INTERMAGNET Meeting Minutes
Public Edition

Zentralanstalt für Meteorologie und Geodynamik,
1190 Vienna, Hohe Warte 38
Austria

Monday 02 – Wednesday 04 July 2018

Participants:

EXCON:

Gauthier Hulot (GH), IPGP, France
Alan Thomson (AT), BGS, UK

The following EXCON members participated via on-line communications for selected sessions:
David Boteler (DB) NRCan, Canada
Carol Finn (CF), USGS, USA

OPSCOM:

Charles Blais (CB), NRCan, Canada
Stephan Bracke (SB), IRM, Belgium
Simon Flower (SF), BGS, UK
Benoît Heumez (BH), IPGP, France
Andrew Lewis (AL) GA, Australia
Jürgen Matzka (JM), GFZ, Germany
Jan Reda (JRD), IoG PAS, Poland
Hiroaki Toh, (HT), KU, Japan
Chris Turbitt (CT), BGS, UK
Virginie Maury (VM), IPGP, France
Sergey Khomutov[1] (SK), IKIR, Russia
Roman Leonhardt (RL), ZAMG, Austria
Benoît St-Louis (BSL), NRCan, Canada

Guests:

Seiki Asari, JMA, Kakioka Obs, Japan
Jeremy Fee, USGS, USA
Pavel Hejda, IG CAS, EPOS, Czech Republic
Achim Morschhauser, GFZ, Germany
Anne Neska, IoG PAS, Belsk Obs, Poland
Eduard Petrovsky, IG CAS, IAGA, Czech Republic
Tero Raita, U. Oulu, Sodankylä Obs, Finland
Yuri Sumaruk, IGP, Odessa Obs, Ukraine

Guests participating on-line:
Aude Chambodut, ISGI, France

[1] SK supported by RSF grant no. 14-11-00194

Institute Abbreviations:

BGS – British Geological Survey
EPOS – European Plate Observing System
GA – Geoscience Australia
GFZ –German Research Centre for Geosciences
IAGA – International Association of Geomagnetism and Aeronomy
IKIR – Institute of Cosmophysical Research and Radio Wave Propagation FEB RAS, Russia
IG CAS - Institute of Geophysics, Czech Academy of Science
IGP – Institute of Geophysics, National Academy of Sciences of Ukraine
IoG PAS – Institute of Geophysics, Polish Academy of Science
IPGP – Institut de physique du globe de Paris, France
IRM – Institut Royal Météorologique, Belgium
ISGI – International Service of Geomagnetic Indices
JMA – Japan Meteorological Agency
KU – Kyoto University, Japan
NRCan – Natural Resources Canada
RSF – Russian Science Foundation
USGS – United States Geological Survey
ZAMG - Zentralanstalt für Meteorologie und Geodynamik, Austria

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INTERMAGNET Meeting Minutes

This public edition of the minutes has been edited to remove material relating to individual observatories, institutes or individuals. Throughout these minutes, references to subcommittees and committee members are identified using the abbreviations shown in section 2 below and initials included above in the list of participants.

1 Welcome and introductions

The meeting was held at the offices of the Zentralanstalt für Meteorologie und Geodynamik, Vienna Austria. The meeting was hosted by RL, Head of Conrad Observatory ZAMG. RL welcomed participants and described the logistics of the meeting. SF, OPSCOM chair, thanked ZAMG for hosting the meeting, opened the meeting and thanked participants and guests for attending. AT, EXCON Chair, welcomed and thanked participants and their institutes.

2 Committee structure and membership

2.1 Executive Council (EXCON)

Alan Thomson*
David Boteler
Carol Finn
Gauthier Hulot

2.2 Operations Committee (OPSCOM)

Chair Simon Flower* Secretary Andrew Lewis

Subcommittees

Definitive Data (DD)	GINS/WWW/Data Format (GWD)	IMO Applications and Standards (IMO)	Technical Manual (TM)	Instruments and Data Acquisition (IDA)
Jan Reda* (P)	Charles Blais* (P)	Chris Turbitt* (P)	Benoît St Louis* (P)	
Andrew Lewis (S)	Hiroaki Toh (P)	Andrew Lewis^ (P)	Andrew Lewis (P)	Benoît Huemez (S)
Benoît Heumez^ (P)	Jan Reda (P)	Benoît Huemez (S)	Chris Turbitt^ (P)	Benoît St Louis (S)
Charles Blais (P)	Roman Leonhardt (P)	Benoît St-Louis (P)	Hiroaki Toh (S)	Chris Turbitt (S)
Hiroaki Toh (P)	Simon Flower (P)	Jürgen Matzka (P)	Jürgen Matzka (P)	Jürgen Matzka (S)
Roman Leonhardt (P)	Stephan Bracke (P)	Sergey Khomutov (P)	Stephan Bracke (S)	Sergey Khomutov (S)
Sergey Khomutov (S)	Virginie Maury (P)	Tero Raita (S)		
Simon Flower (P)		Virginie Maury (S)		
Tero Raita (P)				
Virginie Maury (P)				

* Chair of council/committee/subcommittee; ^ Deputy Chair of subcommittee

(P) primary affiliation; (S) secondary affiliation

2.3 Changes to membership

Tero Raita was welcomed as a new member of OPCSOM, he will participate in the IMO and DD subcommittees.

3 Meeting agenda and minutes from previous meeting

3.1 Agendas

SF described the INTERMAGNET committee structure and, for the benefit of guests, explained the linkages between the DD and GWD subcommittee and the IMO and TM subcommittee sessions. SF presented the main agenda for the meeting and noted minor changes to the order of agenda items may be required. The agenda was accepted without change and is available in the appendix.
The four subcommittee chairs presented their subcommittee meeting agendas. These are available in the subcommittee minutes below. SF requested an addition to the GWD agenda to discuss standards for message broker usage within INTERMAGNET and JM requested clarification on the changes in NRCan resourcing of INTERMAGNET data archive and web site hosting services. The EXCON agenda was not presented in this session but is included in the EXCON report below.

3.2 Approval of minutes from Hermanus

Minutes from the Hermanus meeting were published in March 2018. The process of publication included review and acceptance of those minutes by the committee so further approval was not required during this meeting.

4 Presentation of guests

Guests introduced themselves and nominated sub-committee meetings they would like to attend

Anne Neska expressed interest in EPOS discussions but is undecided on subcommittee meetings
Yuri Sumaruk will present on ODE observatory during the meeting.
Seiki Asari will participate in the GWD and IMO subcommittees.
Tero Raita is attending his second meeting as an observer and will attend the DD and IMO committees.
Pavel Hejda is presenting on governance of geomagnetic observatory data within EPOS.
Jeremy Fee is interested in attending the GWD and DD discussions.
JM nominated Achim Morschhauser to participate in the DD and GWD subcommittee meetings.

Guests not present in this session:
Eduard Petrovsky
Achim Morschhauser

5 *In-camera* discussions

5.1 Committee membership

SF feels that the subcommittees membership is not generally under represented but there are sometimes problems with attendance at meetings and within the subcommittee meetings due to the logistics of parallel subcommittee meetings. GH suggested classifying membership as “main” and “consulting” members where main members are expected to attend meetings and consulting members can be consulted when necessary.
Consideration was given to membership on a subcommittee by subcommittee basis with discussion on some individual changes. BSL noted that TM subcommittee requires representation from each of the other subcommittees and does not have anyone from GWD - SF will attend some of the TM meetings in the coming days. CT commented that there is more overlap between IMO and DD than there is between TM and GWD. CB commented that GWD has good representation and requires no additions or changes. SF will talk to people individually over the coming days.

5.1.1 New membership

Committee members held a general discussion on membership and prospective members while noting the requirement to maintain appropriate skills and suitable representation across the INTERMAGNET IMO network. The importance for all members to have support from their institutes and the ability to travel to the annual meetings was highlighted.
AT said the subject of membership requires annual consideration and EXCON must be guided by OPSCOM about new membership. AT noted it is best to remain flexible and re-iterated his view that each subcommittee should have at least one on-line meeting throughout the year and while face-to-face meetings are always best, online meetings are a good alternative.
The lower than normal attendance by EXCON members at this meeting was mentioned and will be considered further within EXCON.

5.2 IDA sub committee

Reactivating the IDA subcommittee to discuss any relevant topics arising over the previous year is a standing agenda item and AT called for discussion. CB raised the topic of message brokers, it was considered a relevant topic for IDA but not pressing and so it was agreed there is no need for the subcommittee to convene during this meeting.

5.3 How we work

SF raised the question of documentation and policy notes on procedural issues within INTERMAGNET, for example:

- template letters for invitation to meeting;
- how is an INTERMAGNET officer appointed;
- how is an EXCON member appointed;
- how is a meeting venue selected?

The idea is to offer guidance and description for procedural tasks, not to increase bureaucracy and set rules. Currently there is only one policy note (on the subject of IMO acceptance). There was general agreement with the idea of recording and documenting such procedures. Discussion was centred on the nature of the documentation being descriptive rather than setting out rules. Consideration was given to publishing the notes and it was decided this would be a case-by-case decision. AT noted many

procedures are based on historical precedence and guidance may be available within the minutes from previous meetings.

6 Progress on plenary actions items from Hermanus meeting

Number	Responsible	Description	Status (Green = completed, Orange = ongoing; Red = not started)
Plenary A1	subcommittee chairs + AL	Chairs to document action items and decisions in subcommittee minutes. Secretary to minute the plenary sessions and compile all minutes.	**Done**
Plenary A2	subcommittee chairs	Arrange an online subcommittee meeting before the next face to face meeting.	**Partial - completed for DD only**
Plenary A3	AL	Receive any corrections of Dinant minutes and co-ordinate with BSL to finalise Dinant minutes.	**done**
Plenary A4	SF, Jeremy Fee, SB	Provide summary paragraph of presentation made at Dinant to finalise Dinant minutes.	**done**
Plenary A5	SF	Include discussion on Communications as a standing agenda item in future meetings.	**Done**
Plenary A6	SF	Announce future INTERMAGNET meetings on worldobs mailing list.	**done**
Plenary A7	SF	Call for recommendations to invite key people/representatives to next meeting. Invite IAGA representative to next meeting.	**done**
Plenary A8	Committee members	Provide suggestions or recommendation for new OPSCOM membership to SF and EXCON	**On-going**
Plenary A9	SF, AL	Develop procedures and time-table for pre and post meeting tasks (participant invitation, attendance lists, preparation and publishing minutes)	**On going – refined during this meeting**
Plenary A10	SF	Review subcommittee membership for practicality of meetings, including the appointment of deputy chairs	**On going – refined during this meeting**
Plenary A11	CT, JM, AL	Do a comparison study of all available quasi-definitive and definitive data for 2015. Jane Exton (BGS) has software to perform the comparison. Produce and publish a paper of results with INTERMAGNET authorship. Review methods of QD data production and include A.Chulliat in preparations and discussions.	**Partial - study completed and presented during this meeting. Publication not prepared.**
Plenary A12	JM, **SF**	Create DOIs for existing definitive data DVDs and report on any problems (one DOI for each DVD).	**Partially completed, SF added**
Plenary A13	BH, SB, M	Prepare a DOI discussion document	**Outstanding – require a list**

	Nose, E Clarke, J Fee, **SF**	suggesting best practice and offering advice to institutes on using DOIs.	**of example cases of DOI usage. SF added to document these examples.**
Plenary A14	JM, SF	Commence capture of already created DOIs from institutes and add to metadata system.	**Done**
Plenary A15	Committee members	Encourage their institutes to consider the issues of data licensing and DOIs.	**Done – email issued by SF, several positive replies received.**

7 Presentation in plenary sessions

7.1 Communications (AT)

A reflection on how we communicate with IMOs and the wider community followed by discussion and suggestions for improvements.

AT has had discussions with Eduard Petrovsky (IAGA president) and the IAGA Executive Committee (of which he is a member) on the connections between IAGA and INTERMAGNET and there is now a link to IAGA on the INTERMAGNET website. AT will arrange a presentation on INTERMAGNET activities during the next IAGA Division V business meeting at IUGG Montreal in 2020.
Regrettably there was no INTERMAGNET session at the recently completed workshop at Conrad and this was a missed opportunity. A session for INTERMAGNET discussions should also be held at every IAGA Geomagnetic Observatory workshop. Copies of the most recent minutes and report to IMO could be distributed to the IMO community at the workshop. It would be useful for pre-planning if an attendance list could be provided before each workshop to assist targeting areas of under-representation in INTERMAGNET and specific groups could be encouraged to attend INTERMAGNET meetings. JM noted his useful discussions with the Chinese delegation during the recent Conrad observatories workshop and he will maintain contact into the future.
An INTERMAGNET trade-stand at the next IUGG general assembly was raised. The BGS organised such a stand on behalf of INTERMAGNET at the 2016 European Space Weather workshop, so materials and concepts could be used as a basis for a stand at the next IUGG. SF noted there was an INTERMAGNET stand at IUGG some years ago where data CDs were available as give-aways. SF called for suggestions on the theme for the stand. Ideas from the floor included a USB of 25 years of INTERMAGNET definitive data; promoting availability of 1-second data, and the impending release of the next version of the technical manual.
Following on from the presentation on the World Meteorological Organisation's Observing Systems Capability Analysis and Review Tool (OSCAR) by Larisa Tritchenko during the Hermanus INTERMAGNET meeting AT reported that progress on OSCAR has been slow. The INTERMAGNET metadata system may be helpful to feed into the OSCAR project.
The idea of formal recognition for individuals who have provided notable or long service to INTERMAGET was raised and AT is happy to send a letter of recognition if suitable candidates are brought to his attention.

7.1.1 Discussion

CT noted it would be valuable to improve dialogue and interaction within the IMO community and brought up the concept of an online forum which has been previously considered by GWD. CB has investigated free on-line forum tools and has been exploring GitHub for this purpose.
SB noted that GitHub is designed for programmers but "issues" can be used for more general discussions. GH asked for examples of using GitHub for non-software related topics and CB noted examples on Amazon Web Service topics and Anne Neska mentioned MT data discussions within EPOS. Jeremy Fee said GitHub is used extensively within USGS. SF suggested the need for something of general interest to kick-start usage of GitHub by the community and encourage people register so they can contribute to GitHub posts. It could be advertised in the next report to IMOs that there is a preview of the next version of the Technical Manual available on GitHub to encourage people to start using the system. CT asked if the website FAQs could be put onto GitHub with a feature to raise on-line questions to INTERMAGNET.

7.1.2 Refreshing the web site and social media

AT and BSL suggested changing the website to look more attractive and to review the site for outdated material. Any significant update or review requires input from people who are already very busy but perhaps GitHub can be used to share the load. AT suggested the need to augment the FAQ section with more topics such as: What is INTERMAGNET; Why should I join; How will I benefit from membership? Any update to the website is a good opportunity to advertise INTERMAGNET.
GH raised the possibility of using other communication tools such as twitter and asked should INTERMAGNET issue storm warnings on twitter? SF noted that real-time social media requires editorial effort and CT commented that out-of-date social media can promote a negative rather than positive image. As an alternative it may be possible to get agreement from institutes that already publish on social media to publish on behalf on INTERMAGNET. RL suggested the website could include a portal listing institutes publishing on topics relevant to INTERMAGNET. Similarly, INTERMAGNET could list web services and application hosted by institutes. JM noted we must be mindful of INTERMAGNET providing services which are important for individual institutes. This is an important strategic topic suitable for EXCON discussions. AT agreed to consider the subject in EXCON.
AL noted there is an INTERMAGNET Wikipedia page which could benefit from improvements.

7.2 Progress on technical manual (BSL)

A summary report of the status of development of the next edition of the Technical Manual.

Starting with some background information to put the guests in context, BSL described the reasons for selecting a reformat of the entire manual and then provided the status of advancement of V-5.0.0 d-0.9 that was circulated before the meeting. He commented on the tasks required to publish the manual on the web site, how these tasks will be distributed and performed during the working sessions of the Vienna meeting, and an overview of the look ahead for possible new insertions.

7.2.1 Background information on version 4.6 to 5.0.0

- Reformat of the manual to remove duplication and eliminate out of sync information with the web site.
- Decision to write the manual in PHP as part of the web site offering the possibility to use commercial PDF converter to automatically generate the book format version if the PHP code meets certain requirements.

    - The evaluation of new tools to share the development load, provide version control and open the manual to a wider community than the INTERMAGNET members as they become available.
    - The major challenge in this process was to document procedures and data format still under development.
- The new format of the manual was designed to make the access to information easier and organized by:
    - Observatory type (1-minute, 1-second)
    - User or provider of data
- Progress from the last meeting was included and distributed in an updated draft version V-5.0.0 d-0.9 prior to the meeting which includes:
    - Completed general, specifications, data format, submission and distribution sections
    - Partially completed data processing section (mainly Chapter 5)
- The subcommittee will concentrate efforts during this meeting to complete as much as possible of the sections required to publish version 5.0.0 a few months after the meeting. To do this, the subcommittee members will create a list of outstanding items, prioritize them and distribute them to individuals or small working groups in the hope that most of the not too complex ones can be completed during this meeting. Deadline for the more complex ones will be estimated and a follow-up teleconference will be scheduled to complete the process.
- The review process will start soon after the meeting for the completed sections and soon after the teleconference for the other sections. These reviews will be divided by these categories:
    - Data format accuracy
    - Real-time data definition consistency throughout the manual
    - Process of data submission and distribution
    - General overview of the entire manual
- Publication on the web site will be done as soon as these processes are completed
- If time permit, the subcommittee will start planning future inclusions to the manual such as:
    - Flagging of the data
    - Web services
    - Electronic licenses

7.3 One-second definitive data (JRD)

A presentation on progress of collection of 1-second data 2014 – 2016 and issues with data checking

2014: 38 IMOs provided data; 36 accepted
2015: 36 IMOs provided data; 19 accepted
2016: 8 IMOs provided data; 2 accepted
2017: 1 IMO has provided data (WIC)
From 2015 onwards, data were requested in ImagCDF format but some IMOs provided data in IAGA-2002 format. Due to lack of checking software for the ImagCDF format only those data provided in IAGA 2002 format have been checked and accepted.

7.3.1 Checking 1-second definitive data

The procedure used to check 1-second data involved converting 1-second IAGA-2002 files to 1-minute IAF files and comparing these IAF data files to the accepted definitive one-minute IAF files. Attempts to use currently available software to convert ImagCDF files to IAF were not successful.

Software tools and guidance for data checkers are urgently required to allow effective checking of 1-second data provided in ImagCDF format.
JRD noted the most important point for checking the 1-seconda data is that the 1 second data agrees with the 1-minute data. SK commented that spectral analysis of 1-second data is useful to check for noise sources and other problems not obvious in the time-series data and RL noted that infilling periods of missing 1-second data using data from instruments with different frequency responses can be problematic for 1-second data sets. He also mentioned the MagPY software has facilities to deal with ImagCDF format – it can convert data from 1 second to one minute; convert from ImagCDF to IAGA-2002 and there is a 1-second data checking module available. The ImagCDF data checked so far shows that IMOs have trouble with the interpretation of the 1-second standard and complying with the file name standard. SF suggested that we need to provide assistance to the community to work with data in ImagCDF format.
GH said is it important there is no discouragement for IMOs to submit one-second data. The ability for partial compliance with the standard is an important feature of the ImagCDF format to encourage data submissions. Developing a system of data flagging will also allow data providers to notify data users of problems or issues within data sets.
SF suggests instructions on ImagCDF should be included in the next call for 1-second data. SF requested the Definitive Data subcommittee work on recommendations for detailed checking and analysis of 1-second definitive data.

7.3.2 Publishing 1-second definitive data

So far, the accepted 1-second definitive data remains on the Paris FTP server and has not been published. There is not yet a formal system to check and publish ImagCDF format definitive 1-second data. A system is required to transfer the accepted 1-second data from Paris to the INTERMAGNET web site. CB suggested NRCan would prefer not to convert ImagCDF data files into other formats for publication. It would be best to make ImagCDF data available and offer tools to users to read and convert these files if required. BH will set up a two-step directory structure on the Paris ftp server to facilitate a more formal process of 1-second data checking, similar to the 1-minute data checking system. When 1-second data are published on the INTERMAGNET web site it should be announced to the community, perhaps via an article published in EOS.

7.4 Licensing and DOIs (SF)

An update and discussion on data licensing and digital object identifiers.

7.4.1 Licensing

SF recently sent an email to the IMO community requesting comments on data licensing. The Creative Commons CC-BY-NC was suggested as the default license for data available from INTERMAGNET.
The existing data licence available for many years on the INTERMAGNET web site is similar in substance to the CC-BY-NC licence but changing to a Creative Commons licence will mean:

- The licence is well understood;
- Is machine readable;
- Is available in multiple languages.

So far two replies have been received to the email, both indicate they are comfortable with using the CC-BY-NC licence.

SF asked if individual data files should have the associated licence included within the file to allow for specific licences for different institutes. The new metadata system will be capable of recording licence details for individual institutes.
VM expressed concerns about data licence conditions changing in the future and JM noted the new metadata system has time-stamps for all parameters so it can easily handle changes but licence conditions cannot be retrospectively changed once data have been distributed under a particular licence. Pavel Hejda noted EPOS has proposed the CC-BY and CC-BY-NC licence for data distributed through EPOS and contributing institutes can decide which of these licences they choose.
CT noted that a condition of membership of INTERMAGNET is sharing of data. It will be possible for individual institutes to have less restrictive licence conditions that the default licence.
It was agreed that CC-BY-NC is an acceptable default licence for data distributed by INTERMAGNET; it is OK for institutes to have less restrictive licences and a mechanism is required to attached licences to data files (as metadata in ImagCDF or IAGA-2002 data files for example).

7.4.2 DOIs

An action item from Hermanus was to create DOIs for existing definitive data DVD. SF has spent time with a data science expert at GFZ to develop the first DOI for the 2013 definitive data DVD. The DOI is not yet ready but much of the background work required in now in place. The broad structure of the required metadata has been prepared and populated, in large part, from information on the INTERMAGNET website. More refinements may be required. A draft landing page for the DOI has been set up (hosted by GFZ) and is now open for comment

http://dataservices.gfz-potsdam.de/panmetaworks/review/805c9ff9e6b10ea7c80f3664e6d007f50dec3bb38aa0f775419f3ed41e43e055-intermagnet/

This landing page could be used as a template for preparing DOIs for the other DVDs. INTERMAGNET is the publisher and the individual institutes are listed as authors so the citation includes a long list of institutes. Work is yet to be completed on compiling the list of DOIs from individual institutes that describe subsets of the data. SF notes that providing credit to institutes and ensuring ease of citation are sometime difficult to reconcile. VM and GH note that the French use a single DOI covering their entire geomagnetic dataset which has living content.
An important aspect of DOIs is immutability of data once the DOI has been minted. The metadata and landing page can change but the dataset itself should not change. As INTERMAGNET is not a certified DOI authority and does not have approved systems to ensure data cannot change it may be necessary to move datasets to GFZ web servers (as the issuer of the DOI) to guarantee the data will not change once the DOI has been created. This raises issues about distributed data archives which need to be considered. The INTERMAGNET web site should continue as the source of pre-DOI data then, after the DOI is created, data are moved to GFZ to guarantee immutability.
AT requested a recommendation from the GWD subcommittee.
GH asks how a user should use the DOI and suggested there should be an example on the landing page showing how to quote the citation.

7.5 Relocating the INTERMAGNET data archive & web service (CB)

References to individual institutes have been removed from this section

Report on progress on relocating INTERMAGNET's data archive, ftp and web services out of NRCan.

NRCan are looking to move the INTERMAGNET data archive, data reception from GINs and data distribution web service from Canada to another institute. The INTERMAGNET web site can remain on NRCan servers. One institute has expressed interest to host the services. Web service specifications have been written and CB provided requirements some time ago. Further updates are expected by the end of July.
SF commented that it would be very good to diversify the institutes providing services to INTERMAGNET.

7.5.1 Changes at NRCan

The Canadian Government cyber security action plan has forced updates to NRCan systems and hardware. INTERMAGNET rsync and ftp servers are now running on new operating systems and hardware with more disk space and better availability at mission critical data centres but there are still some vulnerabilities that need to be addressed. Increased disk space means there will be no space issues into the future, possibly for another 10 years. The INTERMAGNET archive is currently about 300 Gb (data from 1991) but can now be easily increased to 1 TB. While archive and storage are no longer an issue the high and increasing traffic to the web service for real-time data requests remains a problem for NRCan. Any new institute hosting these services will need to prove they can manage this aspect of the services. Further discussion within subcommittee and provision of options for EXCON are required.

7.6 Definitive data publication on USB stick (BH)

Information on the status of INTERMAGNET data publication.

The history of INTERMAGNET data publication:

- 1991 – 2005 on CD (one or two CDs)
- 2006 – 2013 DVD;
- 2014 USB stick sent out in March 2018 to 83 contacts, 117 USB keys, with 2 returned.

2015 will be the 25th year of INTERMAGNET data publication so it is proposed to include all data (1991 – 2015) on one 32 GB stick to be published before the end of this year (Oct/Nov 2018).
Increased demand for the memory stick is anticipated due to the large amount of data so perhaps more units should be produced. This will be particularly necessary if they are supplied to delegates at the next IUGG meeting. Costs are about 2300 Euro for 150 copies.
Following the decision made at Hermanus the 2015 data will be the last distributed on durable media. GH asked if the memory stick will have a DOI and SF confirmed it will, just as all the other CDs and DVDs. SF questioned if the decision to stop distributing data on durable media should be reversed. BH noted there has not been any feedback from the community on this question and suggested memory sticks could be issued once every 5 years or even on individual request. AT suggested that an announcement should be included with the final distribution of memory sticks noting that this will be the final issue and users would need to request data in the future. Jeremy Fee suggested it could be possible to set up a system so online requests from users could go direct to a memory stick production company and users cover costs themselves. CT suggested the IMCDView software could be updated to access data directly from the INTERMAGNET web services rather than from local data files.
BH confirmed that the 2015 memory stick will be the last one but the committee should give the question of producing data on durable media more consideration in the future. CT asked if there was any pre-publication announcement to advertise availability to the wider community and suggested an article or publication would be useful, possibly in IAGA news.
The topic will be discussed further in subcommittees.

7.7 Update on EPOS (P. Hejda)

An explanation of the administrative structure of EPOS and an update on activities relating to the geomagnetic community.

The European Plate Observing System consists of Thematic Core Services (TCS) based on scientific communities. “Geomagnetic Observatories” is one such TCS. While EPOS is a European project the geomagnetic community is organised world-wide. There are other TCS within EPOS with global coverage such as the “Satellite Data” TCS. The Geomagnetic Observatories TCS is organised in three parts;

- European Geomagnetic Model and Data Archive;
- European Service of Geomagnetic Indices;
- European Service of Magnetotelluric Data and model.

The TCS are linked to, and communicate with, Integrated Core Services via a compatibility layer.
EPOS is now a legal entity whose members are states, not institutes. On the TCS level a consortium will be established with an advisory board. As INTERMAGNET is not a legal entity it cannot be on the board but representatives from INTERMAGNET can be invited to board meetings. There are two advisory bodies, a user committee and a data providers committee.

7.7.1 Supplier Letter

EPOS suppliers are the individual institutes supplying geomagnetic data. EPOS requires written confirmation from suppliers to offer clarification of data ownership and licensing and confirm their data can be supplied. A letter will be sent to each institute to be signed by their representative. The CC-BY licence will be the default for EPOS but individual institutions can have other licences. Data from INTERMAGNET will probably use CC-BY-NC. An annex will be included in the letter listing data sets. In return for supplying data to EPOS, their data will be available to a wider community and institutes will receive statistics from the EPOS system listing users who have downloaded their data. IMOs will not need to supply data specifically to EPOS; data will be provided to EPOS from the INTERMAGNET web services.
A number of EPOS services were due for completion in September 2017 but there have been unexpected delays and the implementation is running behind schedule. EPOS is still at an early stage of development.

7.8 Metadata (SF)

A summary of work on the geomagnetic metadata system.

A metadata system for the geomagnetic community has been developed using funding supplied through EPOS. The system is an oracle database schema made up of about 30 tables and 15 dictionaries. All key entities (except the IAGA code) have associated time periods and are available in multiple languages. The schema has now been peer reviewed by database experts and there is a public facing interface available on BGS servers so it is possible to write web services to access INTERMAGNET metadata as XML files. The difficult work yet to be done is populating the system from available data such as INTERMAGNET readme files and world data centre meta-data holdings. Development is now close to the point where content from the metadata system can be supplied to the INTERMAGNET web site.

7.9 Recent results from Odessa observatory (Y. Sumaruk)

A brief history of geomagnetic work at Odessa and information on current status.

The earliest magnetic observation near Odessa were made along the Black Sea from 1859 to 1886. A map of the Odessa anomaly was published in 1890 and regular observations commences in 1894.
The Odessa observatory commenced operation in 1924 and was relocated in 1931 to Stepanovka where observations have been made since 1948. Instrumentation was updated in the 1970s. In 2007 a LEMI fluxgate was installed and then, in 2010, a torsion photoelectric magnetometer was installed with assistance from the Polish academy of science. In 2015, under an agreement with GFZ, new magnetometers were installed including a DTU FGE suspended fluxgate a GSM19 overhauser magnetometer and data acquisition equipment. Data have been sent to the Edinburgh GIN since the time this system was installed.
The variometer pavilion is underground and has stable temperatures throughout the year with an annual range of 1 degree Celsius. The noise level is very low and data compare well to those from the Kiev observatory. Data are prepared in INTERMAGNET format and preliminary baselines are adopted using an automatic process.
An application has been submitted for Odessa to join INTERMAGNET.

7.10 NanoMagSat cube satellite proposal (GH)

A report presenting the current state of planning for the proposed NanoMagSat

NanoMagSat is a proposal for a 12U satellite using the same Absolute Scalar Magnetometer (ASM) as currently used on the Swarm satellites which can provide 1 Hz vector absolute data and 250 Hz scalar data. The ASM instrument has been proven to provide useful data and the goal is to build and launch one such nano-satellite into a 60-degree inclined orbit while Swarm is still flying. Swarm funding continues until 2021 and the project is expected to continue until 2024.
Discussions with ESA and CNES are ongoing to encourage future development of a constellations of such nanoMagSats to complement the ground-based observatory network. ESA are showing interest in nanosat constellations and now the feasibility of a nanoMagSat has been demonstrated the planning process needs to be taken to the next step. INTERMAGNET has previously provided a very useful letter of support. Work continues and additional support is welcome.

7.11 2015 quasi-definitive data (AL)

A report on comparison of quasi-definitive and definitive data for 2015

The definition of quasi-definitive data (QD) has recently been updated. Both the new and old definition state QD monthly means must be within 5 nT of definitive data monthly means and QD data will be published within 3 months of collection. Recent QD data were compared against the two measurable parameters from the definition and to maximise availability of both QD and definitive data the year 2015 was chosen. A total of 70 IMOs submitted QD in 2015, of these 17 had no definitive data so 53 IMOs were included in the comparison. A total of six months from 4 IMOs (1%) out of 603 months of available data were found to be outside the 5 nT limit. There were an addition 4 months which were close to the 5 nT limit.
Publication delay is more difficult to measure as metadata on publication date is optional in the IAGA-2002 format and was not available for all data files. The operating system file modification data was used as the next best measure of publication date. The file modification date was tested against publication date for some data files which also included publication date in the metadata header and the two dates were found to agree. Publication delay was calculated for all 70 IMOs using the operating system file modification data and 77% of the twenty-three thousand daily QD data files were found to

be published within the three-month period after data collection. 47 IMOs (67%) were found to have delivered at least some QD data after the 3-month delay period.
Discussion focused on the publication delay and it seems the operating system file modification date is not a suitable measure of publication delay. SF noted it would be useful to give a general reminder to IMOs on QD timeliness.

7.12 K9 lower limit (A. Chambodut via Skype)

An update on the current status of deriving the k9 upper limit

Deriving K9 lower limit (K9LL) has been done by ISGI using a method developed by Mayaud. The details of the method have not been made publicly available up to now. K9LL is derived using the distance between the corrected geomagnetic (CGM) coordinates for the observatory and the auroral oval as one of the primary parameters. The location of the oval used in Mayaud's work was +/-69 latitude but later investigation has not clarified the basis for that definition of the oval. An equation for the so-called "L" curve in Mayaud's plot to define K9LL was never published and defining that curve is one of the aims of a new study.
There are some discrepancies between the value of K9LL actually used and the value calculated. In the past these differences were accepted by ISGI and others in the interests of not constraining the observer because all scaling was done by hand and data were provided under gentlemen's agreements.
Differences of some 10s of nT were not considered to be a problem and it was acceptable to round the K9LL to the nearest decade, 50 or 100 nT. These differences are encompassed in the calculation of the aa and Am indices.
As CGM changes with secular variation this will also affect the K9LL. Mayaud considered this point but he states changes due to secular variation are negligible over 10s of years and he did not consider such changes as a problem. However, it is possible that secular variation could be introduced into some indices through the slow change of the K9LL.
Work is underway on some more accurate geomagnetic indices, such as a new index similar to Kp but using a larger observatories network and a finer time scale.
INTERMAGNET observatories should not change the K9LL if there are discrepancies between the value used and the value issued by ISGI - it is more important to maintain homogeneity in the data series. It is important the value actually used for the K9LL is correctly reported.
GH asked about the impact on the difference in Kp index on the K9LL. A study has been done on the aa and Am but no study has been done on Kp.
JM noted the older publication of Bartels concluded that K9LL should not be changed. And the quasi-logarithmic nature of K-index means small changes do not significantly affect the K values.
CT confirmed, that for new IMO applications he should verified with the IMOs they have contacted ISGI to obtain the K9LL.
Aude highlighted that K indices calculated for observatories located inside the auroral ovals are meaningless.
A paper on this work will be published in the next few months.

7.13 Federation of Digital Seismic Network Web Services (CB)

Presentation on proof of concept proposal to use FDSNWS. CAPS for INTERMAGNET geomagnetic data.

SeisComP3 is commercial software developed by GFZ for acquisition, processing and distribution of seismic data. NRCan now uses SeisComP3 seismic software, protocols and infrastructure for their geomagnetic network. SeisComP3 has a large user and support community and includes FDSNWS and

common acquisition protocol server (CAPs). CAPS supports any time-series data so it could be used for geomagnetic data and includes built-in tools to monitor data latency and server loads which could be useful for INTERMAGNET. Some aspects of the system are seismic oriented and not useful for geomagnetic data but FDSNWS queries to a CAPS data base of geomagnetic data could be very useful for real-time geomagnetic data distribution.
NRCan and USGS are implementing FDSNWS for their seismic network and CB will work on proof of concept to use FDSNWS for geomagnetic data. Both NRCan and USGS are working to adapt geomagnetic data for the system. Conversion tools have been developed to reformat geomagnetic data to seismic miniSeed format (and the reverse) so it will be possible to convert INTERMAGNET data to allow an FDSNWS system to distribute INTERMAGNET data and also potentially use a seedLink message broker service to distribute real-time data. It will also be possible to interface with MagPY. USGS already uses the system to store magnetotelluric time-series data.
Any development of an FDSNWS system for INTERMAGNET would be in addition to the existing INTERMAGNET systems at NRCan and be most useful as a service to provide real-time data to reduce the increasing load on NRCan INTERMAGNET servers for real-time data distribution. It may also be possible to use IRIS to host INTERMAGNET geomagnetic data.

7.14 Discussion documents (SF)

INTERMAGNET discussion documents are not publicly available and there are a number of discussion documents with interesting and relevant information which could be re-worked to ensure the information is not lost. Perhaps they should be converted into Technical Notes, Policy Notes or incorporated in the Technical Manual. SF will contact authors or relevant people to review these discussion documents and ensure information is properly captured.

7.15 Commercial observatories (AT)

A company in the USA which designed, builds, calibrates and markets magnetic direction finding and steering equipment for the oil industry have enquired about INTERMAGNET membership for a magnetic observatory they may build. The motivation seems to be for the instrument calibration work they undertake. The site of the proposed observatory is on an industrial estate. Technical information provided so far on magnetic gradients and buildings seem good.
There are no other commercially operated observatories within INTERMAGNET but there is no reason why such an observatory could not join INTERMAGNET provided they abide by the rules. CF and USGS will follow up with the company to get more information.
Discussions centred on concerns regarding private observatories joining INTERMAGNET and the implications their membership could have on commercialising the value of being an IMO. CT questioned if INTERMAGNET membership is used as an “industry standard” does it open any possibility of liability or the need for a legal disclaimer on data. A no liability clause should possibly be added to data distributed by INTERMAGNET. AT noted that INTERMAGNET does not have legal status and there does not seem any compelling reason to change this at this stage but legal advice may be required. CB noted there were issues allowing private companies access to the old INTERMAGNET FTP site. SF highlighted the Creative Commons licence includes disclaimers which may cover this situation. JM suggested that such requests should be considered on a case by case basis rather than deciding on a blanket policy for commercial observatories joining INTERMAGNET.
It was agreed that USGS should monitor developments in this particular case.

7.16 IMCDView (SF)

There is a link on the INTERMAGNET website software page to download the IMCDview software from the BGS ftp server. There are also some copies the software on the Paris-GIN. VM will delete these old copies.
IMCDview includes data importation/format conversion facilities but they are limited, mainly due to low angular resolution of data in IAF files. A new piece of software to do format conversion via a GUI is under development and will be made available soon. Once that work is completed the importation/format conversion tools within IMCDView will be removed.

8 Next meeting

Two offers to host the next meeting were considered by the committee. HT presented on behalf of the Kyoto University to host the meeting in Kyoto, Japan in September 2019. BSL presented an offer from NRCan to host the meeting in Ottawa in July 2019 (before or after the next IUGG assembly in Montreal). A vote by show-of-hands was held. The offer by NRCan to hold the next meeting in Ottawa won the vote. SF will co-ordinate details.

9 Plenary decisions and action items

9.1 Decisions

Number	Description
P.D01	The next meeting will be hosted by NRCan in Ottawa in July 2019
P.D02	CC BY NC is a suitable default licence for data distributed by INTERMAGNET

9.2 Action items

Many of the action Items considered in plenary sessions have been captured within the council and subcommittee action items which can be found in the sections below. Those actions items not fully included in the council and subcommittees lists are included here.

Number	Responsible	Description
P.A01	chairs + AL	Complete subcommittee reports, decision logs and action item list by 6 weeks after completion of the meeting
P.A02	chairs	Supply a report on subcommittee activities for inclusion in the “Report to IMOs” by 6 weeks after completion of the meeting
P.A03	SF	Complete a report to IMOs and distribute to IMOContacts, WorldObs and the INTERMAGNET web site by 12 weeks after completion of the meeting
P.A04	AL	Complete draft minutes, including reports from subcommittees by 12 weeks after completion of the meeting
P.A05	Committee members	Review the draft minutes within 14 weeks after meeting
P.A06	AL	Complete corrections and amendments to the minutes with 16 weeks.
P.A07	AL and SF	Review minutes for publication within 20 weeks after meeting

P.A08	Committee members	Review draft “public” minutes within 22 weeks
P.A09	AL	Upload minutes to INTERMAGNET document archive, publish the “public” minutes on INTERMAGNET web site and notify IMOContacts by 24 weeks after completion of the meeting
P.A10	subcommittee chairs	Arrange an online subcommittee meeting or document meeting before the next face to face meeting.
P.A11	SF	Request committee members for recommendations on targeted invitations by 10 weeks before the next meeting
P.A12	AT	Invite IAGA representative to attend next meeting
P.A13	SF	Commence arrangements for the next meeting with the local host by 10 weeks before the next meeting
P.A14	SF	Finalise the list of attendees and resolve any non-attendance issues 6 weeks before the next meeting
P.A15	SF	Request committee members for agenda items for inclusion at the next meeting and request chairs to create subcommittee agendas
P.A16	SF	Include discussion on Communications as a standing agenda item
P.A17	SF	Announce INTERMAGNET meetings on worldobs mailing list
P.A18	AT	Arrange and deliver an INTERMAGNET briefing during the IAGA Div V-Obs business meeting at IUGG assembly Montreal 2020
P.A19	AT	Arrange an INTERMAGNET discussion session during the next IAGA observatories workshop
P.A20	SF	Publish draft agendas 2 weeks before the next INTERMAGNET meeting
P.A21	SF	Arrange an INTERMAGNET “trade-desk” at the IUGG Montreal meeting
P.A22	AT	Investigate data disclaimers and the question of liability in relation to commercial/privately funded observatories joining INTERMAGNET
P.A23	VM	Remove old versions of IMCDView from Paris GIN
P.A24	SF	Publish new version of IMCDView and data format conversion software on GitHub
P.A25	SF	Investigate machine readability of creative commons licensing
P.A26	Committee members	Suggest suitable topics for policy notes.
P.A27	SF and committee members	Update subcommittee membership lists and categorise committee affiliations into primary and secondary.

10 Executive Council

10.1 Participants

G Hulot, A Thomson. By phone: D Boteler, C Finn

10.2 Agenda

Underlining identifies items added to the preliminary EXCON agenda following discussions during the plenary meeting on the 1st day.

- Report on progress on EXCON Hermanus Action Items (see below)
    - Follow-up on any relevant items
- Discussion Potentially Leading to Decisions
    - Status report on new INTERMAGNET web service host
    - Requests from 'commercial observatories'
    - Any issues arising around transition from DVD to online data
        - (Hermanus minutes) "(EXC.D2) we should now move to modern digital delivery and specifically end the issuing of DVDs after the issue of the 2014 DVD. Depending on feedback from OPSCOM on any technical issues that might delay a new implementation, this new digital format should apply to the 2015 data and certainly to the 2016 data and thereafter."
        - GH's email: USB key solution seems to be favourable to IMOs
            - Options: 5 year USB issued by IM, or, IMOs request USB copy of data either from IM or direct from USB supplier
- General Discussion & Information Exchange
    - Status of EXCON
        - Maximising meeting attendance and representation
        - Succession planning
        - Governance issues in general: composition and procedural rules
    - Status of OPSCOM subcommittees and activities
        - 'Non-compliant IMOs' - new category of membership
        - Maximising meeting attendance and representation
        - Encouragement of mid-term electronic meetings
        - Progress on definitive 1-minute data
        - Progress on 1-second data
        - Progress on the Technical Manual
            - V&M statement to appear in technical manual
        - Progress on DOIs and data licensing
    - Discussion on ways forward for INTERMAGNET
        - Any new science opportunities?
            - In Dinant & Hermanus we discussed nanosats, electric & MT field measurements and standards, and variometers
            - Are new standards required for any new science areas?
        - Communication

- Scope for advertising INTERMAGNET via conference stands, e.g. AGU, EGU…?
- Need for a website refresh? – place with GWD committee for further consideration
- Use of Wikipedia, message board (c.f. AI EXC.7 in Dinant), social media?
- '25 years of IM data' paper for EOS
- New data visualisation tools (c.f. existing activity index)?
- Updates on and links to external organisations (space weather related)
    - e.g. OSCAR-WMO, UN-COPUOS, …
- INTERMAGNET long service recognition

- Any Other Business

10.3 Progress on EXCON Hermanus action items

Number	Responsible	Description	Status
EXC.A1	AT, SF	Issue letters of invitation to key regional IMO and observatory institutes to attend next IM meeting as guests. Also use the 'worldobs' message board to advertise and encourage guests.	**Done**
EXC.A2	AT, SF, with support from CB and BH	Develop and act on a communications strategy and plan, based on the discussions in plenary at Hermanus.	**Ongoing**
EXC.A3	EXCON, SF	Assess web service offers/bids and assist transfer of web service to new host.	**Ongoing**
EXC.A4	SF	Create a schedule of work at 2 months prior to the annual meeting to ensure that attendance is maximised by IM officers and that all issues to be discussed at the meeting have adequate skills and knowledge present.	**Done**
EXC.A5	AT	Volunteer an IM status report to the IAGA division five business meeting and increase visibility of links between IM and IAGA on both the IM and IAGA websites.	**Done**

10.4 EXCON decisions and action items

10.4.1 Decisions

Number	Description
EXC.D1	There is a new category of 'non-compliant' IMOs See EXC.A6 for implementation
EXC.D2	Long service recognition See EXC.A10 for implementation details

10.4.2 Action items

Number	Responsible	Description
EXC.A1	CF, CB, SF	Web service and archive host Agree on a list of manageable milestones to check progress on alternative

		web service and archive host over next few months and liaise with OPSCOM chair over progress and options for successfully implementing and maintaining the service and archive
EXC.A2	CT, CF	Commercial observatories Reply to enquirer directing them to liaise with USGS on establishing an observatory to INTERMAGNET standards but raising concern over the likely noise environment of the proposed observatory location.
EXC.A3	CT, AT	Reply to enquirer agreeing to their request for permission to use INTERMAGNET screenshots in a training video, but also directing them to the institutes responsible for any data used and/or shown to get full permissions.
EXC.A4	SF+OPSCOM	Managing the transition from DVD to online data Continue the transition to on-line data subject to constraints such as (with any technical issues to be discussed within OPSCOM and referred back to EXCON where necessary): a) The basic electronic entity becomes an "INTERMAGNET reference data set, year 2XXX" (IRDS-2XXX, e.g. IRDS-2018) which is updated annually with documented changes. This is analogous to the coefficient data file that represents the 5-yearly updated IGRF. Ideally, each IRDS revision should provide a copy of the complete INTERMAGNET data set, where space is available, including any revisions of previous years' data, where this is required. b) Several electronic copies of the annual IRDS should be distributed geographically to ensure data security (e.g. no loss of data). Procuring a small set of USB keys may be sufficient for this. c) The IRDS should exist in a format that ensures data integrity (e.g. no subsequent editing) d) The IRDS may, but not necessarily, be distributed on a physical medium such as a USB key, as IMOs request e) The IRDS has an associated DOI for the IRDS dataset and users quote this DOI *plus* any additional DOI for any specific data file used, where this extra DOI must be attached because of national DOI policies for that data file.
EXC.A5	AT, SF	Letters of commitment from EXCON and OPSCOM institutes EXCON will request a letter of commitment from institutes to permit EXCON INTERMAGNET officers to attend annual meetings. OPSCOM may request a similar letter to be sent to institutes for new and existing OPSCOM members, if this is seen to be necessary by OPSCOM and or individual members
EXC,A6	CT, AT, CB	Non-compliant IMOs We designate a new category of non-compliant IMOs such that, after 2 years of non-compliance with the conditions of INTERMAGNET membership, IMOs are automatically moved to this state and the institute is informed. After a further 2-3 years of non-compliance such NC-IMOs have all IMO status removed and will be required to reapply. Non-compliant IMOs are to be clearly identified and listed on the INTERMAGNET website, in a manner that distinguishes them from fully compliant IMOs.
EXC.A7	GH, AT, CF	Survey the IMO community on co-located scientific instruments Over the last few years discussions have taken place in EXCON on new

		science directions for INTERMAGNET and the implications that might have in terms of developing new standards. However, prior to undertaking such developments, we will conduct a short survey of all IMOs/institutes on what exactly are the other instruments that they run, and why, and how they see the future for instruments and associated standards. A survey and report will be given in plenary at the next meeting.
EXC.A8	SF, AT	Promoting INTERMAGNET Survey the options for promoting INTERMAGNET at upcoming scientific and other conferences. Enquire specifically about promoting INTERMAGNET through the IAGA trade stand at the next IUGG meeting in Montreal.
EXC. A9	AT, SF	25 years of INTERMAGNET data Prepare a draft EOS article updating progress made by INTERMAGNET since the last article in 2013, and highlighting the quarter-century milestone of data delivery. This draft is to be reviewed by EXCON in the light of progress on the new technical manual, DOIs etc, ahead of the next meeting, prior to submission.
EXC.A10	AT	Long service recognition EXCON will be pleased to send a letter of appreciation for technical and engineering staff at institutes, where deemed appropriate, to mark long service (for example on retiral or departure) and for 'exceptional' contributions, without which INTERMAGNET would not continue to flourish. Institutes and IMOs are therefore asked to request this of EXCON chair and provide information on the individual's contribution. Recognition of scientific achievements will not be considered in this way.
EXC.A11	SF, AT	Wikipedia entry Update the INTERMAGNET Wikipedia entry, and keep a watch on amendment of content
EXC.A12	AT, BSL	Vision and Mission statement in Technical Manual The V&M statement is to be added to section 1.2 of the Technical Manual (version 5.0).

11 Definitive data subcommittee

11.1 Participants

Committee Members
Charles Blais, Virginie Maury, Hiroaki Toh, Simon Flower, Sergey Khomutov, Jan Reda, Roman Leonhardt, Benoit Heumez, Alan Thomson, Gauthier Hulot

Guests
Eduard Petrovsky, Achim Morschhauser, Pavel Hejda, Jeremy Fee, Seiki Asari, Tero Raita, Anne Neska, Yuri Sumaruk.

11.2 Agenda

- A review of progress on actions items from Hermanus Meeting (South Africa)
- Reports on the 1-min and 1-sec Definitive Data collection
- One-second definitive data issues
  - Problems regarding data collection of 1-sec Definitive in CDF format
  - Publication of 1-sec definitive on INTERMAGNET web
- One-minute definitive data issues
  - Analysis of 1-min definitive data collection on the example of 2015
  - Publication of 1-min definitive data sets on INTERMAGNET web
- A quarter of a century of definitive data on USB stick
- Some cases concerning 1-min definitive data sets signaled by data checkers
- A discussion of the differences between K9-limits adopted by IMOs and determined by ISGI
- Organisational matters
- DD Subcommittee Action Items following the Vienna Meeting

11.3 Review of actions items after Hermanus

Action	Responsible	Description	Status
DD.A1	CB	Lead the work and start a Discussion Document on how to prepare one-minute definitive data set for INTERMAGNET online (following the end of DVD production)	**Ongoing**
DD.A2	JRD	Send CALL FOR ONE-MINUTE DEFINITIVE DATA FOR 2017 – end of January 2018. 12 IAF files, yearmean file, BLV file, observatory readme file. Total 15 files. Deadline for data submission - July 1, 2018	**Done** **Sent to IMOs 2018-02-19. Deadline July 1st, 2018**
DD.A3	JRD	Send CALL FOR ONE-SECOND DEFINITIVE DATA FOR 2016 – February 2018. These data should be provided in ImagCDF format. Deadline for data submission – October 1, 2018	**Done** **Sent to IMOs 2018-03-08. Deadline October 1st, 2018**
DD.A4	JRD	Compilation of 1-minute 2015 definitive data without country files. These data will be published on USB as a transition following the last DVD for 2014 and before the online only publication.	**Well advanced**
DD.A5	AL	Ask IMOs for information on progress in	**Done**

		preparation/providing 1 sec definitive data. What difficulties do they face?	
DD.A6	SF	Add supporting option for ImagCDF format - DataCheck1s.jar jar (Java application)	**Progress** **1) SF 2018-02-08: "I am working with Achim Morschhauser from GFZ to add the ability to read the CDF format to the DataCheck1s.jar program …"** **2) BGS has prepared gm_convert-1.0.jar application, which is complement to DataCheck1s.jar**
DD.A7	RL	Continue to develop MagPy software in close contact with interested people (eg. data checkers)	**Progress** **RL is developing the MagPy software**
DD.A8	JRD	Tests of both MagPy software and updated version of DataCheck1s.jar	**Done** **Results of test were sent 2018-02-12 to opscom and RL**
DD.A9	BH	Comparison between K9-limit adopted by IMOs and K9-limit determined by ISGI and look for large discrepancies	**Done** **Email from BH of 2018-01-03 with Excel document containing appropriate information**
DD.A10	RL	Lead a Discussion Document on the online publication of 1-sec and 1-min definitive data. Identify and summarize essential aspects when switching to online publication such as: deadlines, timeliness of submission, required metadata, associated metadata and so on.	**RL has provided draft version of DD document titled "Online Publication .."**
DD.A11	AL, JRD	Email question/request to data checkers whether they are willing to check 1-sec definitive data of "their" group of IMOs. This Action Item will be carried out as soon as DataCheck1s.jar and MagPy is ready to handle ImagCDF files (DD.6 above)	**Outstanding** **Appropriate checking procedures of are not yet ready**
DD.A12	JRD	Perform statistical analysis of data collection 2015 1-min definitive data and present results on the next INTERMAGNET Meeting	**Done**

11.4 Report of 1-min definitive data collection

11.4.1 USB 2014

- First time on USB
- 112 IMOs
- 37 countries
- Already distributed to IMOs and institutions interested in definitive data

11.4.2 USB 2015

(situation of 2018-06-22)
Received binary 117 IMOs (available on step1 Paris ftp server)
Fully accepted binary 112 IMOs (available or soon available on web)

11.4.3 Definitive 2016

(situation of 2018-06-11)
Received binary 107 IMOs
Fully accepted binary 90 IMOs

11.4.4 Definitive 2017

(situation of 2018-06-21, deadline 2018-07-01)
Received binary 56 IMOs
Fully accepted binary 27 IMOs

Very important issue in the near future is publication on USB of 1-min definitive for the period 1991-2015. According to the plans these data will published on USB2015

11.5 Report of 1-sec Definitive Data collection

11.5.1 Definitive 2014

(situation 2018-06-15)
Provided 38 IMOs
Accepted 36 IMOs
Note: requested format IAGA2002

11.5.2 Definitive 2015

(situation 2018-06-15)
Provided 36 IMOs
Accepted 13 IMOs
Note: requested format CDF, provided CDF or IAGA2002

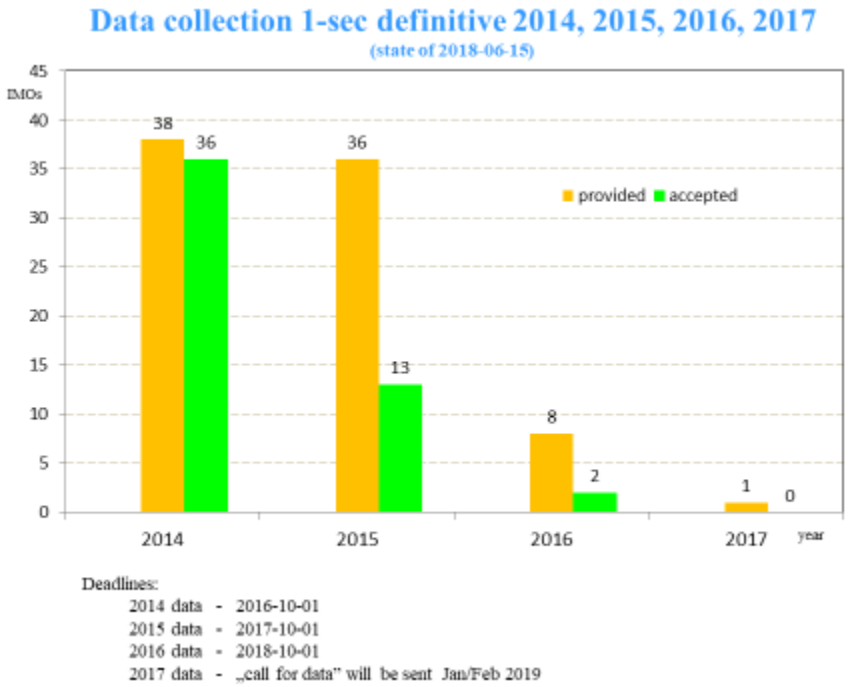
11.5.3 Definitive 2016

(situation 2018-06-15)
Provided 8 IMOs
Accepted 2 IMOs
Note: requested format CDF, provided CDF or IAGA2002

11.5.4 Definitive 2017

(situation 2018-06-15)
Provided 1 IMOs (WIC- Conrad Observatory)
Accepted 0 IMOs
Note: requested format CDF, provided CDF

11.6 Problems regarding data collection of 1-sec Definitive in CDF format



11.6.1 2014

requested and provided: IAGA2002
Utilities:
- DataCheck1s.jar + autoplot
- iaga2002_to_iaf21.exe (conversion IAGA2002 to IAF)
- imcdview.jar

IAGA2002 were converted to IAF, next IAF were compared with accepted 1-min definitive

11.6.2 2015, 2016, 2017

Requested: ImagCDF
Provided: ImagCDF, IAGA2002
Checked IAGA2002 data sets (the same method as for 2014 data)
There were difficulties checking ImagCDF
Most conversions from ImagCDF to IAF were unsuccessful, both using gm_convert-1.0 and gm_convert-1.0 or MagPy

RL presented how to use MagPy as a console application. It could be very useful for preparation of 1-sec definitive data

RL, SK, Tero Raita declared that they can prepare guidance on how to prepare 1-min and 1-sec definitive data. Such guidance is necessary both for IMOs and data checkers. The people most committed to this task are JRD and BH.

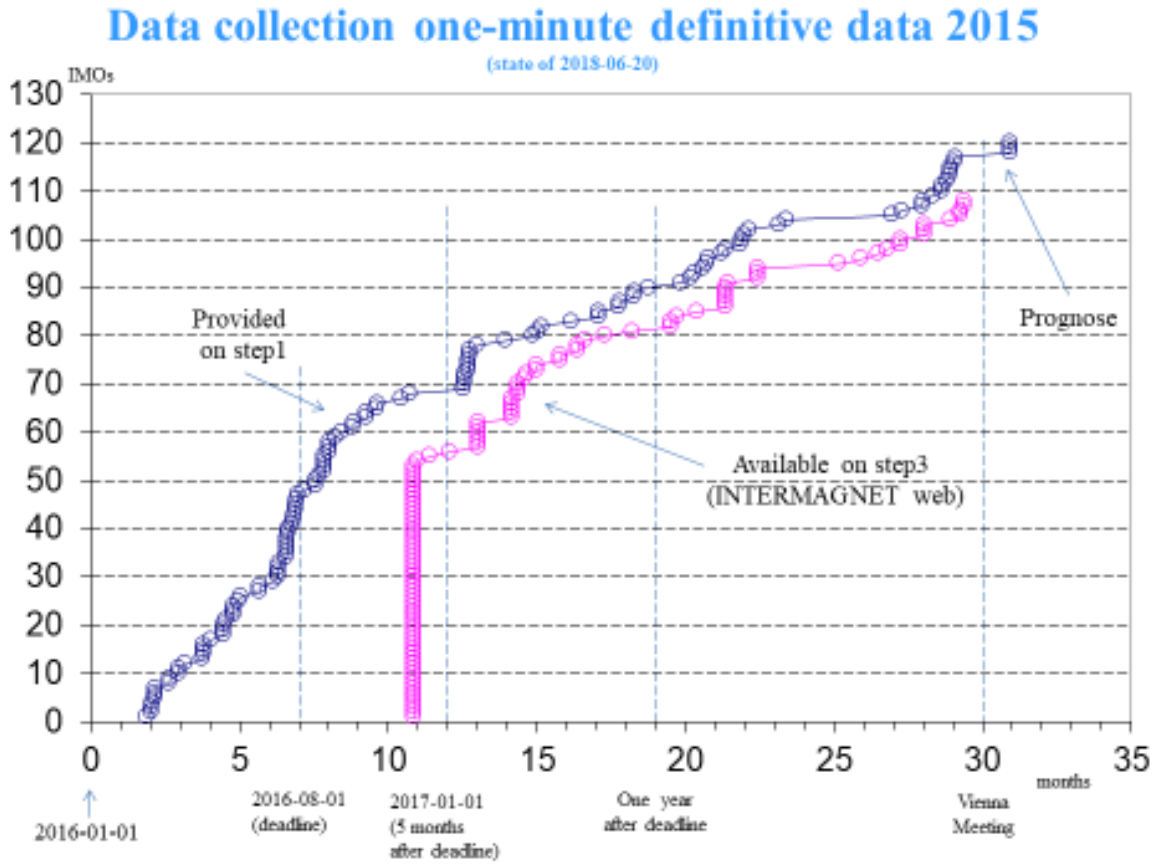
11.7 Publication of 1-sec definitive on INTERMAGNET web

- RL has provided a draft version of Discussion Document DD32 titled: “Online Publication”
- So far, accepted 1-sec definitive are still on Paris ftp server only
- 1-sec definitive data should be published on INTERMAGNET web http://www.intermagnet.org/data-donnee/download-eng.php
- Data format on web, which format will be published on web?
- now IAGA2002
- ultimately CDF
- Copying data from Paris to INTERMAGNET web
- Publication Date, 1-sec definitive data will be stamped at the moment of publication on the INTERMAGNET web site

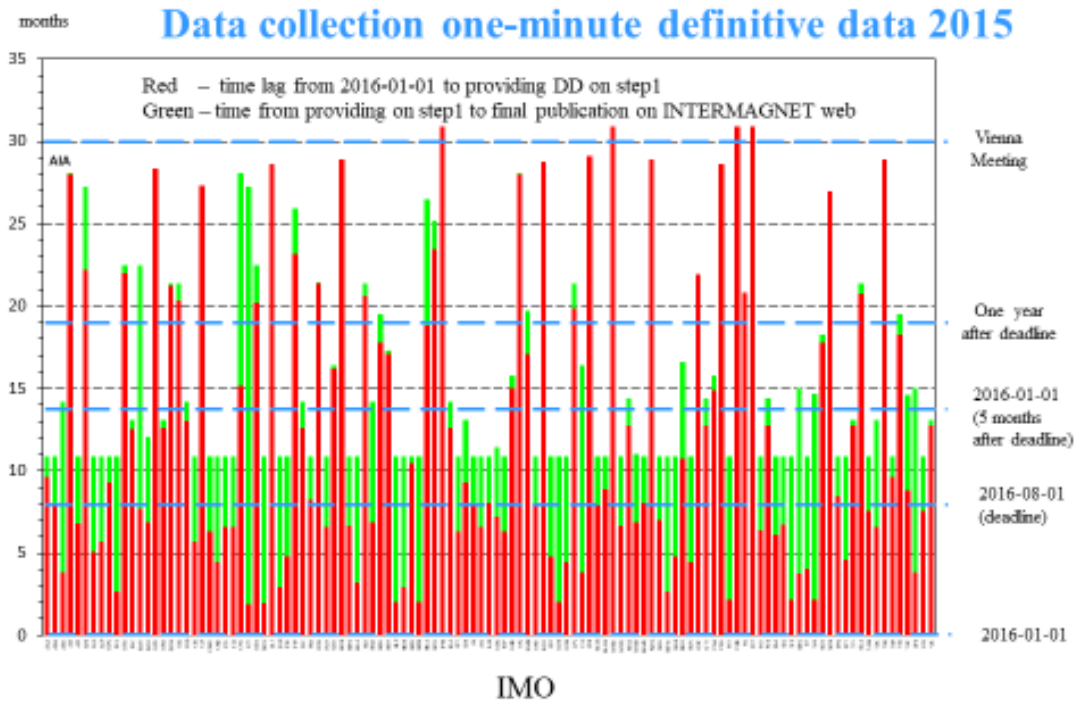
VM proposed two steps on Paris ftp server, with two independent login and password, similar to the system used for 1-minute definitive data.

11.8 Analysis of 1-min definitive data collection on the example of 2015

Slides presented to the meeting



A figure has been removed from the public version of the minutes



11.9 Publication of 1-min definitive data sets on INTERMAGNET web

CD/DVD/USB		
1991-2015	Online	
2016 onward	Notes	
12 IAF files		
codyymmm.bin	12 IAF files	
codyymmm.bin	This format holds minute, hourly and daily mean values as well as K indices.	
obligatory		
yearmean.cod	yearmean.cod	All published annual mean values since the beginning of its

		activity
obligatory		
codyyyy.blv	codyyyy.blv	baseline file, format IBFV2.00
readme.cod	readme.cod	Observatory readme file

where:

- cod 3 chars IAGA code
- yyyy or yy year
- mmm month
- cty country code (3 or 2chars)

There is a need to write a description of how “readme .cod” should be prepared.
Who reported this problem in Vienna?
Who is willing to write a description?
Eventually we can add this to DD action items.

11.10 Questions on 1-min definitive data sets

There are doubts shared by IMOs or data checkers on the use of "I" instead of "A,Q,D" in “yearmean” files.
Examples:

```
a)
 2009.500 999 99.9 999 99.9 999999 999999 999999 999999 999999 A  DHZ   1
 2010.500 337 51.4 -64 51.2  10573   9793  -3985 -22523  24881 A  DHZ
b)
 2012.500   6 42.9  85 36.2   4510   4479    527  58662  58835 A  XYZ
 2013.500 999 99.9 999 99.9 999999 999999 999999 999999 999999 I  XYZ   2
 2014.500 999 99.9 999 99.9 999999 999999 999999 999999 999999 I  XYZ   3
 2015.500   5 54.8  85 22.2   4734   4708    488  58446  58637 A  XYZ
```

Which example is correct? There is nothing on this topic in the Technical Manual or the INTERMAGNET web site.

11.11 DD decisions and action items

11.11.1 Action Items

Action	Responsible	Action
DD.A1	RL, SK, AL, BH	Preparation of a guide on how to prepare 1-min and 1-sec definitive data.
DD.A2	JRD	Send CALL FOR ONE-MINUTE DEFINITIVE DATA FOR 2018 by end of January 2019. Deadline for data submission is July 1st, 2019. (No country files!)
DD.A3	JRD	Send CALL FOR ONE-SECOND DEFINITIVE DATA FOR 2017 – February 2019. Deadline for data submission is October 1st, 2019
DD.A4	JRD	Compilation of data for USB drive 1991-2015
DD.A5	BH	Production and distribution of USB 1991-2015
DD.A6	VM	Preparation of Paris ftp server for both stages of the 1-sec definitive data collection (independent logins and passwords similar to the system used for 1-min definitive data)

DD.A7	SF	Continuation of work related to Java software (DataCheck1s, gmconvert)
DD.A8	RL	Continue to develop MagPy software
DD.A9	HT	Investigate comparison of 1-sec definitive with 1-min definitive data
DD.A10	CB	Preparing a place on INTERMAGNET ftp server for online publication of Definitive Data for 2016 onwards

12 GINS/WWW and Data Formats Subcommittee

12.1 Participants:

Committee Members:
Charles Blais (chair), Hiroaki Toh, Jan Reda, Roman Leonhardt, Sergey Khomutov, Simon Flower, Stefan Bracke, Virginie Maury

Guests:
Achim Morschhauser, Anne Neska, Jeremy Fee, Pavel Hejda, Tero Raita, Yuri Sumaruk

12.2 Agenda

- Update progress on CDF format (GWD A.5-6) - CB, SF, JR
- Update on MagPy on data checkers (GWD A.8-10) - RL
- Update on DOI (Dourbes GWD. 11) - SF
- Update on licensing (GWD A.7) - SF
    a) Follow-up discussion on email sent by Simon in regards to "Proposed changes to how INTERMAGNET licenses your data" sent on May 18, 2018
- If not discussed in definitive data, hosting of definitive on the web (follow-up on discussion document) - CB, SF, JR
- If time permits, open discussions on innovation and techniques applied at institutes
    a) GitHub discussion
    b) NRCan CHIS data centre operation modernization - CB
    c) Message brokers
        i. Ideas for real-time data transfer

12.3 Session 1

12.3.1 Review of Action Items

Number	Responsible	Description	Status
GWD A.1	CB, BH	Investigate options for online discussion groups and communication	It was decided that GitHub might be the best environment to engage the community in discussions of documents and code. We will be moving existing documentation, like the FAQ, to it and encourage the committee members to add/correct documentation.
GWD A.2	SB	Read the content of the FAQ and provide feedback/corrections	Suggestions has been contributed by Stefan. The FAQ will be added to GitHub and the committees will apply corrections to sections. Issues can also be flagged within the environment. **Action item** - CB will convert the FAQ to GitHub and create a link from the website **Action item** - SB will list his issues in GitHub **Action item** - Committee members to contribute corrections

GWD A.6	CB	Modify website to offer CDF format download	Not possible. The CDF format opens up much more flexibility (eg: time ranges like annual and daily values) which the data download can not support. Proposal to limit download to the new FTP and deprecate the data download (address security concerns). **Action item** - CB will advertise the FTP on the website and relevant documentation like FAQ on GitHub
GWD A.7	RL BH	Provide discussion document on disturbance flagging in CDF format	Discussion document has been created and RL proposes to add it to GitHub **Action item** - RL will add disturbance flagging documentation to GitHub
GWD A.11	CB	Investigate options for automated data checking through the Web site	Evaluated options using python Flask API for submitting files (without writing to disk) but there is no quick solution. This requires significant development, which I can't allocate. This does not have to be done by hosting institute. Email was sent out to committee asking for an alternate host. No response. MagPy can be the offline package that could do the same thing.
GWD 1	SF	Find Discussion Documents that could be converted to technical or policy notes and ask authors to make the conversion	SF prepared a list of technical notes that could be converted and will present in plenary. **Action item** - SF will follow up with authors to determine if discussion documents can be transformed to technical notes
GWD 14	SF	Create documentation and perhaps some simple scripts for using Autoplot with INTERMAGNET CDF format.	We will not do this as MagPy can do the same thing.
GWD 19	JM	Look into the proposed additions to the IYF documentation and recommend which method of calculating annual means should be used	Not discussed during the meeting **Action item** - CB will follow-up with JM

12.3.2 Licensing

Follow-up discussion on licensing present by SF during plenary. Essentially, a series of questions were raised:
SF - What is the text that need to be added to point to licensing while referring institutes?
RL - Should we follow EPOS formatting?

Jeremy Fee, CB - Should let institutes flag licensing in their files and not have INTERMAGNET alter contents?
VM - Should we change the archive?
SF - What is a machine-readable licensing?
Action item - SF, CB will write a text to advertise licensing on the web and FTP
Action item - SF will investigate on what is a machine-readable license?

12.3.3 DOI

Follow-up discussion on DOI presented by SF during plenary.
Action item - SF will take feedback from the members from email on DOI and follow up with Potsdam.
Important thing to verify is linking existing DOI from other institutes (VM).

12.3.4 GitHub

Many are in favor of using GitHub in regards to a collaborative environment. Discussions will continue in regards to use cases and examples. Jeremy Fee setup a skeleton main repository to show such an example.

12.4 Plenary

CT is asking GWD to continue discussion in web data checking utility.

12.5 Session 2

12.5.1 Web data checking

Discussion around the ability of other institutes hosting it. It was determined that we will write a technical requirement document and see if any institute would be willing to host it.
Action item - CB will write a technical requirement document by consulting with others and SF will send the document to the community.

12.5.2 GitHub

Discussion on how we would promote the use of GitHub to the members in a way that is simple to use. Jeremy Fee presented a Jekyll template that could be used to generate GitHub pages https://intermagnet.github.io . We also showed/discussed various use cases of how discussions, comments, and documents could be shared. SF will encourage members to create a GitHub account so that we could present these examples to them.
Following INTERMAGNET presentation led by Jeremy Fee, INTERMAGNET members will be encouraged to start using it as a discussion platform and, as we gather feedback, INTERMAGNET will start applying best practices.
Action item - All will create GitHub accounts and are encouraged to start using it
Action item - CB will add links to GitHub on web when relevant documentation needs to be linked
Action item - CB will have mid-year meeting on GitHub

12.5.3 FDSNWS

Although Canada may not have the ability to host a custom web service for INTERMAGNET, it might have the ability to host a FDSNWS part of its seismic infrastructure. CB presented SeisComP3 to the committee members and its capabilities. Jeremy Fee also commented on USGS current use of miniSeed and other seismic utilities within his institute for geomagnetic data. Jeremy Fee and CB demonstrated

use cases and answered questions surrounding SeedLink, miniSeed, and the seismic community. RL shared his ideas related to differences between communities such has the use of vector data and other methods (such as de-spiking).
Following the INTERMAGNET presentation led by CB, it has been agreed that Canada will start investigating the use of its SeisComP3 for the geomagnetic community.
Action item - CB will pursue an internal test of an FDSNWS using current INTERMAGNET data flow and report
Important note that it was determined that this will not replace current files as miniSeed does not carry some metadata found in IAGA2002 and CDF. This is only a method, using commercial tools, to deliver time series data only and have applications designed around it.

12.6 Plenary

Action item - SF to clean up versions of Imagcdview and move it to GitHub

12.7 Additional notes

During plenary and side discussions, there has been great interest of logging publishing delays of various data types to INTERMAGNET.
Action item - CB will add publication delay of data after SeisComP3 proof-of-concept implemented (see FDSNWS section)
I will develop a single file for each sampling period, data type, and formats. Using the submission time and the date of the file, we calculate the delay in days.

12.8 GWD decisions and action items

12.8.1 Action Items

Number	Responsible	Description	Status (Green = completed, Orange = ongoing; Red = not started)
Vienna GWD.A01	CB	Convert the FAQ to GitHub and create a link from the website	FAQ completed. https://intermagnet.github.io/faq/ Waiting for committee contribution before linking
Vienna GWD.A02	SB, all	Contribute corrections/issues to FAQ	
Vienna GWD.A03	CB	Advertise the FTP on the website and relevant documentation like FAQ on GitHub	Many static pages converted to GitHub and example website created. https://intermagnet.github.io/ Waiting for committees to contribute comments.
Vienna GWD.A04	SF, CB	Write a text to advertise licensing on the web and FTP	Completed but not advertised on website. https://intermagnet.github.io/data_conditions.html Waiting for community feedback.

Vienna GWD.A05	SF	Take feedback from the members on licensing and follow up with Potsdam	
Vienna GWD.A06	All	Create GitHub accounts and encouraged to start using it	**Ongoing**
Vienna GWD.A07	CB	Add links to GitHub on web when relevant documentation needs to be linked	**Ongoing**
Vienna GWD.A08	CB	Mid-year meeting on GitHub	
Vienna GWD.A09	CB	Pursue an internal test of an FDSNWS using current INTERMAGNET data flow and add report on data latency	
Vienna GWD.A10	SF	Clean up versions of the imagcdview and move it to GitHub	
Hermanus GWD.A5	CB	Convert historical data to CDF format on the FTP and keep all original formats	**Ongoing. Simon has recently transferred CDF data to the INTERMAGNET web. Simon also gave an updated Java utility to convert IAGA2002 to CDF for the archive.**
Hermanus GWD.A7	RL, BH	Provide discussion document on disturbance flagging in CDF format.	**Done. A discussion document has been written and published.** **Vienna Update: RL will publish the document on GitHub**
Hermanus GWD.A10	JR, RL	Provide MagPy tool once feedback has been implemented to data checkers and implement additional feedback	
Hermanus GWD.A11	CB	Investigate options for automated data checking through the Web site	**Evaluated options using python Flask API for submitting files (without writing to disk) but there is no quick solution. This requires significant development, which I can't allocate. This does not have to be done by hosting institute.** **Vienna Update: CB will write a technical requirement document by consulting with others and SF will send the document to the community.**

Dourbes GWD.1	SF	Find Discussion Documents that could be converted to technical or policy notes and ask authors to make the conversion.	**Vienna Update: SF will follow up with authors to determine if discussion documents can be transformed to technical notes**
Dourbes GWD.2	CB	Put these new technical or policy notes (Dourbes action GWD.1) on the web site.	**Ongoing with Dourbes GWD.1**
Dourbes GWD.9	RL, SF, Jeremy Fee, SB, CB	Create a Discussion Document on using message brokers, Jeremy Fee to lead the document.	**Jeremy Fee and SB will continue work on the discussion document on message brokers. Discussion document will address more on message format rather than method (ex: AMQP vs MQTT). There will be different constraints between data acquisition and data dissemination. Discussions will continue at the next GWD meeting.**
Dourbes GWD.19	JM	Look into the proposed additions to the IYF documentation and recommend which method of calculating annual means should be used.	**Not started**
Dourbes GWD.23	SF	Complete testing on software that converts data in ASCII formats (IMF, WDC, IAGA-2002) to binary formats (IAF and ImagCDF). This software is called gm_convert. Release this software to users.	**Ongoing. Test version sent to JR and CB**.

13 IMO Applications and Standards Subcommittee

13.1 Participants

Subcommittee Members: Chris Turbitt (chair), Sergey Khomutov, Andrew Lewis, Jürgen Matzka, Benoît St-Louis

Not present: Virginie Maury

Guests: Seiki Asari, Benoit Huemez, Anna Neska, Eduard Petrovsky, Tero Raita, Yuri Sumaruk

13.2 IMO Subcommittee agenda, 2018

1 IMO action Items from the 2017 meeting
2 IMO Subcommittee membership
- Role and appointment of a deputy chair

3 IMO Applications
- IMOs withdrawn since the Hermanus meeting
- Update on applications from 2017
- New applications
- Prospective IMOs

4 IMOs of concern
- Data checker discussion – Andrew Lewis, Sergey Khomutov, Tero Raita – what are the common problems, what can be done to improve efficiency & communication
- Communications to IMOs of concern – is there a need to enforce policy on non-compliance more rigorously?
- Resolved IMO issues since last meeting
- Lists of IMOs of concern and IMOs awaiting checking

5 IMO Subcommittee contributions to the Technical Manual
- Any outstanding items?

6 Standards
- Discussion on K9 limit used by IMOs
- Handling leap-seconds in one-second data
- Current status of instrumentation meeting the one-second standard

7 IMO Subcommittee Action Items following the Vienna Meeting

13.3 Action items from the 2017 meeting

A number of action items have been removed from this public copy of the minutes as they contain discussions about individual observatories/institutes.

Number	Responsible	Description	Status (Green = completed, Orange = ongoing; Red = not started)
IMO.1	CT	Discuss with EXCON and OPSCOM chairs the appointment of a new member of the IMO Subcommittee (& TM Subcommittee) and the reappointment of existing members	**Subcommittee view is that the number of members is adequate. If there was some expertise required or someone with appropriate expertise joined**

		to ensure meeting attendance	**OPSCOM, this could be evaluated later, but no further action required. Completed**
IMO.2	CT	Appoint a deputy chair for the IMO Subcommittee	**Completed during the meeting. AL appointed deputy chair. All communications from the subcommittee chair will be cc'd to AL such that the subcommittee can meet even when the chair is absent. Completed**
IMO.7	JM	Instigate monitoring of preliminary data delivery by IMOs at GFZ and report results routinely to IMO Subcommittee chair	**CT/CB Move to GIN/WWW as needs a report on real-time data delivery. Outstanding (AI IMO.4 CT)**
IMO.8	JM	Add IMO subcommittee chair to the mailing list for e-mails generated by GFZ notifying IMOs that they have missed the definitive data deadline	**Completed**
IMO.9	CT	Draw up a set of internal rules for guidance in making decisions on notifying IMOs as to when they are about to lose INTERMAGNET status and draft a letter for IMOs that are not compliant with PN1	Deleted. Superseded by the decision to create a non-compliant IMO status. (**AI IMO.5 CT**)
IMO.26	CT	Update the IMO application form to reflect the two delays available on the web site (plotting and data download)	**Outstanding. (AI IMO.11 CT)**
IMO.27	JM, CT, AL	Provide an e-mail address for the INTERMAGNET secretary from GFZ and ensure this is accurate on the INTERMAGNET web site	**Outstanding. (AI IMO.12 JM, CT, AL)**
IMO.29	BSL	Consider the calculation of the F-component in the annual mean files – should this be mathematically consistent with the annual mean of XYZ, or should it be calculated as the mean of the base F data (one-minute or one-second)? (Carried forward from Dinant meeting).	**Outstanding. (AI IMO.13 BSL)**

13.4 IMO Subcommittee Membership

AL was appointed deputy chair. This role is not expected to have actions attributed to it, but has been created such that one additional subcommittee member has sufficient information to chair a meeting should the subcommittee chair not attend a meeting. Hence, all communication sent by the subcommittee chair will be cc'd to the deputy chair.

During the meeting, IMO Applications membership SB was removed from the subcommittee whilst BH was added.
The subcommittee agreed that there was no current need to extend the subcommittee membership, however new expertise would be welcomed if available.

13.5 IMO applications

13.5.1 IMOs withdrawn since the Hermanus meeting

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.5.2 Update on applications from 2017

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.5.3 New applications

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.5.4 Prospective IMOs

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.6 IMOs of concern

13.6.1 Data checker discussion

What are the common problems, what can be done to improve efficiency & communication?
The subcommittee were joined by Tero Raita & BH, data checkers for some of the IMOs with particular difficulties in submitting definitive data, and also by Eduard Petrovsky, president of the IAGA Executive Committee.
The subcommittee discussed some of the common issues with definitive data submission & acceptance. Often, data checking is lengthy with little improvement despite a lot of communication between the data checker and the IMO. Tero Raita commented that often problems are due to poor baseline fitting and removal of outliers. There is a need for improved software to assist IMOs. BH added that there can be variation in the amount of detail in the feedback given to IMOs between data checkers and suggested that data checkers should be rotated between IMOs to give more consistency. There is a downside in that data checkers often build a relationship and understanding with IMOs so, although rotation of data checkers was seen as a good idea, the minimum period between rotations should be five years.
There is still a major issue with some IMOs that they are not adequately checking file formats and metadata consistency prior to submitting definitive data. JRD issues instructions along with the call for data, however data checkers are spending time detecting and feeding back some of these straight forward corrections. The IMOs should be making more use of IMCDView and check1min so it is suggested that a separate package of software and instructions are provided to IMOs (e.g. as a download) to make this requirement clearer than the instructions in the call for data. There is a need for a new version of check1min that works across multiple platforms as this is currently an issue for many IMOs who don't have access to a DOS machine. Ideally, definitive data would be submitted via a web

interface that automatically runs the same checks as check1min at the time of upload, such that IMOs have immediate feedback on whether the data are acceptable or not.
There are also some criteria, such as the 90% rule and the 0.2nT limit on mean value comparisons that routinely cause issues for data checkers. Some issues arise from changes to data formats, etc. for IMOs who are not able to maintain their software. The subcommittee therefore recommends that the requirement to submit hourly and daily means in the IAF files is removed. Mean values can easily be derived by the user using (for example) IMCDView. JM suggested that this should be a strategy across all of INTERMAGNET, however there is a need to ensure that hourly mean values continue to be sent to the World Data Centre.
SK noted that there is little in the Technical Manual that states how often a scalar magnetometer should be sampled (other than minimum of 30 seconds) and whether the one-minute scalar magnetometer data should be spot values or filtered values. BSL is to add a comment in the manual to the effect that, "INTERMAGNET recommends that the scalar magnetometer is sampled at the highest possible rate and that the data are filtered to one-minute values using the filter specified in Section 2.4". (**AI IMO.14 BSL**)
JM stated that there is a wider issue with non-compliant filtering in the variometer data of some observatories. Those IMOs operating early versions of recorders supplied by GFZ have box filters centred on 30 s past the minute. The subcommittee agreed that new applications should not be accepted where the filter is not INTERMAGNET compliant, however the number of existing IMOs that do not meet this standard is currently unknown. As a preliminary check, JM is to conduct a survey of the metadata in the IMO readme files for the last published INTERMAGNET CD to see which IMOs state that the filter is non-compliant. (**AI IMO.20 JM**)
BH stated that the changes by INTERMAGNET can cause delays to some IMOs. As an example, changing the one-second data format from IAGA-2002 to CDF was a difficult for some observatories to implement. Delaying the one-second data caused the IMOs to miss deadlines for the one-minute data as these were derived from the one-second.

13.6.2 Communications to IMOs of concern

Is there a need to enforce policy on non-compliance more rigorously?
JM stated that the current treatment of IMOs was good – in that there was not a rigid enforcement policy for IMOs that do not comply with INTERMAGNET policy & standards – however there is a need for a coherent strategy from INTERMAGNET.
AL requested some guidance on the procedure to follow once communications stall between a data checker and an IMO. Tero Raita suggested that it would be useful to have an arbiter on data quality checks as occasionally acceptance is subjective. Tero also noted that communications are mostly at an observatory level when problems can be at an institute level.
Eduard Petrovsky offered that IAGA could be more involved in communicating with institutes that operate observatories, either in requesting support for observatories or providing letters of support to observatories.
Eduard Petrovsky also suggest a two-tier IMO status, with some observatories allocated to a second list of 'associated' INTERMAGNET observatories, where they can be for a maximum period (e.g. 5 years) before losing all INTERMAGNET membership. CT stated that this idea had been discussed previously (e.g. at the INTERMAGNET Mexico City 2005 meeting) but had been rejected at that time as there was a concern that IMOs on the secondary list would not be motivated to change procedure to regain full membership. However, there is a need to review this and therefore CT is to ask EXCON whether this can be considered and, if so, will draw up a proposal to change the INTERMAGNET membership conditions to accommodate 'non-compliant' observatories. This proposal will detail time-lines for observatories dropping out of full membership, the conditions of 'non-compliant' membership (e.g. should real-time

data be available on the web site) and the process by which an observatory regains full membership. (**AI IMO.5 CT**)

13.6.3 Resolved IMO issues since last meeting

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.6.4 Lists of IMOs of concern and IMOs awaiting checking

This section has been removed from this public copy of the minutes as it contained discussions about individual observatories/institutes.

13.7 Standards

13.7.1 Discussion on K9 limit used by IMOs

Following the presentation by Aude Chambodut in plenary session, the advice to IMOs that do not already have a value for K9 lower limit is to contact ISGI to ensure a reasonable value is adopted before K-indices are produced. For IMOs that are already producing K-indices, the instruction is to ensure that the value of the K9 lower limit being used by the IMO is accurately recorded in the metadata sent to INTERMAGNET. Where the value of the K9 lower limit is not representative, the guidance from ISGI is that this value should not be changed (in order to maintain homogeneity in the time series) but should be accurately recorded.

13.8 IMO decisions and action items

13.8.1 Decisions

Decisions have been removed from this public copy of the minutes as they contained references to individual observatories/institutes.

13.8.2 Action items

A number of action items have been removed from this public copy of the minutes as they contained references to individual observatories/institutes.

Number	Responsible	Description
IMO.A04	CT	Instigate monitoring of real-time & preliminary data delivery by IMOs in co-ordination with CB
IMO.A05	CT	Draft an internal policy for non-compliant IMOs for review by EXCON & the IMO Subcommittee
IMO.A11	CT	Update the IMO application form to reflect the two delays available on the web site (plotting and data download)
IMO.A12	JM, CT, AL	Provide an e-mail address for the INTERMAGNET secretary from GFZ and ensure this is accurate on the INTERMAGNET web site
IMO.A13	BSL	Consider the calculation of the F-component in the annual mean files – should this be mathematically consistent with the annual mean of XYZ, or should it be calculated as the mean of the base F data (one-minute or one-second)? (Carried forward from Dinant meeting).
IMO.A14	BSL	BSL is to add a comment in the manual to the effect that, “INTERMAGNET

		recommends that the scalar magnetometer is sampled at the highest possible rate and that the data are filtered to one-minute values using the filter specified in Section 2.4”.
IMO.A20	JM	Conduct a survey of the metadata in the IMO readme files for the last published INTERMAGNET CD to see which IMOs state that the filter is non-compliant.
IMO.A22	CT	Set a date for an interim online IMO Subcommittee meeting

14 Technical Manual Subcommittee

14.1 Particpants

Subcommittee Members: Benoit St-Louis (chair), Chris Turbitt (deputy), Stephan Bracke, Andrew Lewis, Jürgen Matzka, Hiroaki Toh

Absent: None

Guests: Anne Neska, Tero Raita, Seiki Asari, Virginie Maury, Simon Flower

14.2 Agenda

1. Committee membership (missing expertise?)
2. Review of Hermanus actions items
3. Technical Manual
    a. Review status of draft 0.9
    b. Create list of missing items for the last day session
    c. Priority items for publication
    d. Publication of version 5.0.0
        i. Complete first release
        ii. Proof read
        iii. Data format check
4. Web
    a. Synchronization of data format with Technical Manual (one source only with reference)
    b. Other links to/from the web site
    c. Policy and Technical notes to be published
    d. FAQ maintenance
    e. Web site review
5. Other topics
    a. Flagging data
    b. Web services
6. Round table
7. Distribution of action items
8. Schedule progress video conference (~4 months)
9. INTERMAGNET on Wikipedia (added during the meeting)

14.3 Committee membership

The TM Subcommittee membership was discussed at the beginning of the meeting. With the new additions from the last meeting in Hermanus, it was decided that 6 members would be sufficient for the time being. The membership will be reviewed on a regular basis and will be adjusted to reflect the workload. CT has been appointed as deputy chair to act as chairman in case of the absence of the chairman.

14.4 Review of Hermanus actions items

The comments in this table reflect the status at the beginning of the meeting. Considerable progress has been made during the last day workgroup session.

Number	Responsible	Description	Status (Green = completed, Orange = ongoing; Red = not started)
TM.1	Subcommittee Chairs	Provide list of action items to secretary within 1 week using ** as an indicator for items to be presented in plenary sessions.	**Completed (ongoing action carried forward)**
TM.2	Secretary	Distribute list of action items to INTERMAGNET members within 2 weeks.	**Completed (ongoing action carried forward)**
TM.3	Subcommittee Chairs	Provide final Subcommittee reports to secretary for inclusion in the minutes within 6 weeks.	**Completed (ongoing action carried forward)**
****TM.4**	Secretary	Provide draft of minutes within 16 weeks. Note that a decision was made that secretary will only compile plenary minutes and subcommittee minutes will be compiled by subcommittee chairs	**Completed (ongoing action carried forward)**
****TM.5**	CT	Add meeting decisions from previous and current meetings to decision logs.	**Completed (ongoing action carried forward)**
TM.6	BSL	Provide references to the two FAQ sections, “What is the BGS method for creating Quasi-Definitive Data?” and “What is the IPGP method for creating Quasi-Definitive Data?”, in Chapter 6.3, “Submission of Quasi-definitive Data”	**Completed**
****TM.7**	BSL, BH, Ellen Clarke, Dave Calp, JM	Rewrite of Chapter 5, including new introduction, text for 5.2 “Data Quality Control”, amalgamate component descriptions with 6.1.2 to avoid duplication, introduce common error sources and ‘reliability’ of components, simplify the equations of F-P by referring to the calculations of H & Z in Section 6.4, improve the quality of the diagrams, change references to ‘computed’ baselines to ‘observed’ baselines for consistency	**Outstanding**
TM.8	JM	Contribution to Section 6.4 “Definitive Data Calculation based on HDZ Oriented Variometer”	**In Progress**
TM.9	BSL	Consider replacing Appendices B-1 and B-2 of the manual (referenced in 6.3.3.1) with references to the web site	**Completed (will be reflected in the manual when the active links are updated)**
TM.10	BSL	Move Sections 6.3.3.2.2, 6.3.3.2.3, 6.3.3.2.4 & 6.3.3.2.5 to Appendix	**Completed**

TM.11	BSL	Move the text between, “The INTERMAGNET CD-ROM Software…”, and, “any data converted to WDC-files.” To Appendix	**Completed**
TM.12	BSL	Move Section 6.3.3.3 and 6.3.3.4 to appendices with reference in Chapter 7	**Completed**
****TM.13**	SF	Once TM5 has been completed, verify that Real-time definition is consistent throughout the manual and defined along with target transmission delays.	**Ready to proceed (will take advantage of the last day workgroup session to start the review)**
TM.14	JM	Create a section on de-spiking in Chapter 5 referencing external sources where possible.	**Outstanding**
TM.15	JM & David Calp	Provide reference for Absolute quality control and curve-fitting algorithms.	**Outstanding**
TM.16	AL	Once TM5 has been completed, perform final review of Technical Manual V-5	**Outstanding (will be ready to proceed after the progress meeting in early fall)**
****TM.17**	GWD Subcommittee	Once TM5 has been completed, perform final review of data formats in the Technical Manual	**Ready to proceed (will take advantage of the last day workgroup session to start the review)**
TM.18	BSL	Once completed, publish the Technical Manual V-5.0.0 on the INTERMAGNET web site	**Outstanding (planned for end of 2018)**
TM.19	TM Subcommittee	Consider the need to publish filter coefficients for one-second data in the Technical Manual	**Outstanding (suggestions were made during last meeting and will be revisited during sub-committee sessions if time permit)**
****TM.20**	AT & BSL	Review TM Chapter 1 and include vision & mission statements plus update INTERMAGNET officer details	**Partially completed (will be completed during the last day workgroup session)**
TM.21	JM	Create a Discussion Document on the estimation of errors in the production of Definitive Data	**Outstanding**
****TM.22**	SB	Review the FAQs on the IM web site and identify areas that need to be fixed, updated or added	**Completed (recommendations will be reviewed)**
****TM.23**	SF	Review all existing discussion documents to see whether any of these can be converted to technical notes	**Outstanding**
TM.24	BSL	Remove references in TM5 to web services until these are running and documented	**Completed**

14.5 Technical Manual

14.5.1 Review status of draft 0.9

Most of the time available during the subcommittee sessions was spent reviewing the latest draft of the Technical Manual and the outstanding actions items. A prioritized list of actions that are specifically required for the released of the technical manual was created. These actions are reflected in the list of action items in section 7 below.

14.5.2 Create list of missing items for the last day session

Considerable progress on missing items was achieved during the last meeting Technical Manual workgroup session. Based on the review performed during the subcommittee sessions it was decided that several sections of the manual were ready for the final review. Priority items for missing information specifically required for the released of the Technical Manual were distributed first and sections ready for review were distributed to the remaining participants.

14.5.3 Priority items for publication

To prevent any further delays in the publication of the Technical Manual, the subcommittee decided to prioritize only items that could be completed during the allocated time of the last day workgroup or shortly after the meeting. Other items will be developed as time permit and will be incorporated in following releases of the Technical Manual.

14.5.4 Publication of version 5.0.0

Version 5.0.0 is very close to be ready for first release and priority was given to the missing sections during the time available at the meeting. Final review of some sections was also performed during the meeting. Complete review will start shortly after the scheduled progress meeting early fall.

14.6 Web

Not discussed. Will be carried forward as an agenda item for the next meeting

14.7 Other topics

Items such as flagging data and web services that are not in operation yet will only be documented in later release of the Technical Manual.
Following up from last meeting action item TM.19, it was decided that 1 Hz filter would not be included in the Technical Manual (at least for the time being) as this is considered to be a manufacture issue to meet the one-second specifications by having a proper filter adapted to their particular instrument.

14.8 Schedule progress video conference

A subcommittee progress meeting will be scheduled early fall to prepare the final draft for complete review before publication.

14.9 INTERMAGNET on Wikipedia

There is an entry for INTERMAGNET on Wikipedia that is far from being a good representation of the functions of INTERMAGNET. A request for the course of actions have been passed to EXCON for their input.

14.10 Round table

It was suggested (in plenary session) that the next review of the Technical Manual could be used as a test for the GitHub tool which would allow reviewer to incorporate changes directly in the manual.

14.11 TM decisions and action items

14.11.1 Decisions

Number	Description
TM.D01	Draft technical manual will be uploaded to GitHub to facilitate community input

14.11.2 Action Items

Number	Responsible	Description
TM.A01	Subcommittee Chairs	Provide list of action items and decision logs to secretary within 6 weeks.
TM.A02	Secretary	Distribute list of action items to INTERMAGNET members within 8 weeks.
TM.A03	Subcommittee Chairs	Provide subcommittee reports to secretary for inclusion in the minutes within 6 weeks.
TM.A04	Subcommittee Chairs	Provide report to IMOs for your subcommittee to Opscom chair within 6 weeks.
TM.A05	Secretary	Provide draft of minutes within 12 weeks. Note that a decision was made that secretary will only compile plenary minutes and subcommittee minutes will be compiled by subcommittee chairs.
TM.A06	Opscom chair	Produce report to IMOs and send to IMO contacts, Worldobs and post on INTERMAGNET WEB site within 12 weeks.
TM.A07	INTERMAGNET officers	Review draft minutes within 14 weeks.
TM.A08	Secretary	Put the final INTERMAGNET minutes on the document archive and distribute to INTERMAGNET officers within 16 weeks.
TM.A09	Opscom chair and Secretary	Prepare version of the minutes for general distribution within 20 weeks.
TM.A10	INTERMAGNET officers	Review “public minutes” within 22 weeks.
TM.A11	Secretary	Put “public minutes” on INTERMAGNET web site and send to IMO contacts within 24 weeks.
TM.A12	CT	Add meeting decisions to decision logs.
TM.A13	BSL	Organize a video conference with the Technical Subcommittee members in early fall to review progress.
TM.A14	BSL	Update Section 1.8 (membership and OPSCOM structure).
TM.A15	JM	Contribution to Section 6.4 “Definitive Data Calculation based on HDZ Oriented Variometer”.
TM.A16	JM	Definitive data calculation based on most common orientations and types of instruments (section 6.4 long term).
TM.A17	JM, CT	Production of QD data. Might be desirable as a follow-up from

		Hermanus action TM.12 which was converted to submission. Could also be link with FAQs. (long term)
TM.A18	SF	Once TM5 has been completed, verify that Real-time definition is consistent throughout the manual and defined along with target transmission delays.
TM.A19	GWD Subcommittee	Once TM5 has been completed, perform final review of data formats in the Technical Manual.
TM.A20	AL	Once TM5 has been completed, perform final review of Technical Manual V-5.
TM.A21	BSL	Once completed, publish the Technical Manual V-5.0.0 on the INTERMAGNET web site.
TM.A22	JM	Provide reference for Absolute quality control and curve-fitting algorithms.
TM.A23	JM	Create a Discussion Document on the estimation of errors in the production of Definitive Data.
TM.A24	TM Subcommittee	Review and implement recommendations for the FAQs on the IM web site.
TM.A23	SF	Review all existing discussion documents to see whether any of these can be converted to technical notes.
WG.01	CT	Production of Quasi-Definitive data section 6.3.5
WG.02	JM	Review section 4.7
WG.03	AT, BSL	Add Vision and Mission statements to Chapter 1
WG.04	SF	Update components table in section 6.1.2
WG.05	JM	Update Computation of Baseline values section 5.3 with reference to section 6.5
WG.06	JM	Update Baseline Adoption section 5.4 with curve-fitting algorithms
WG.07	CT	Create section 5.2 on Data Quality Control
WG.08	CB	Re-write FTP Server section 7.2 for the new FTP server without credentials
WG.09	Anne Neska	Review Using INTERMAGNET Data Chapter 7
WG.10	JM	Create a section on de-spiking in Chapter 5 section 5.2.2
WG.11	JM	Create a section on Absolute Quality Control in Chapter 5 section 5.2.3
WG.12	BSL	Incorporate latest description of Quasi-Definitive data
WG.13	BSL	Update INTERMAGNET structure in section 1.8, GINs and Members contacts
WG.14	BSL	Update NOAA URL
WG.15	CB	Section 1.1 Numbers too small 2018, provide new numbers with date
WG.16	CB	Provide information on statistics for Section 1.4 (10) Monthly?
WG.17	BSL	Replace Map and table B-1 with link
WG.18	BSL	Remove Section 1.5 2nd paragraph
WG.19	BSL	Update index
WG.20	BSL	Update active links
WG.21	SF	Find location and provide text to describe that Lat, long and

		altitude should be given in the WGS84 system
WG.22	AL	Update section 5.2.1 Checking Procedure with reference to section 6.1.2 for the components, create a new component image to be moved to section 6.1.2
WG.23	AL	Simplify section 5.5 The Computation of Total Field Differences with reference to section 6.5
WG.24	BH, JRD	Check DVD/CD-ROM directory structure Appendix C-2
WG.25	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.11 section 6.4.3 and Appendix C-1 for text description
WG.26	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.11 section 6.4.3 and Appendix C-1 section 6.4.3 for accuracy of info (difference between various sources)
WG.27	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.10 Appendix C-1 for text description
WG.28	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.10 Appendix C-1 for accuracy of info (difference between various sources)
WG.29	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.00 Appendix C-1 for text description
WG.30	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV2.00 Appendix C-1 for accuracy of info (difference between various sources)
WG.31	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV1.10 Appendix C-1 for text description
WG.32	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV1.10 Appendix C-1 for accuracy of info (difference between various sources)
WG.33	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV1.00 Appendix C-1 for text description
WG.34	Tero Raita, Achim Morschhauser	Check INTERMAGNET Archive data format IAFV1.00 Appendix C-1 for accuracy of info (difference between various sources)
WG.35	SB, VM	Check INTERMAGNET Archive data format IYFV1.02 Appendix C-3 for text description
WG.36	SB, VM	Check INTERMAGNET Archive data format IYFV1.02 Appendix C-3 for accuracy of info (difference between various sources)
WG.37	SF, CB	Check INTERMAGNET Archive data format IMFV2.83 Appendix E-1-3 for text description
WG.38	SF, CB	Check INTERMAGNET Archive data format IMFV2.83 Appendix E-1-3 for accuracy of info (difference between various sources)
WG.39	SB, VM	Check INTERMAGNET Archive data format IBFV2.00 Appendix E-4 for text description
WG.40	SB, VM	Check INTERMAGNET Archive data format IYFV2.00 Appendix E-4 for accuracy of info (difference between various sources)
WG.41	SB, VM	Check INTERMAGNET Archive data format IBFV1.20 Appendix E-4 for text description
WG.42	SB, VM	Check INTERMAGNET Archive data format IYFV1.20 Appendix E-4 for accuracy of info (difference between various sources)
WG.43	Jeremy Fee, HT	Check INTERMAGNET Archive data format IAGA2002 Appendix E-5 for text description
WG.44	Jeremy Fee, HT	Check INTERMAGNET Archive data format IAGA2002 Appendix

		E-5 for accuracy of info (difference between various sources)
WG.45	SB, VM	Check INTERMAGNET Archive data format IBFV2.00 Appendix E-4 for text description
WG.46	SB, VM	Check INTERMAGNET Archive data format IYFV2.00 Appendix E-4 for accuracy of info (difference between various sources)
WG.47	RL, Seiki Asari	Check INTERMAGNET Archive data format IMAGCDFV1.20 Appendix E-6 for text description
WG.48	RL, Seiki Asari	Check INTERMAGNET Archive data format IMAGCDFV1.20 Appendix E-6 for accuracy of info (difference between various sources)
WG.49		Review WEB site for out of date information (???)
WG.50		Review WEB site for out of date information (???)

15 Work sessions (Wednesday 03 July)

15.1 Technical manual updates (BSL)

Fifty tasks to check, rewrite and compare sections of the technical manual were assigned to individuals and small groups of committee members and guests present at the meeting. The individual tasks and those responsible are included as "WG" action items listed in the technical manual minutes above. 90 minutes were allocated for individual work on the tasks. Results of the work were provided to BSL during and after the session and meeting via email.

15.2 GitHub demonstration (J. Fee)

Demonstration and discussion on facilities offered in GitHub for collaborative work on documents and online discussions.

Using the FAQs from the INTERMAGNET website as an example
https://github.com/INTERMAGNET/intermagnet.github.io/tree/master/_faq
Three possible ways were suggested to present the FAQs in GitHub to allow easier update, management and encourage community input and discussion:

- Store all FAQ in one file using a mark-down format (a simple text format).
- List of FAQs using a simple text format.
- A more flexible format to allow links and logos – more like a website

Edits can be made using a browser built-in editor so it is easy to change and publish.
Setting up a system of change approvals is possible and considered important. It is also important to reduce barriers to using the system in order to encourage usage from the entire community.
The history and version control facilities in the system are also very useful to monitor contributors, updates and commits and to encourage transparency.
GitHub can also be used in a less formal way to facilitate on-line discussions and comments. A good example for INTERMAGNET is the message broker discussion:
https://github.com/INTERMAGNET/message-broker.
Anyone can open issues but change approvals require a GitHub ID.
It is important to be aware that content in GitHub is public unless a private repository has been established through monthly pay-per-user. Private repositories require more management for administration and user access control.

In order to encourage experimentation and use of the system a trial project with broad community interest is required. Hosting the draft Technical Manual on GitHub could be a good project to encourage community input. It is possible to manage it in HTML format and have online PDF conversion.
Holding an on-line committee meeting would also be a possible application.

15.3 MagPY demonstration (RL)

A demonstration of facilities in the GeomagPY geomagnetic data processing software system

GeoMagPY is available on GitHub (https://github.com/geomagpy/magpy) and is a multi-platform system (Linux, Windows, Mac). The GitHub repository also includes a list of issues, installation instructions and manuals so please check GitHub regularly.
MagPY is designed so the user does not need to worry about data formats – the system automatically interprets file formats and can handle many different formats including ImagCDF, IAF, IAGA-2002 and WDC.
The system includes multiple options for data processing (co-ordinate transformation, flagging, step correction, filtering, derivatives, smoothing). MagPY never changes original data files and all processing steps are recording in a diary that can be saved to file as a record. Processed data must be exported to a file to save changes. There are many export formats options available.
An important feature is the facility to flag spikes in the data. Flags are recorded in a database or file and the spikes will only be removed, according to which of the four flagging options is chosen, once data are exported to a new file. The flag information can also be saved as additional metadata in the ImagCDF format.
The content of metadata for ImagCDF and IAGA-2002 format can be reviewed and changed.
The “Check-Data” menu is a useful tool to check yearly definitive 1-second data against 1-minute definitive data. The “quick” option will check one randomly selected month from the year of data. The full option will check the entire year, the quick and full checks are the same but the yearly check takes much longer. Checking results are displayed with colour coding.
The checks include:

- Existence of files (supports monthly, daily files etc.)
- Readability of the files.
- Internal consistency of 1-sec data (filtered to 1-min) and compared against 1-min data
- BLV data files
- Metadata in all files (yearmean files etc.)
- K index data

Another useful feature of MagPY is the format conversion tool now available in the latest version of the software via the command line tool “mpconvert”. Conversion between one-minute and one-second IAGA2002, ImagCDF and IAF files is now possible.

16 Appendix

16.1 Meeting agenda

Agenda			
Day 1:	**Monday, July 02, 2018**		

Time	Topic	Duration	Rooms[1]
	Opening Plenary session		
9:00	Welcome address by S Flower (local information)	5	Seminarraum
9:05	Welcome by A Thomson	5	Seminarraum
9:10	Approval and changes of/to main agenda	10	Seminarraum
9:20	Presentation of 4 subcommittee meeting agendas + proposals	30	Seminarraum
9:50	Guests present themselves; Guest's posting to subcommittees	10	Seminarraum
	OPSCOM/EXCON 'in camera' session		
10:00	Procedures in INTERMAGNET: S Flower	5	Seminarraum
10:05	Any change in the need for an IDA subcommittee: A Thomson	5	Seminarraum
10:10	Do we need new officers? Is subcommittee membership appropriate?	20	Seminarraum
10:30	**Coffee[2]**	30	
	Plenary		
11:00	Minutes of last meeting (errors of fact only, typographical errors to be sent to the Secretary by email)	10	Seminarraum
11:10	Review of action items in plenary and by subcommittee	45	Seminarraum
11:55	Update on how we communicate with our members: A Thomson	10	Seminarraum
12:05	Do we need a website 'refresh': A Thomson	10	Seminarraum
	Items for subcommittees [3]		
12:15	Technical manual progress: B St-Louis	15	
12:30	**Lunch[2]**	60	
	Plenary		
	Items for subcommittees [3]		
13:30	One second data progress: J Reda	10	Seminarraum
13:40	Progress on licensing and DOIs: S Flower	10	Seminarraum
13:50	Update on moving the INTERMAGNET data archive & web service: C Blais	15	Seminarraum
14:05	Definitive data publication on USB stick: G Hulot / B Heumez	10	Seminarraum
	Presentations		
14:15	EPOS update: A Thomson / S Flower / P Hejda	10	Seminarraum
14:25	EPOS supplier letters: P Hejda	10	Seminarraum
14:35	Update on geomagnetic metadata: S Flower	10	Seminarraum
14:45	Recent results from Odessa Observatory, Y Sumaruk	15	Seminarraum
15:00	Update on NanoMagSat cube satellite proposal: G Hulot	5	Seminarraum
15:05	Analysis of 2015 quasi-definitive data: A Lewis	15	Seminarraum
15:20	K9 Lower Limit report: A Chambodut (Skype)	10	Seminarraum
15:30	**Coffee[2]**	30	
	Subcommittee & Excon sessions		
16:00	Subcommittee meetings: Tech Manual - WWW/Gins/Formats	45	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
16:45	Subcommittee meetings: IMO apps - Definitive Data	45	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
17:30	**End of day 1**		

Note 1 Seminarraum (40 people); Stabkrisenraum A (20 people); Stabkrisenraum B (12 people)
Note 2 €30 for lunches and coffee will be collected on site by ZAMG staff
Note 3 These are items currently affecting INTERMAGNET that need discussion in both plenary and subcommittees.

Day 2:	Tuesday, July 03, 2018		
Time	**Topic**	**Duration**	**Rooms**
	Subcommittee & Excon sessions		
9:00	Subcommittee meetings: IMO Apps - WWW/Gins/Formats	90	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
10:30	**Coffee**[2]	30	
11:00	Subcommittee meetings:Tech Man - Definitive Data	90	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
12:30	**Lunch**[2]	60	
	Plenary		
13:30	Brief verbal reports on subcommittee and Excon work so far	30	Seminarraum
	Subcommittee & Excon sessions		
14:00	Subcommittee meetings: Tech Man - WWW/Gins/Formats	90	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
15:30	**Coffee**[2]	30	
16:00	Subcommittee meetings: IMO Apps - Definitive Data	60	Seminarraum / Stabkrisenraum A / Stabkrisenraum B
	Plenary		
17:00	Preparation and organisation of working sessions on day 3	30	Seminarraum
17:30	**End of day 2**		
	INTERMAGNET tour and dinner		
17:30	Historial tour of ZAMG house		
19:00	At the heurige "Hengl-Haselbrunner", Iglaseegasse 10, 1190 Wien. http://www.hengl-haselbrunner.at/		

Day 3:	Wednesday, July 04, 2018		
Time	**Topic**	**Duration**	**Rooms**
	Working Sessions		
9:00	Technical Manual, led by Benoit St-Louis	90	Seminarraum
10:30	**Coffee**[2]	30	
11:00	Free slot or further Technical Manual work	90	Seminarraum
12:30	**Lunch**[2]	60	
	Plenary session		
	Reports		
13:30	Report on IMOs: C Turbitt	40	Seminarraum

14:10	Report on definitive data timeliness: J Reda	15	Seminarraum
14:25	Commercial observatories: A Thomson	15	Seminarraum
14:40	Reports from subcommittees	50	Seminarraum
15:30	**Coffee**[2]	30	
16:00	Report from EXCON	15	Seminarraum
16:15	Review and agreement on action items	40	Seminarraum
16:55	Date and place of next meeting: Offer from Kyoto; IUGG Montreal; Others?	5	Seminarraum
17:00	**End of day 3**		