



CONFIGURATION MAP

SLR

Clinic Session Summary

Dave McCormick
October 2016
ILRS 20th Workshop
Potsdam, Germany

MOBLAS-4
Monument Peak, CA



MOBLAS-7
Greenbelt, MD



NGSLR
Greenbelt, MD



MOBLAS-8
Tahiti, French Polynesia



MLRS
Fort Davis, TX



TLRS-4
Mount Haleakala, HI



TLRS-3
Arequipa, Peru



MOBLAS-6*
Hartebeesthoek, South Africa



MOBLAS-5
Yarragadee, Australia

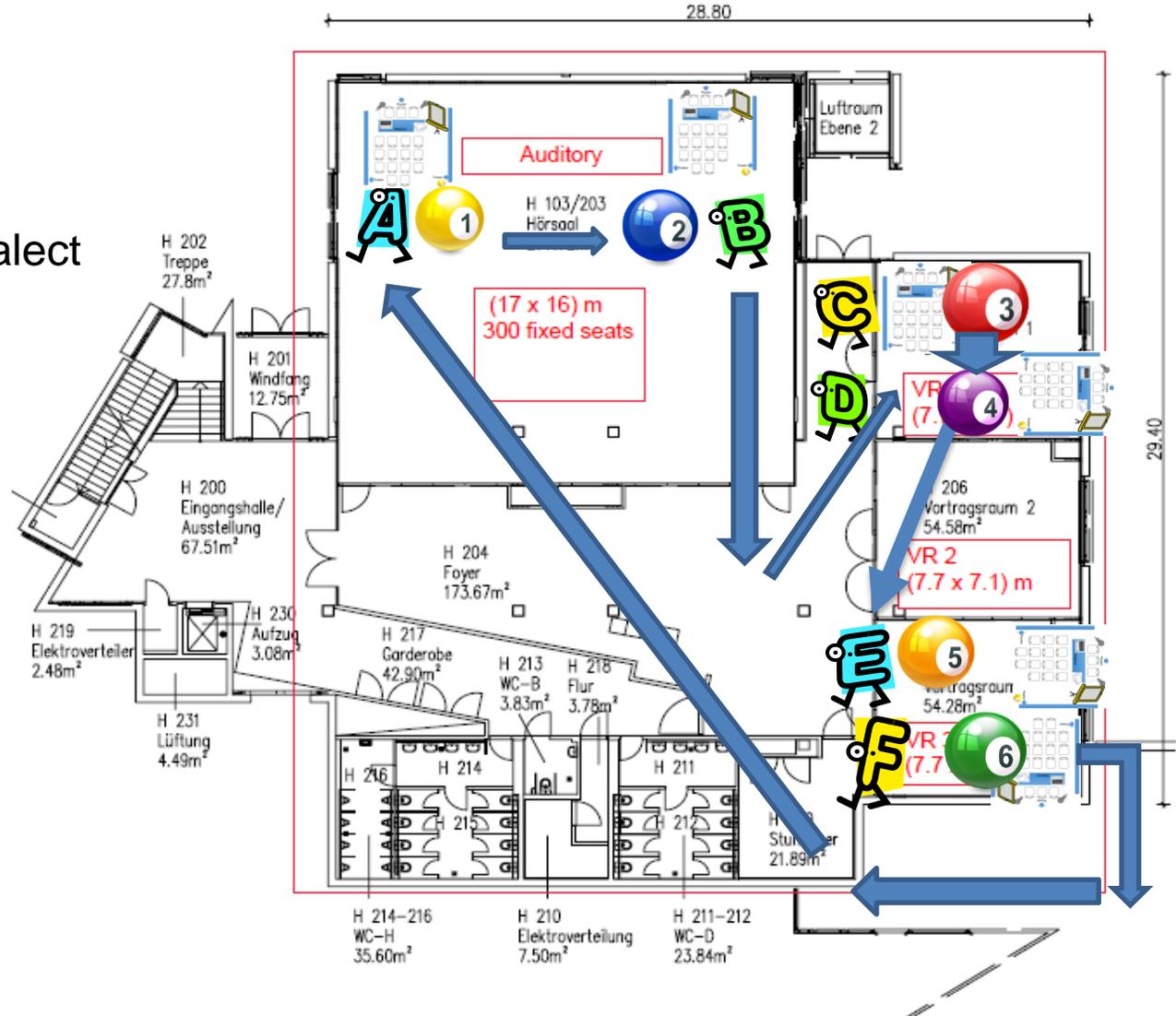


Potsdam Layout

Rotating Participant Groups

-  English dialect group, 8 people
-  French dialect group, 4 people
-  Russian/English dialect group, 7 people
-  German dialect group, 11 people
-  Japanese dialect group, 3 people
-  Chinese dialect group, 13 people

Total of 46 participants



Potsdam Clinic Topics

- 1 Restricted tracking processes familiarization
 - Ricklefs, Horvath
- 2 Procedures for stations and missions
 - Noll, Stevenson, Mueller, Schwatke
- 3 Precise quality assessment of SLR data
 - Otsubo
- 4 Adding new techniques to stations
 - Kirchner, Schreiber
- 5 Optimizing GNSS and daytime tracking
 - Torre, Sherwood, Carmen, Rodriguez
- 6 Station performance assessment tools **Pavlis**

Thank you all !!

Clinic Topics Summary Points/Comments

◆ Restricted Tracking Topic

- **Can restricted tracking satellites** who are duplicates of previously supported restricted tracking satellites **be automatically approved** for support from the ILRS?
 - **Use incremental MSR submission** for efficient approval
- May need to **consider a wavelength restriction** in the future
(The time transfer experiment on Jason-2 is wavelength restricted, however there is no worry about spacecraft damage)
 - Good comment for CB consideration
- Would it be possible to **display mission's go/no-go status online?**
 - Certainly if mission supports this
- Why doesn't everyone **just range at eye-safe laser levels?**
 - Link budget issue, also: restricted tracking concerns may not correspond to eye safety
- **It is apparent some missions do not understand the laser power restriction**
(Missions should be doing the analysis of the SLR system laser characteristics to determine if the laser energy densities at the spacecraft can possibly cause damage)
 - Hopefully the workshop/clinic helped communicate this issue!

Clinic Topics Summary Points

Procedures for stations and missions Topic

◆ Discussion overview:

- Handout given summarizing record keeping required for station changes, changes to quarantine procedure, and FAQ on station procedures
- **Many station contacts attended** as well as a few mission contacts
- **Stressed** CB requirement for ensuring site logs, station change logs, are kept current
- **System changes requiring quarantine are those that have influence on the range measurement**
- Informed station attendees of future plans for OC dual-path data submission which required converging on a common QC methodology for the two OCs.
 - This implementation required an initial review of **data format problems and request for correction by offending stations.**

Clinic Topics Summary Points

Procedures for stations and missions Topic cont.

– Actions:

- Site logs:
 - CRD format system configuration record has **component configuration IDs; these could be referenced in site log**
 - **Encourage EDC to implement the new interactive site configuration log** capability and expand to site logs
 - When available, **stations should update their coordinates** using the SLR implementation of the latest ITRF
- Quarantine:
 - Website should have **list of the type of system changes that require** stations to be put into **quarantine**
 - **Analysts need to be informed when quarantined data are released;** include timeframe so they know how far back to download older data
 - **Stations should be given more feedback on the quarantine progress**

Clinic Topics Summary Points

Procedures for stations and missions Topic

◆ Clinic feedback:

- ILRS **priority list should have a machine-readable version;** perhaps integrate into **EDC API**
- **Can Sentinel-3A mission provide maneuver information?**
 - like other missions have provided (e.g., Jason)

Clinic Topics Summary Points

Procedures for stations and missions Topic

– Questions from groups during this clinic:

- Can angle information be provided in the CRD?
- Is there a format for range rate data?
- Can CPF provide an accuracy indicator value?
- Is there standard s/w available for generating normal points in the CRD format?
- Can the site tie covariance matrix be added in the site log? Or a link to the matrix?
- Is there a guideline for how often to update the site ties? A guideline could help stations justify cost of performing local surveys.

Clinic Topics Summary Points

Precise quality assessment of SLR data Topic

- **All charts for this available via ILRS NESC Forum**
- **Suspect your calibration**, your **system delay** varying in time can be a major error source.
- Do not stop tracking Geodetic satellites after just a few NPs
- **Think interleaving** for high targets
- **Need more Russian station participation in clinics**

Clinic Topics Summary Points

- ◆ Adding new techniques to stations Topic
 - Ideas for expansion/improvement
 - Enhancing stability and prevention of quality problems
- ◆ General Feedback:
 - the immediate feedback from my **operations colleagues** to the clinic session was that they **profited a lot from the session**
 - Some of the background **information that they received** made the requirements that the ILRS puts on operations much more transparent. It **provided insights into areas that usually are not obvious to them**

Clinic Topics Summary Points

- ◆ Optimizing GNSS and daytime tracking Topic
 - We talked about GNSS Scheduling, daylight tracking of HEO targets and the potential of operating in the IR.
 - **GNSS scheduling pressures were acknowledged to be ever increasing.** Some **suggestions** for management were:
 - **Placing a subset of satellites from future full constellations on priority list** as with Glonass.
 - Customers should ask for special campaigns or full constellation campaigns if required.
 - **If customers know what tracking coverage meets their needs they should ask stations to comply - it has become no use to ask for "as much as possible"- this no longer provides a meaningful goal for observers**

Optimizing GNSS and daytime tracking continued

- New **scheduling options were briefly discussed with no real outcomes.** Perhaps **more work is needed** by the missions or **networks standing committees**
- Most stations seemed to be aware of desire for good orbit coverage. To meet that it was thought a **dynamic real-time priority list for GNSS might be useful.** Maybe as an enhancement of **Eurostatus.**
- With **many stations in Europe, maybe a shared tracking process would be effective there**
- Of course it is difficult to achieve good coverage in **daylight conditions.** This led to **Jean-Marie** showing us the benefits of pulling out your frequency doubler
- **IR detectors are now low enough in jitter** to give as good a result as green given the increase in return counts.
 - **Much discussion occurred on implementing IR ranging at individual stations**

Station performance assessment tools Topic

- ◆ The **JCET** station clinic had very good attendance from all six groups that showed **great interest in the information provided through our web portal and the use of our QC Viewer s/w.** Several of the attendees gave us valuable feedback and comments, some during the sessions and others over the subsequent days.
- ◆ The availability of our **systematic error time series going back to 1993 covering the entire network generated a lot of interest** and engineers were keen on seeing the results for their system and discussing the possible causes of the identified systematics.
- ◆ One of the presented tools received with great interest was the **online data base that provides immediate access to the Station History Change Logs. Some of our colleagues were not aware of the need to submit this information and the fact that it is missing for their stations.** We pointed out whenever possible to stations that participated in the clinic if there was a problem with their submissions or the lack of it.
- ◆ The **new tool that provides rough estimates of a systems efficiency based on the actual data collected on LAGEOS and LAGEOS-2 vs. the theoretically possible to collect, was very well received and found very useful.**

Logistics Lessons Learned

- ◆ Condense rotating groups to a lower # than host stations # to create a gap/break for hosts (6 hosts w/ 5 groups)
 - Need to allow hosts to visit/participate in other discussions as the gap rotates or take a break
 - Coffee break was nice/welcomed
- ◆ Parallel poster session and station tour is not desirable
- ◆ Would be nice to identify station crews vs analyst's for next clinic so that hosts know the audience by glance
 - Workshop registration info
 - Badge color
 - Info would also help to construct rotating groups in advance
- ◆ Ad hoc group formulation worked ok
 - About 50 participants, group sizes from 15 to few

Lessons Learned – JCET comments

- ◆ *Due to the nature of the topic we cover and the size of the attending groups (10-20 persons), it seemed that 25 min is not enough to comfortably cover the topics of interest, especially due to the fact that each station wants to see the information we have about their system.*
- ◆ *A necessary modification for the next time we repeat this clinic will be the use of two computers and screens, one for the slide presentation and one for running the applications and displaying the requested information. This will improve significantly the efficiency of the presentation and cut down on the time wasted going from one mode to the other on the same computer.*

Venue

- ◆ Venue and room layout worked very well
- ◆ Projectors and room setup was efficient/reliable
- ◆ Copies provided
- ◆ Venue team was very responsive
- ◆ Thank you!!
 - Hartmut, Ludwig, and entire workshop team!

Next clinic?

◆ TOPIC's desired?

– david.r.mccormick@nasa.gov

◆ Location next clinic

– Australia 2018 or ?

◆ #1 comment from groups – **Will clinic presentations be online?**

– **YES!** Along with all papers/posters in the workshop proceedings

• THANKS TO CAREY NOLL

◆ **Please apply what you learned at this clinic**

– **Follow up with action**

– **Stay in touch with any further questions**

• **Your colleagues are happy to assist you**

