparison with results already published by other authors.



# Operations

All our results are available through the bespoke on-line web interface at:  
<http://www.isc.ac.uk/SKS>

This includes data from the following networks:

- Canadian National Seismic Network - 1989 to 2001
- China Digital Seismic Network - 1986 to 2001
- GEOFON Network - 1993 to 2001
- GEOSCOPE Network - 1987 to 2001
- Kazakhstan Network - 1993 to 2001
- Kirghiz Telemetered Network - 1993 to 2001
- IRIS/IDA Network - 1986 to 2001
- IRIS/USGS Network Network - 1988 to 2001

## **Bibliography of Seismology**

The Bibliography information provided on the ISC website continues to gain popularity. At present there are no references beyond 1996. Work has been carried out during 2004 by Peter Dawson and James Harris to provide a new interface and reference database for this bibliography. Though not yet concluded this project will continue during 2005.

## **Production and Distribution**

Following the decision reached by the ISC Governing Council in 2003 the first of the new ISC printed *Bulletins*, Volume 39 for 2002 data, has been produced and distributed. The new-look *Bulletin* encompasses four months of data and contains printed details of the events reviewed and relocated by the ISC seismologists for FOUR months. It does not however contain any printed phase data. An accompanying CD-ROM contains the full comprehensive *Bulletin* in FFB and ISF formats with all phase data included even for the smallest un-reviewed events, as well as the full reviewed *Bulletin* in PDF format for each of the four months. During 2004 we distributed the annual CD-ROMs of the 2001 data, the printed *Bulletins* of Nov-Dec 2001, Jan-Apr 2002, May-Aug 2002. The last issue for 2002 data, i.e. Sept-Dec 2002, was delayed and published in 2005 due to the need to re-write the program that prepares the PDF files.

# Finance

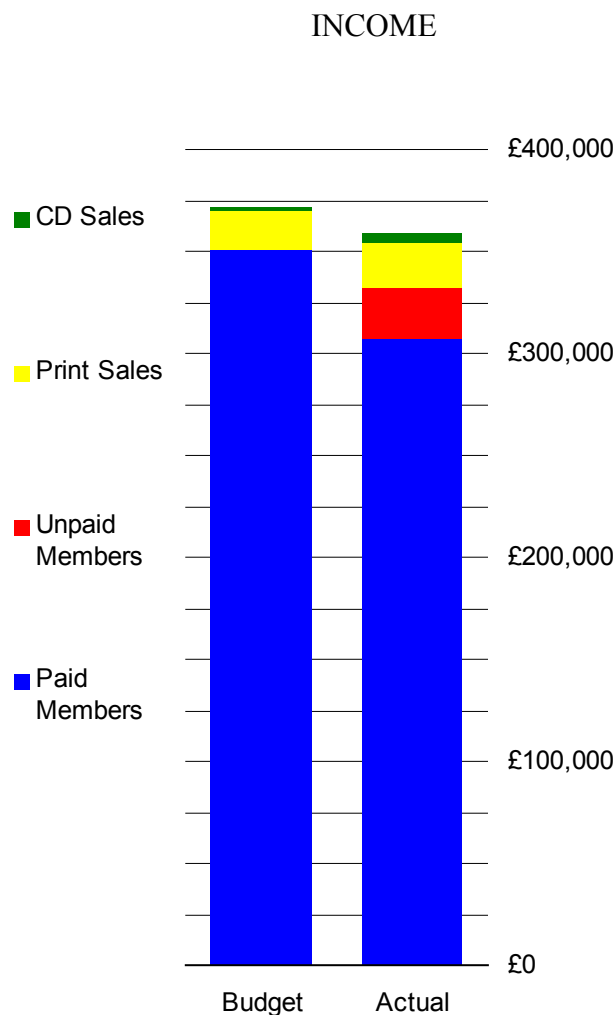
## **Income**

Member contributions fell short of the expectations of the budget written in 2003. The exchange rate between the US Dollar and the British Pound fell significantly once again from \$1.77 to \$1.92 at the year end. Member invoices are almost all in US Dollars and had a lower value when expressed in British Pounds at the end of year rate. In fact, expressed in British Pounds, actual contributions from institutional members fell 4.0% from 2003 to 2004 despite the increase in the unit rate of membership.

At year-end, some 9.6% of 2004 membership contribution invoices were unpaid. No unpaid contributions were written off because eventual payment is anticipated in all cases.

Income from printed products was close to the budget and CD sales were greater than expected.

Total income was less than expected by almost 10%.

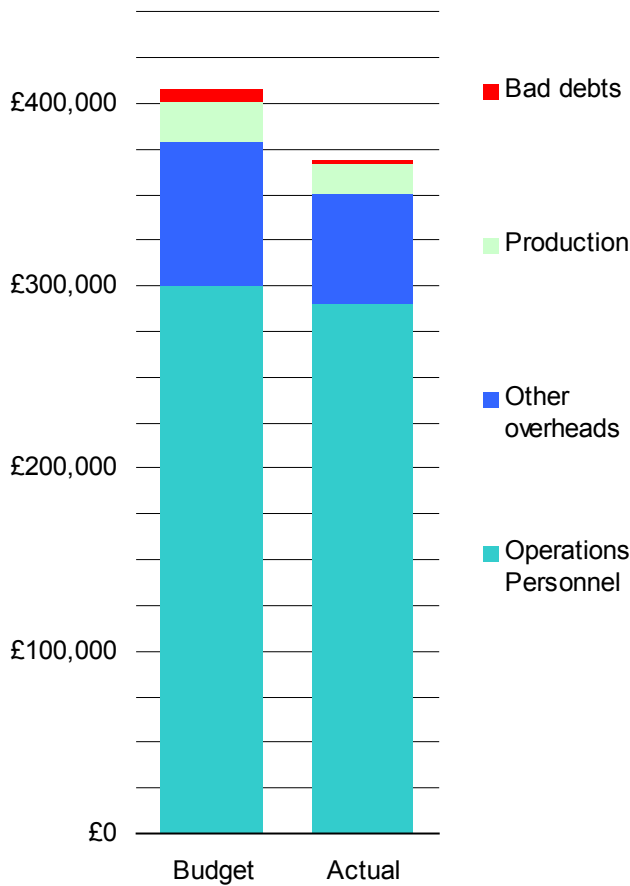


## **Expenditure**

Personnel expenditure is comprised of salaries, pension contributions, recruiting and repatriation expenses. These costs were 3.2% less than budgeted because of the unplanned departure of Richard Luckett before the year end. The ISC continues to follow UK academic salary scales as a guide.

## EXPENDITURE

# Finance



Other overheads include the costs of running the building; computing expenses, travel by both the staff and the committee and the cost of consumables.

Building expenses were £6,000 less than anticipated due to our hesitance to make any refurbishments of the office in the light of the dollar/exchange rate values.

The staff travel expenses and the committee travel expenses were less than expected due to forward planning for cheaper fares and finding travel grants from other sources. Computing expenditure was once again under the budget as were other costs, such as consumables and legal fees.

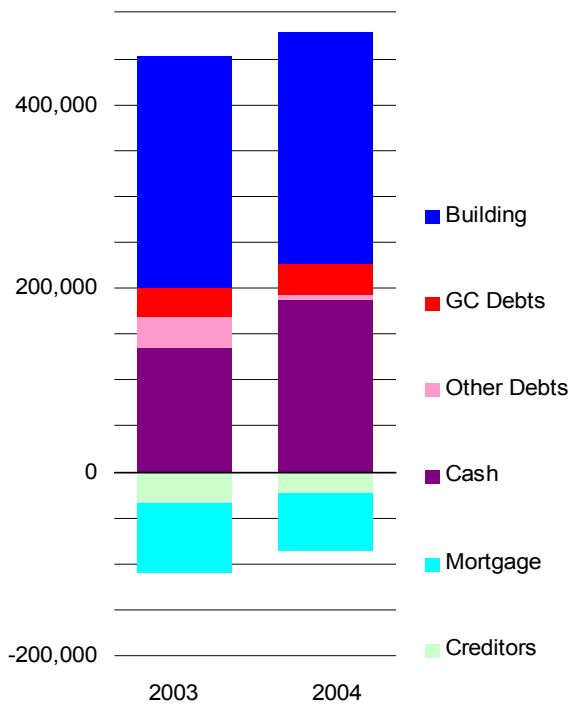
2004 marked a great change for the printed *Bulletin of the ISC*. For the first time in almost 30 years the printing was carried out in the United Kingdom. The costs of sending the films and then proofs to Thailand and then despatching some to our eastern customers and the rest back to the ISC became most prohibitive. The Governing Council’s decision to publish 3 times a year without phase data was put into operation with Volume 39 for 2002. Each *Bulletin* is sent with a CD-ROM holding the entire dataset for the period printed. The cost of production in 2003 was £35,373 and in 2004 it fell by more than half to £16,133.

## Assets

The net value of the ISC’s liquid assets is the difference between cash and creditors. This includes bank balances required for the exchange rate and computer replacement funds. Net liquid assets increased during 2004 from £100,000 to £165,670 reflecting the later arrival of some of 2003 national contributions and a reduction in the value of the ISC mortgage for the building. Apart from balances of the reserved funds, at year-end unencumbered liquid assets regained the £75,000 mark of 2002, which is sufficient to continue operations for almost 3 months.

### ASSETS

# Finance



Current debts owed to ISC (red and pink) are mostly unpaid membership invoices. The net value of the ISC’s current assets is the sum of its liquid assets and current debts owed to the ISC, which are shown in colours other than blue. Net current assets declined during 2004 from £223,000 to £203,000. With these net current assets, the ISC could have continued operating without 2004 contributions for approximately six months if the Executive Committee authorised use of funds that are normally reserved.

The net value of ISC’s tangible assets is the difference between the assets (above the “0” line) and liabilities (below the “0” line) shown in turquoise.

Net tangible assets increased from £178,000 to £189,000 due to a decline in the amount owed on the mortgage for the ISC’s building. The ISC paid 4% of the original principal, as set out in the terms of the loan. In addition, because the loan is denominated in US Dollars, the amount owed expressed in UK Pounds fell with the exchange rate. The ISC plans to continue paying down the mortgage, leading to long-term growth of net tangible assets. But in the short-term net tangible assets may grow quickly, slowly, or even temporarily decline if exchange rates fluctuate.

The net value of ISC’s total assets, which is the difference between all assets and liabilities, decreased from £401,500 to £393,000 during 2004. This is well within British guidelines for charitable organisations, which suggest that net total assets should not normally be much more than twice the annual operating expenditures, or nearly £850,000 in the ISC’s case.

## ***Excess Expenditure and Reserves***

The ISC recognises income from capital-purchase grants only when purchases are made, so that grant income and grant-funded capital expenditures are exactly offsetting. In conformance with international accounting standards, such grants and purchases are not shown as income or expenditures, and the value of such capital equipment is not shown as an asset.

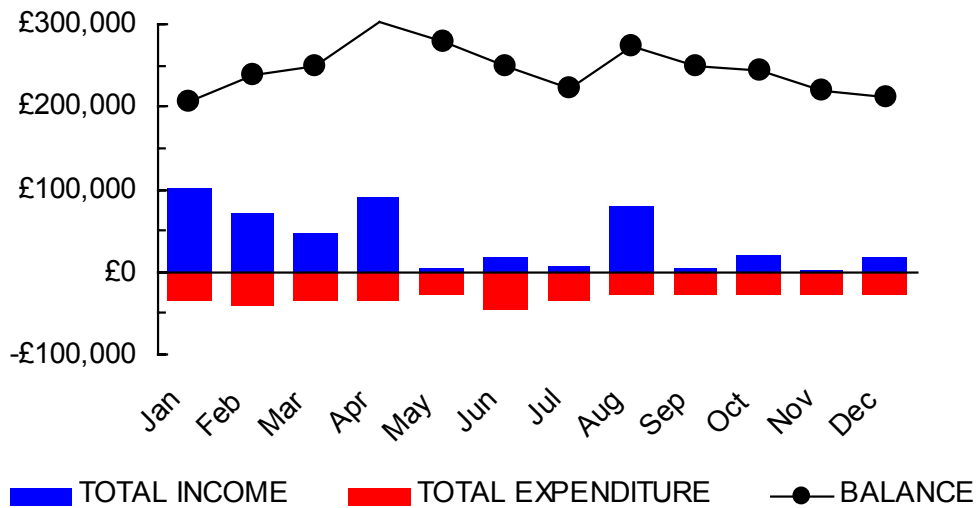
During 2004, interest of £1,261 earned on one of the ISC’s bank accounts was attributed directly to the computer replacement fund rather than being treated as income. As previously

# Finance

recommended by the Governing Council, the ISC transferred £5,000 from the general reserve to the computer replacement fund. The General Reserve total £302,300 showed a decrease of £14,700 accounting for this transfer and the loss of £9,700 on income and expenditure.

## **Cash Flow**

The cash flow figure below shows receipts and outlays using dates when transactions were recorded at the bank, and bank balances with US Dollars converted to UK Pounds using the exchange rate as of the end of each month. Cash flow excludes credit extended to the ISC, debts owed to the ISC, and commitment of assets, such as the exchange rate fund and computer replacement fund.



Receipts were large in January when the national subscriptions from NSF and Ireland arrived having been held up in the Christmas post. February, March, and April income accounts for the majority of 2004 subscriptions being paid and in August the NSF 2004 subscription/grant arrived. Expenditure remained constant throughout the year.

The ISC maintains a £20,000 overdraft facility with the bank for emergency use if contributions are delayed. If other obligations need to be met then permission from the Governing Council chairman would be requested to use the exchange rate or computer replacement funds kept in reserve.

## **Estimated Budget**

The estimated budget for the years 2005, 2006 and 2007 is shown on the table 1 (see appendix). This table also compares 2004 results with forward estimates for the next three years. These estimations are based on the following assumptions:

# Finance

1. The annual subscription rates for members are at the rates agreed at the Governing Council meeting in Sapporo, 2003 except for the 2007 rate.
2. We assume a 3% annual inflation rate.
3. Personnel costs allow for an annual increase of 5% out of which 3% is an anticipated inflation increase and the rest are minimal promotions on the academic salary scale.
4. Building expenses include some minor refurbishments and general maintenance.
5. Travel costs for 2005 include fares to Chile for ISC staff and Executive Committee members to attend the IASPEI meeting for although travel grants have been applied for.
6. Computing costs include the cost of new equipment this year as well as everyday expenditure such as data line costs and consumables, which are forecast to fall in 2006.
7. We assume that 3 agencies will stop their subscription to the ISC.
8. The National Contributions are calculated at the exchange rate at the time of writing this document, which was £1 = \$1.9.
9. A drop in the income is predicted in the number of CDs being sold since each *Bulletin* will now include a CD containing the entire dataset.
10. A grant from the Royal Society has been included in 2005 figures but no other grants have been accounted for although they will be sought.

# Other Activities

## ISC's PARTICIPATION IN MEETINGS AND CONFERENCES

- Expert's Discussion on Civil and Scientific Applications of the CTBT verification technologies. Berlin, Germany, May 2004.
- Annual meeting of the European Geophysical Union, Nice, France, April , 2004.
- Workshop on Reducing Earthquake Losses in the Extended Mediterranean Region (RELEMR), Aqaba, Jordan. January 2004.
- The XXIX General Assembly of the European Seismological Commission, Potsdam, Germany. April 2004.
- The V General Assembly of the Asian Seismological Commission, Yerevan, Armenia. Oct. 2004.
- 3<sup>rd</sup> Conference on Continental earthquakes, Beijing, China. July, 2004.
- Meeting of the American Geophysical Union, San Francisco, California. December 2004.

## Visits by ISC personnel

- Visit to British Geological Survey, Edinburgh, UK. June, 2004
- Visit to Earth Sciences Division of United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France. February 2004
- Visit to the European-Mediterranean Seismological Centre, Bruyeres-le-Chatel, France. February, 2004
- Visit to the Royal Society of London, December, 2004
- Visit to the CTBT Organization, Vienna, Austria. Oct. 2004

## Visitors to the ISC

- Mr. V. R. Gordon and Dr. K. N. Danilenko, Research Institute of Pulse Technique, Moscow & Technical Secretariat of the RF National Authority for CTBT
- The ISC Executive Committee: Prof. A. Dziewonski, Dr. C. Browitt, Prof. O. Starovoit, Prof. J. Woodhouse , Dr J Plomerova and Dr. G. Gibson
- Dr. M. Wiggins-Grandison, Earthquake Unit, University of West Indies, Jamaica.
- Dr. Stuart Sipkin , US National Earthquake Information Center, Colorado, USA
- Dr. Irina Gabsatarova , Russia Geophysical Survey, Russia Academy of Science
- Dr. Michael Pasyanos ,Lawrence-Livermore National Laboratories, Livermore, USA.
- A delegation of the China Earthquake Administration, Mr. Li Youbo, Deputy Director General of China Earthquake Administration and Mr. Zhu Shilong, Director, Department of International Cooperation, CEA, Ms. Han Lizhen, Mr. Wu Weimin, Mr. Zhang Zhoushu,, Mr. Zhao Xinping, Mr. Yuan Tinghong, Mr. Quan Dehui, Mr. Dong Jichuan, Ms. Wang Xia

## Other Activities

### *List of Publications and Reports 2004*

- Aspinwall, M., M. Bolton, P. Dawson, M. Evans, J. Harris, R. Lockett, N. Ozel, A. Shapira and D. Storchak, 2004. Compiled, revised and published information on global seismicity by the International Seismological Centre. Abstract, the XXIX General Assembly of the European Seismological Commission, Potsdam, Germany, p. 55. and V General Assembly of the Asian Seismological Commission, Yerevan, Armenia, p. 85.
- Evans, M.S., Kendall J-M. and Willemann, R.J., Global Analysis of Upper Mantle Anisotropy Using Automated SKS Splitting Measurements, AGU Fall 2005, poster T33A-1336.
- Hatzor, Y. H., A.A. Arzi, Y. Zaslavsky and A. Shapira, 2004. Dynamic stability analysis of jointed rock slopes using the DDA method: King Herod's Palace, Masada, Israel. *Inter. J. Rock Mechanics and Mining Sci.*, 41:813-832.
- Lockett, R., A. Shapira and D. Storchak, 2004. Contributions of the IDC to global seismology, Abstract, the XXIX General Assembly of the European Seismological Commission, Potsdam, Germany, p. 53. and V General Assembly of the Asian Seismological Commission, Yerevan, Armenia, p. 212.
- Lockett, R., A. Shapira and D. Storchak, 2004. CTBT contributions to the monitoring of global seismicity. Abstract of Expert's Discussion on Civil and Scientific Applications of CTBT Verification Technologies, Berlin, May 2004.
- Pinsky V. and A. Shapira, 2004. Destabilization of lithosphere by migration of fluids through the system of tectonic faults: mathematical modeling and geophysical applications. Final report for the period 20-11-2000 – 30-11-2003. GII Rept. 562/025/04(2). Prepared for INTAS
- Pinsky V., A. Polozov, A. Hofstetter and A. Shapira, 2004. Automatic and interactive advanced procedures for rapid flexible earthquake location and early warning. Abstract: V General Assembly of the Asian Seismological Commission, Yerevan, Armenia. p. 213.
- Pinsky V., Y. Gitterman, D. Kadosh, U. Peled, A. Vered-Malitzky, A. Hofstetter and A. Shapira. Location of surface explosions using acoustic observations. Abstract of Expert's Discussion on Civil and Scientific Applications of CTBT Verification Technologies, Berlin, May 2004
- Puskulco, S. and N. Marel Ozel, 2004. What is happening in the East Anatolia last 10 years. Abstract, the XXIX General Assembly of the European Seismological Commission, Potsdam, Germany, p. 55.
- Shapira A., 2004. The International seismological center: An update. Meeting of the Society for Earthquake and Civil Engineering, London. April 2004.
- Shapira A., 2004. Seismic hazard evaluations in low seismicity areas. Meeting of the Society for Earthquake and Civil Engineering, London. April 2004.
- Shapira A., 2004. CTBT contribution to Global Seismology: An ISC perspective. CTBT Newsletter Issue 5.
- Shapira A., A-Q Amrat Abdhala, J. Dabbeek and W. Hays, 2004. Earthquake hazard assessment for building codes- Final report April 2000- March 2004. GII Report 537/059/04. prepared for US- AID
- Storchak, D., 2004. Summary of the ISC *Bulletin* of events of 2001. Abstracts , The Annual meeting of the European Geophysical Union, Nice, France; The XXIX General Assembly of the European Seismological Commission, Potsdam, Germany, p. 55. and the V General Assembly of the Asian Seismological Commission, Yerevan, Armenia, p.83.



## Other Activities

- Zaslavsky, y., A. Shapira, M. Gorstein and M. Kalmanovich, 2004. Estimation of site effects in the Israel seacoast area by ambient noise records for microzonation. Proceedings: 5<sup>th</sup> Intl. Conf. On case Histories in geotechnical Engineering. NY, NY Paper: 12A-4 ; 9pp.
- Zaslavsky, Y., A. Shapira, N. Perelman and M. Kalmanovich, 2004. Observed and predicted acceleration response spectra from the February 11, 2004, M=5.1 Dead Sea earthquake. Abstract, the XXIX General Assembly of the European Seismological Commission, Potsdam, Germany, p. 158.
- Zaslavsky, Y., A. Shapira, G. Ataev, M. Kalmanovich, M. Gorstein, M. Mikenberg, T.Aksinenco, V. Giller, N. Perelman, I. Livshits, D. Giller, I. Dan and A. Shvatsburg. 2004, Use of ambient excitation for site effect assessment in northern Israel. Abstract, the V General Assembly of the Asian Seismological Commission, Yerevan, Armenia, p. 164.

**Table 1**

**ESTIMATED BUDGET**

	<u>2004 Actual</u> <u>Amounts</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
<b>EXPENDITURE</b>		£	£	£
Publications	16,133	19,690	17,060	17,710
Personnel Costs	290,311	301,950	316,280	333,050
Buildings	15,908	20,130	19,400	19,810
Travel	10,223	21,880	15,148	18,275
Computing	15,638	23,860	13,010	13,260
Other costs	18,774	16,370	16,860	17,370
Provision for write-offs	1,780	8,040	9,600	10,000
	<u>368,767</u>	<u>411,920</u>	<u>407,360</u>	<u>429,480</u>
<b>INCOME</b>		at \$2450/unit	at \$2570/unit	at \$2700/unit
National Contributions	331,922	350,740	358,960	378,925
Sale of Publications inc CDs	27,128	20,000	18,500	18,500
Grant from Royal Society		44,725		
	<u>359,050</u>	<u>415,465</u>	<u>377,460</u>	<u>397,425</u>
Gain or (Loss)	-9,717	3,545	-29,900	-32,055
Net Liquid Assets	165,671	169,216	139,316	107,261

£1=\$1.9