

Main Ring Magnet system

Magnet design &
Field measurements
Installation
Survey & alignment

K. Egawa

H. Iinuma

M. Masuzawa

Y. Ohsawa

Power supply design

Testing

Tuning

Installation & Cabling

T. Adachi

T. Oki

T. Sueno

T. Kawamoto

N. Tokuda

Retired but still active

R. Sugahara

K. Tsuchiya

Contents

Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

Others

R&D

FY2013

Schedule

Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

Others

R&D

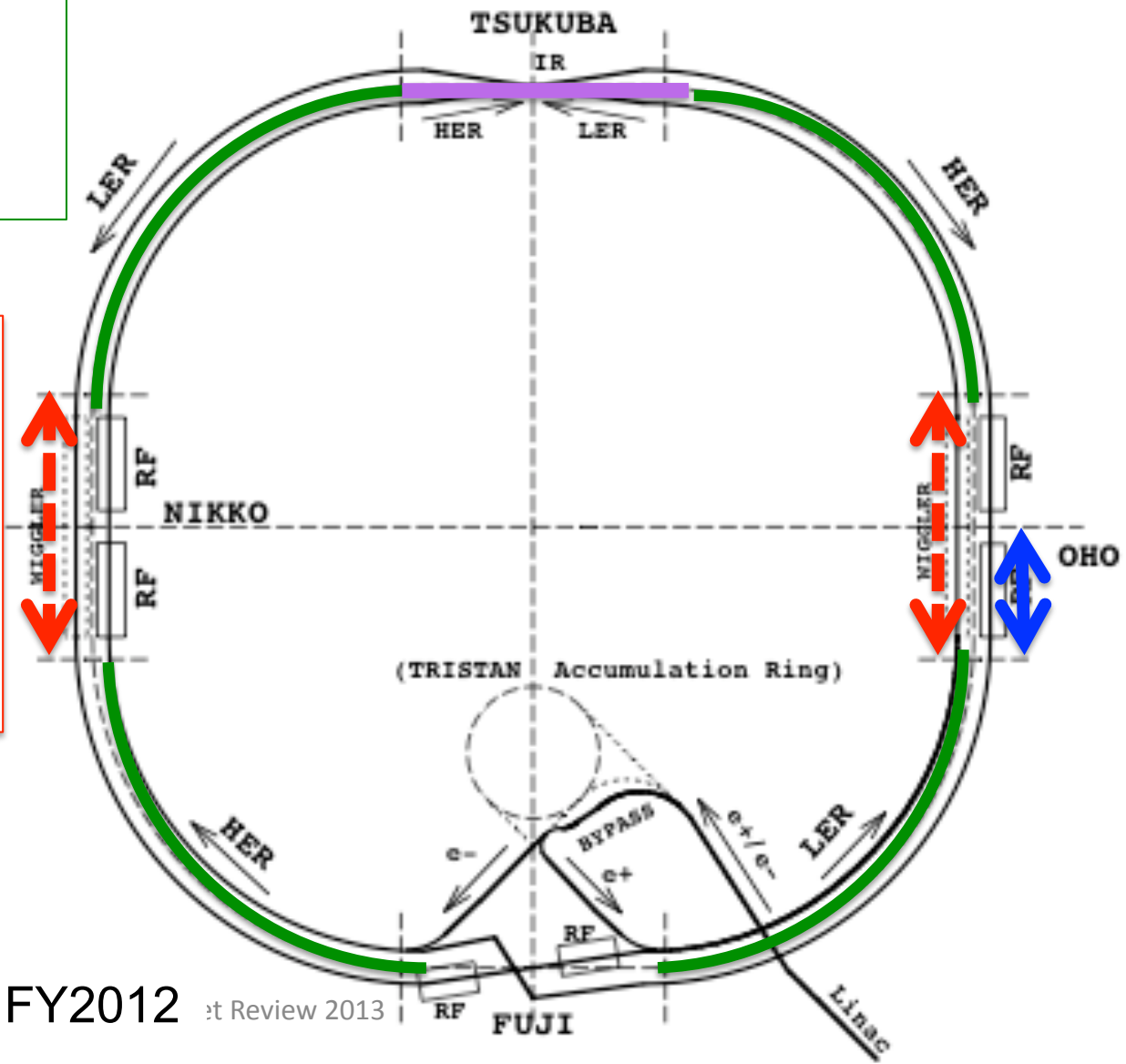
FY2013

Schedule

(1) LER arc dipoles (100) installed & preliminary alignment done.
 LER vertical dipole correctors (~140) installed and aligned.

(3) Totally new HER/LER
 Surveyed and marked on the floor.

(2) Oho/Nikko sections
 LER wigglers (280)
 HER wigglers (36)
 installed & preliminary alignment done.

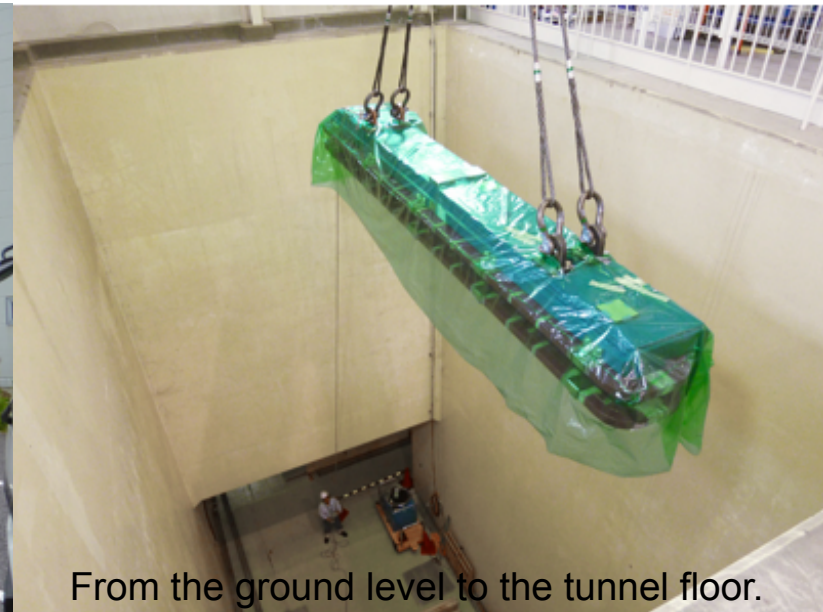


(1) LER arc dipoles (100) installed & preliminary alignment done.
LER vertical dipole correctors (~140) installed and aligned.

(1) LER arc dipoles (100) installed & preliminary alignment done.
LER vertical dipole correctors (~140) installed and aligned.



From the storage area to the access building.



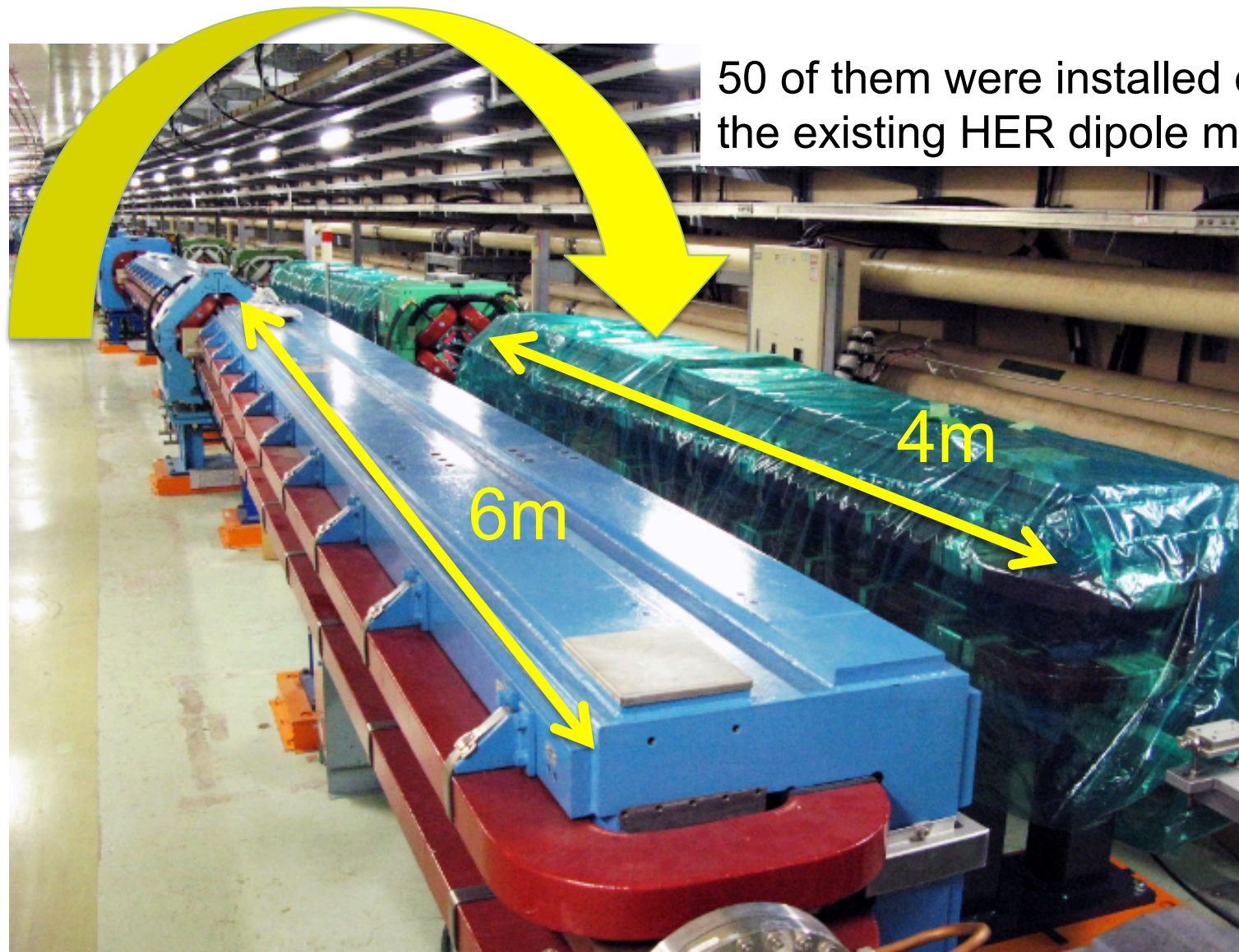
From the ground level to the tunnel floor.



Mounting on the air palette.



(1) LER arc dipoles (100) installed & preliminary alignment done.
LER vertical dipole correctors (~140) installed and aligned.



There is no overhead crane in the arc sections.

(1) LER arc dipoles (100) installed & preliminary alignment done.
LER vertical dipole correctors (~140) installed and aligned.



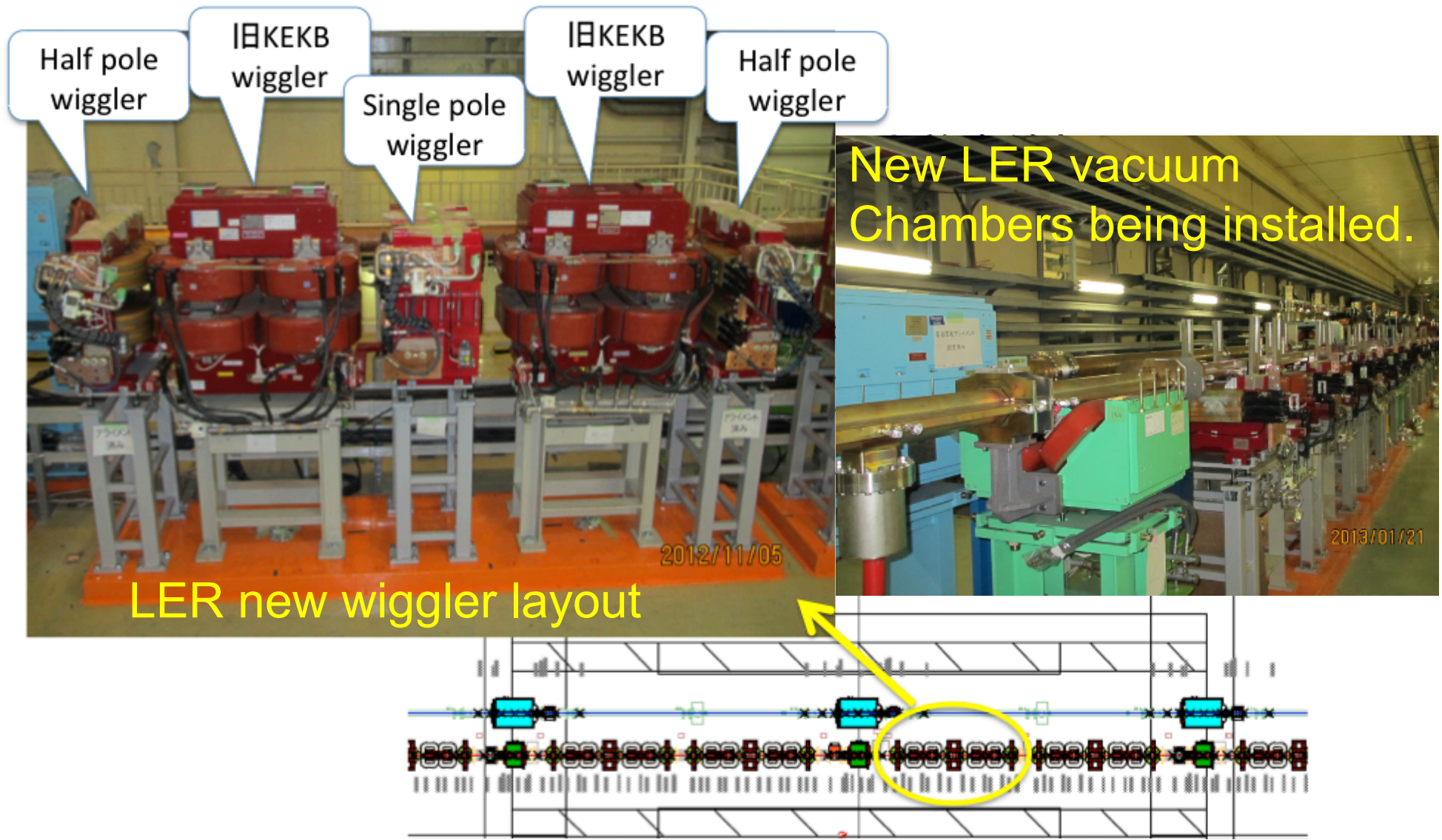
LER wider vertical corrector

112 half pole (newly fabricated)
56 single pole (newly fabricated)
112 double pole (KEKB reused)

(2)Oho/Nikko sections : LER wigglers (280) HER wigglers(36)
installed & preliminary alignment almost done.

36 (KEKB reused)

(2)Oho/Nikko sections : **LER wigglers (280)** HER wigglers(36) installed & preliminary alignment almost done.



Oho sections: LER beam line is closer to the aisle.

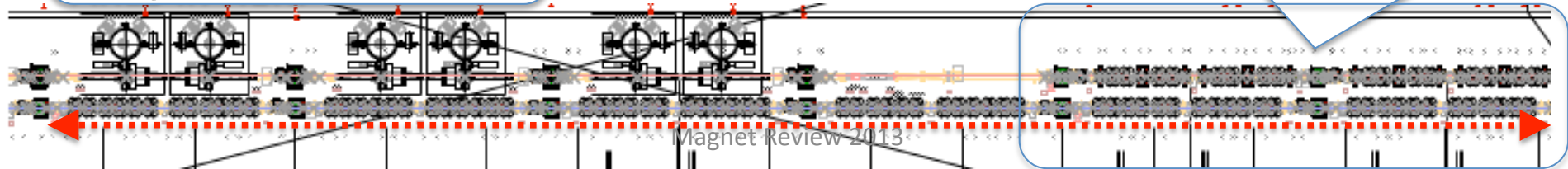
(2)Oho/Nikko sections : LER wigglers (280) HER wigglers(36) installed & preliminary alignment almost done.



Some LER wigglers right next to the relocated ARES in HER.



Wigglers in both HER & LER



(2)Oho/Nikko sections : **LER wigglers (280)** HER wigglers(36) installed & preliminary alignment almost done.

LER wigglers over HER superconducting cavities @ Nikko straight section.



(2)Oho/Nikko sections : **LER wigglers (280)** HER wigglers(36) installed & preliminary alignment almost done.

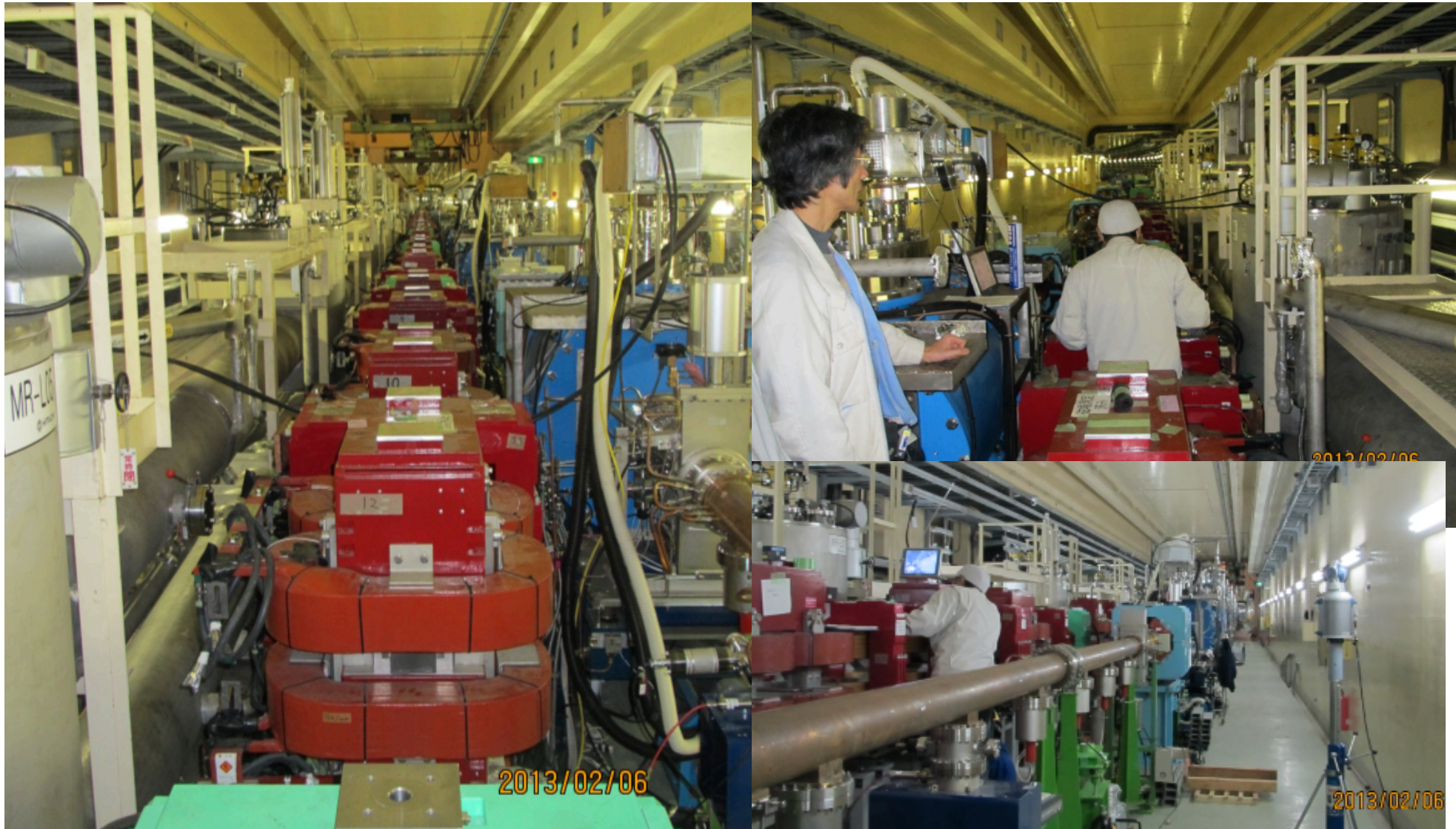


Not much space at all between LER and He gas supply lines for SCC.

Not much space at all between LER and SCC, either.



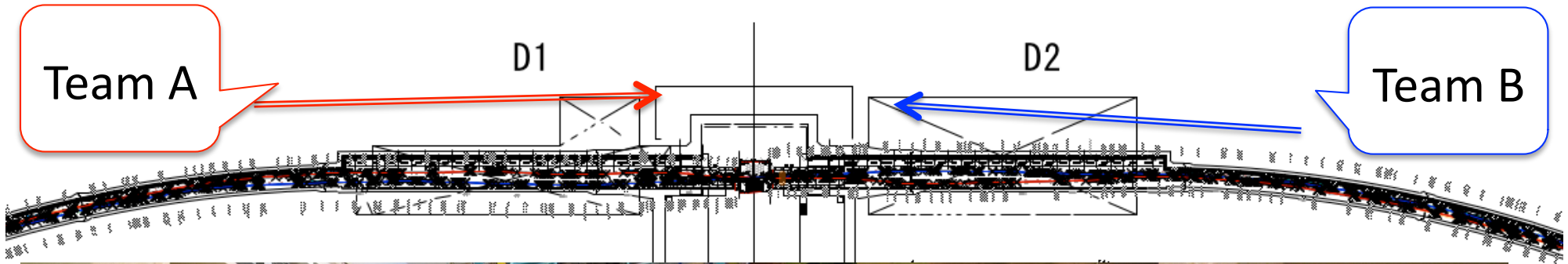
(2)Oho/Nikko sections : **LER wigglers (280)** HER wigglers(36) installed & preliminary alignment almost done.



Waiting for some more wigglers for the field measurements to be completed. The last batch will be installed & aligned some time this week.

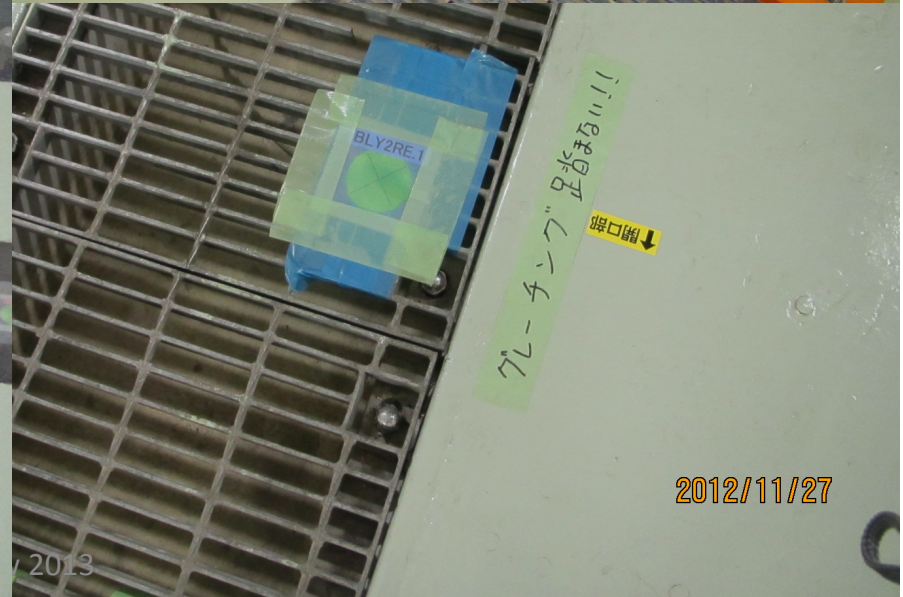
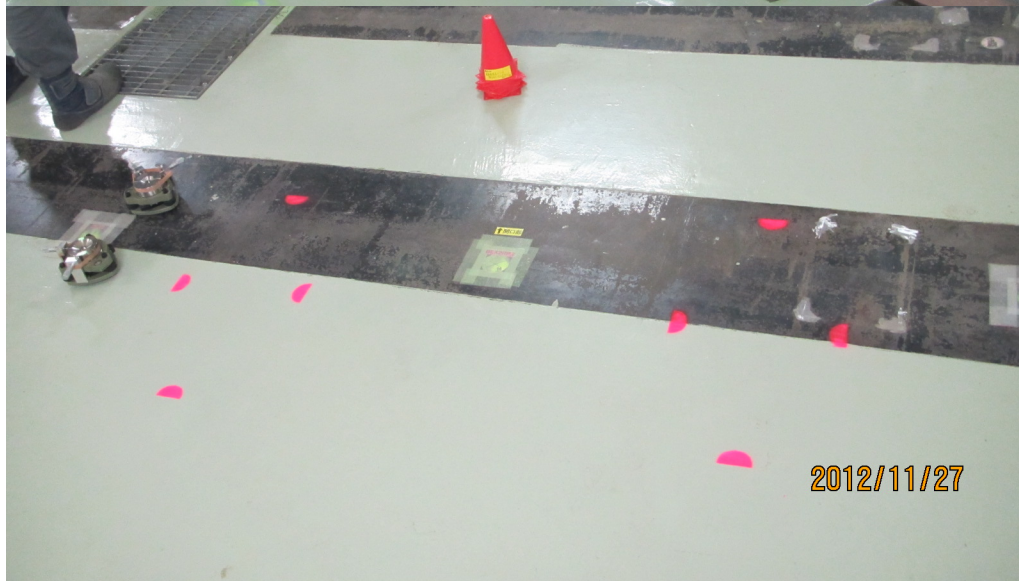
(3) Totally new HER/LER : Surveyed and marked on the floor.

Tsukuba



IP points obtained by 2 survey teams agree within 0.1 mm

(3) Totally new HER/LER : Surveyed and marked on the floor.



(3) Totally new HER/LER : Surveyed and marked on the floor.



(3) Totally new HER/LER : Surveyed and marked on the floor.



(3) Totally new HER/LER : Surveyed and marked on the floor.



(3) Totally new HER/LER : Surveyed and marked on the floor.

BELLE
rolled in.



Base plates for the magnets mostly done. Magnet installation will start from May.

Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

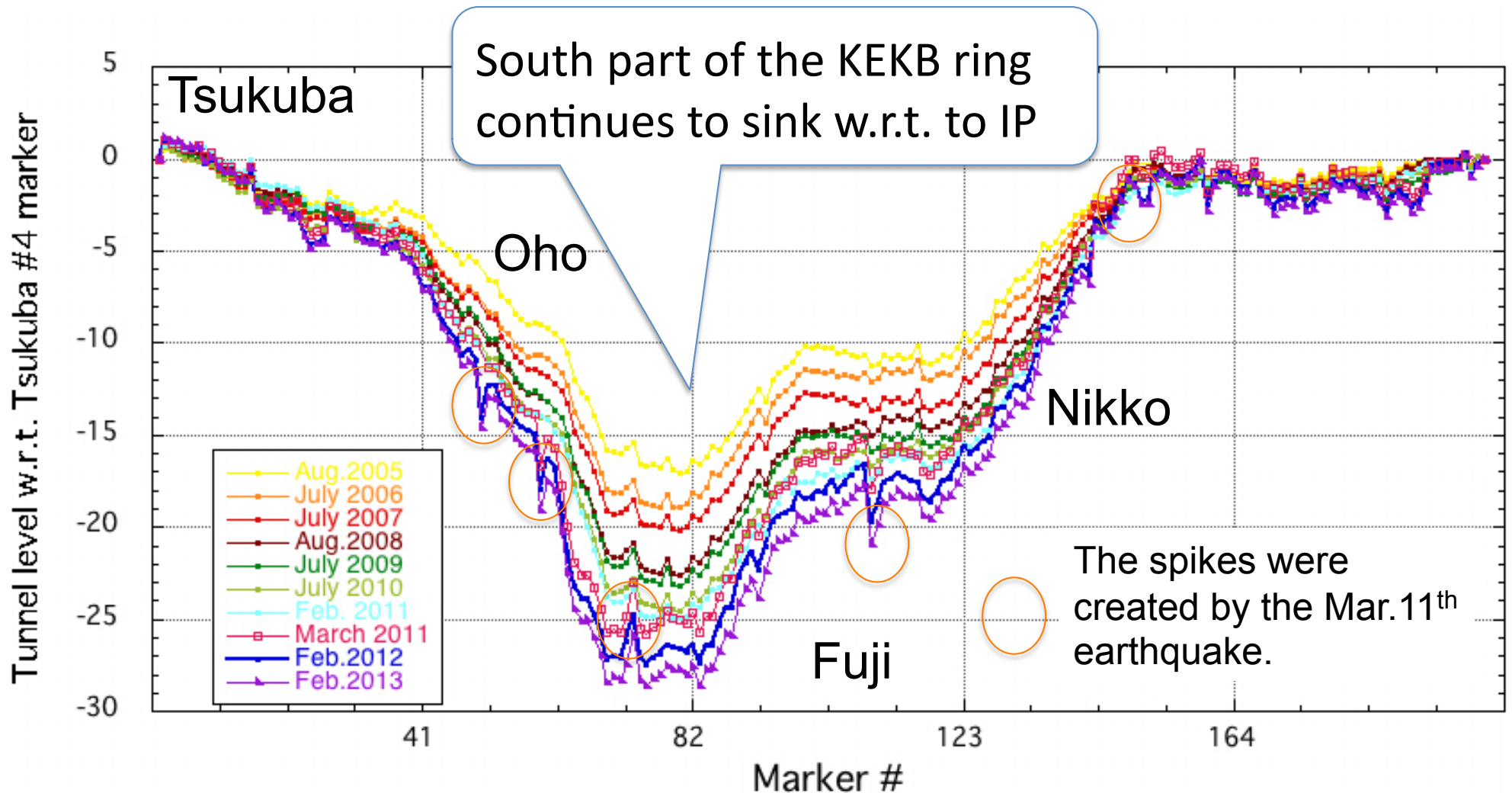
Others

R&D

FY2013

Schedule

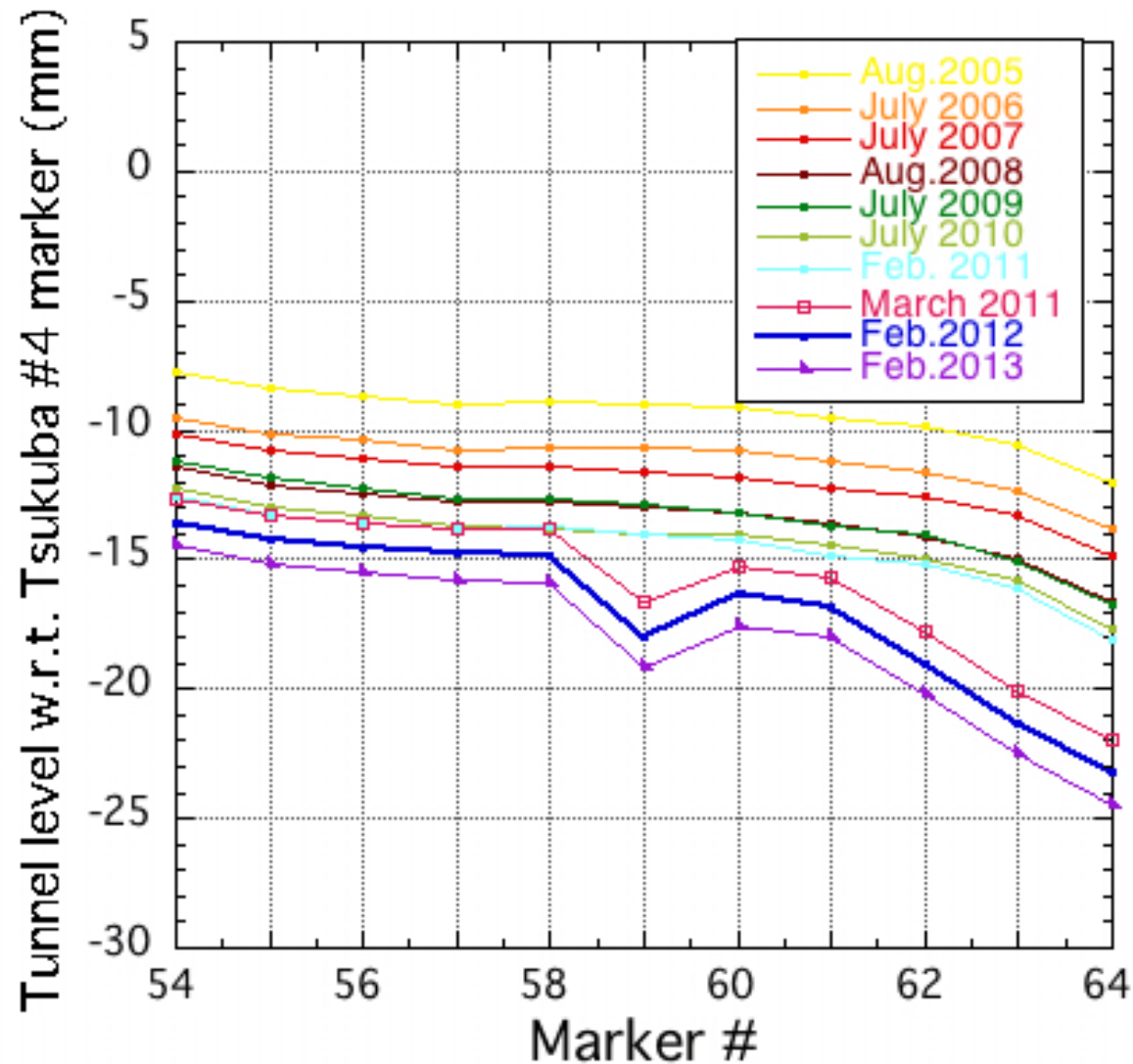
Tunnel Level Survey



Discussion with the Optics Group

A decision not to flatten out the tunnel level but to smooth it out, based on the **2012 data (blue line)** was made.

Tunnel Level Survey

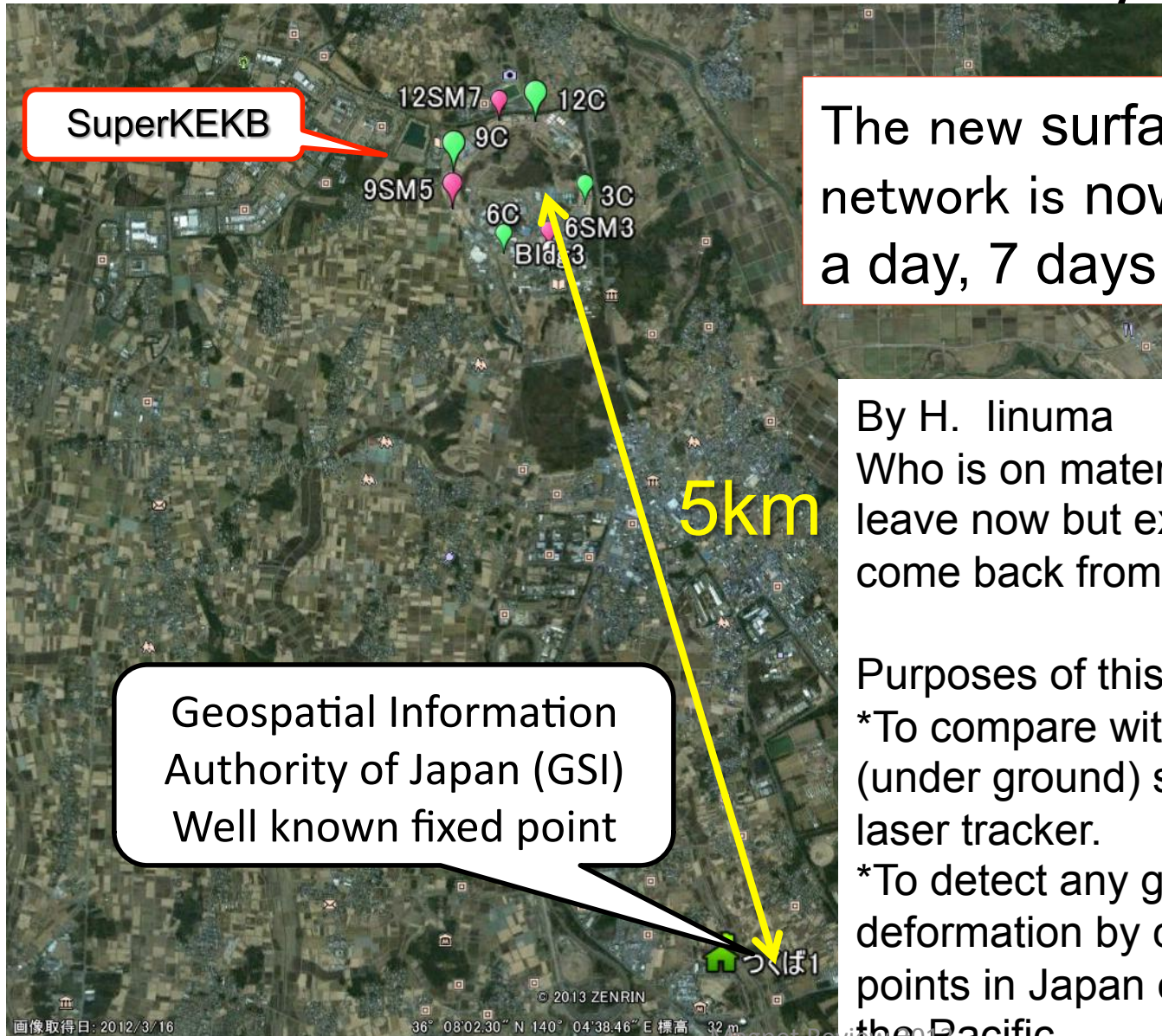


Feb. 2011
Mar. 2011

An example of the spike from the earthquake. #59 sank by about 4 mm and does not seem like it will recover naturally. Also it seems like #62 and up sank significantly due to the earthquake.

Survey

Deformation monitor by GPS



The new surface surveying network is now working 24 hours a day, 7 days a week.

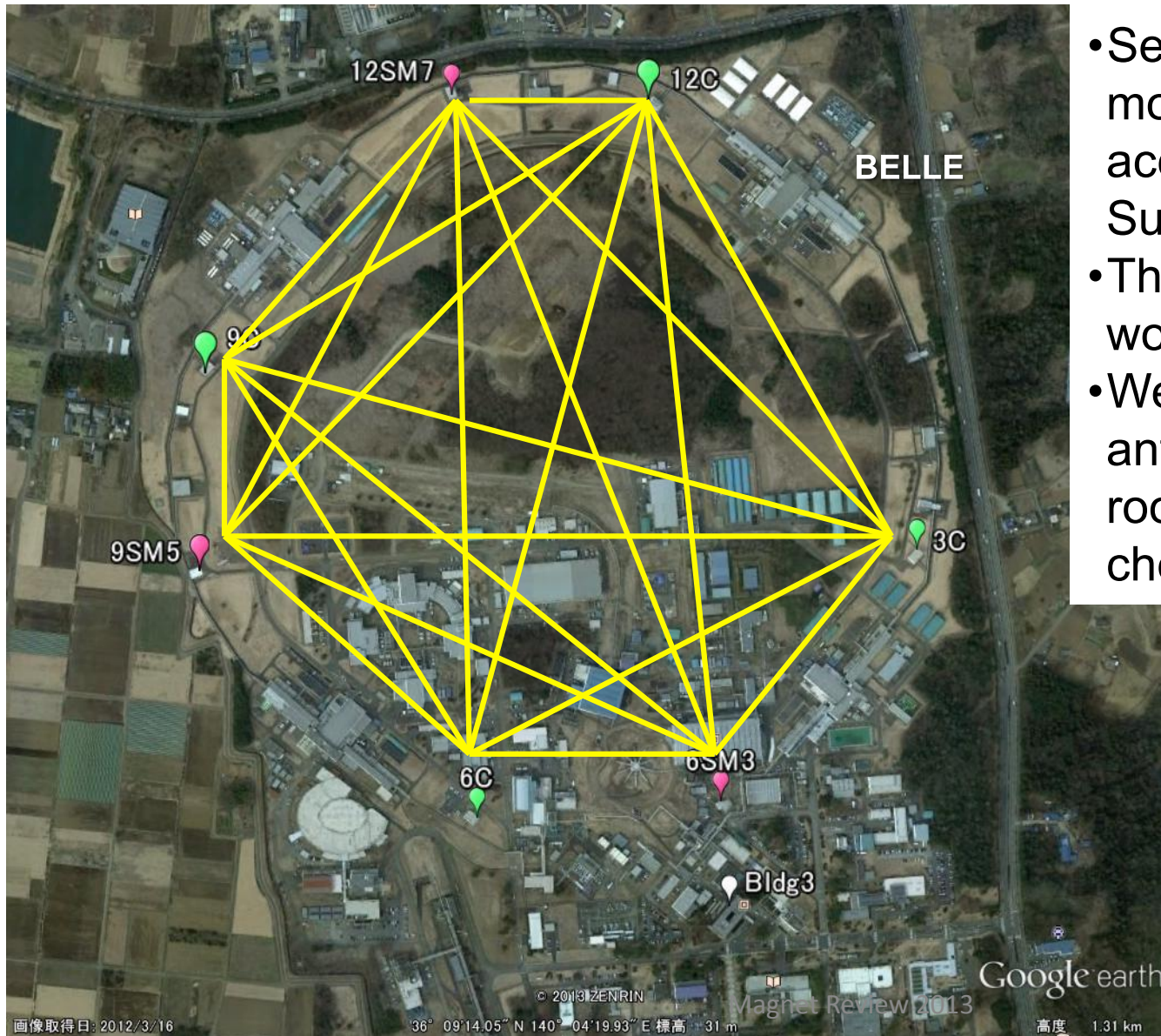
By H. Inuma
Who is on maternity/childcare leave now but expected to come back from April.

Geospatial Information Authority of Japan (GSI)
Well known fixed point

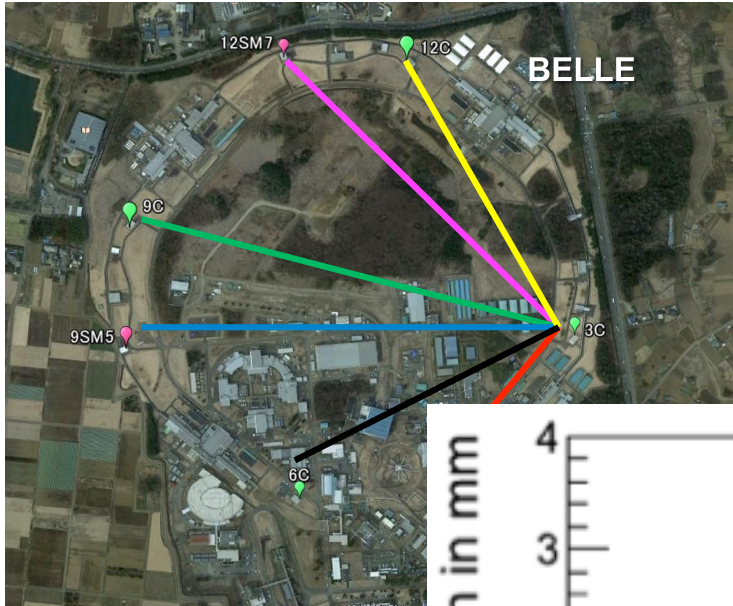
Purposes of this project:

- *To compare with the tunnel (under ground) survey network results by laser tracker.
- *To detect any geological crustal deformation by comparing other GPS points in Japan or/and GPS points across the Pacific.

Surface network by 7 (+1) GPS

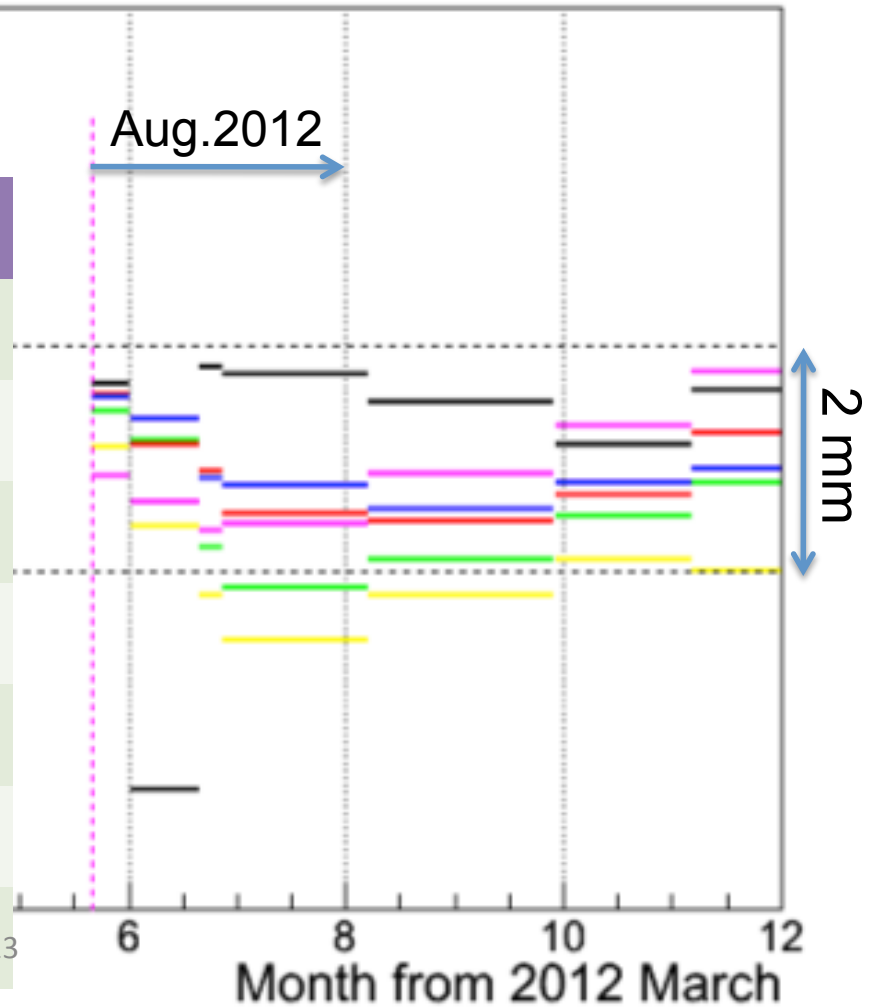


- Seven GPS antennas are mounted on the roofs of the access buildings to the SuperKEKB main ring.
- This system has been working since Aug. 2012.
- We also have one GPS antenna to mount on the roof of bldg-3 for periodic checkup.



Stability of the slope distances:
 ~1 mm stability over 400 m ~ 900 m (ppm!)
 has been accomplished.
 (Position accuracy:
 horizontal < 3mm, vertical < 6mm from the
 Leica specification sheet).

place	Latitude (N)	Longitude (E)	Ellipsoidal height (m)	Ave. Slope distance (m)
3C	36 09' 12.93512"	140 04' 36.50100"	78.0146	0
6C	36 09' 01.87511"	140 04' 14.16083"	77.6748	654.2805
6SM3	36 09' 02.56042"	140 04' 26.55720"	73.6924	405.0502
9C	36 09' 20.13805"	140 04' 00.35192"	78.0247	930.4865
9SM5	36 09' 12.02100"	140 04' 00.04799"	74.5330	911.6635
12C	36 09' 31.33356"	140 04' 22.86369"	75.0584	661.6656
12SM7	36 09' 31.56883"	140 04' 12.85894"	74.5791	824.0912



Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

Others

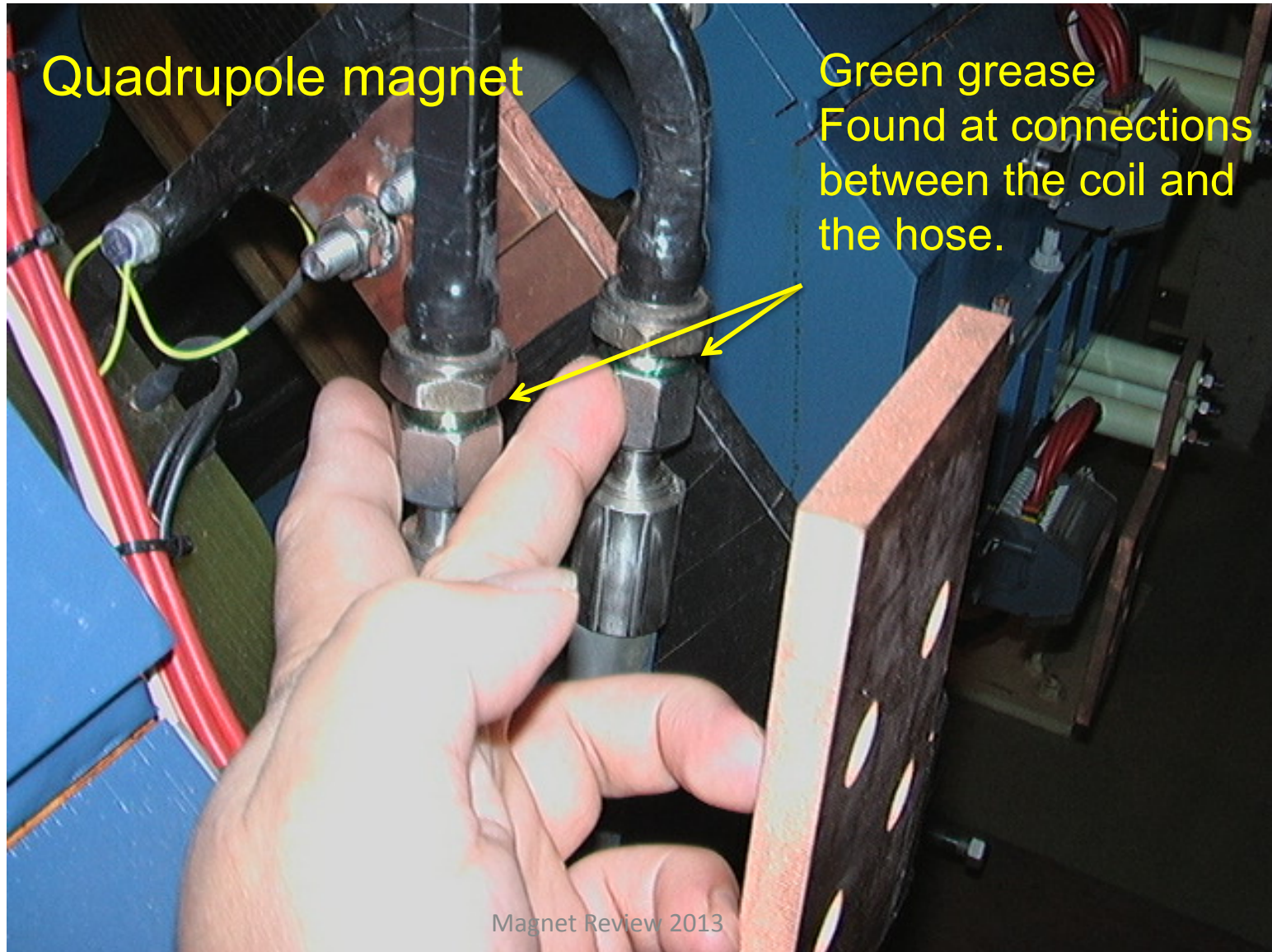
R&D

FY2013

Schedule

We think it is important,
useful and informative to
share our experience here.

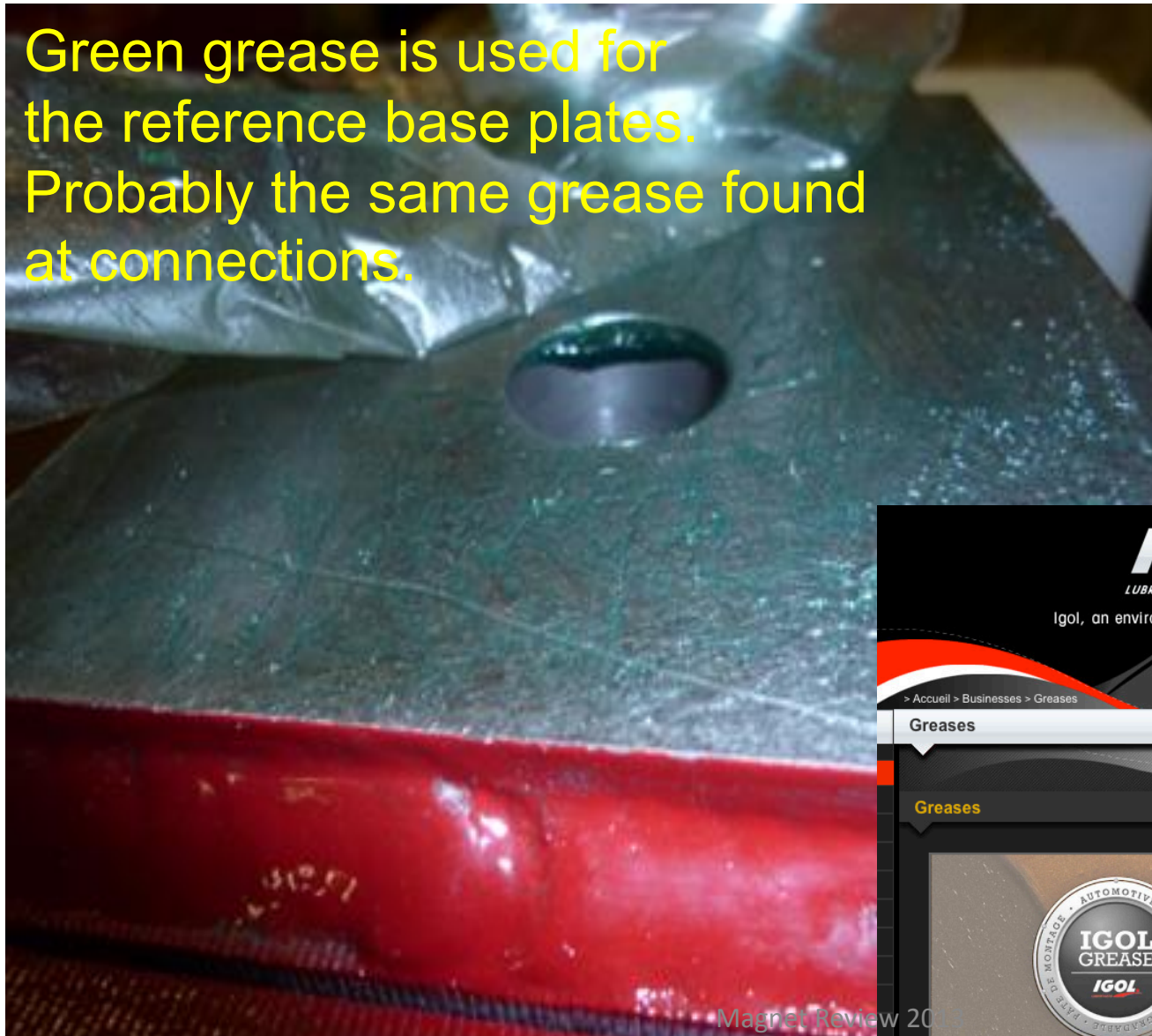
Grease contamination **in the cooling water system** (Sigma Phi wigglers & quadrupoles)



Grease contamination **in the cooling water system** (Sigma Phi wigglers & quadrupoles)

Green grease is used for the reference base plates. Probably the same grease found at connections.

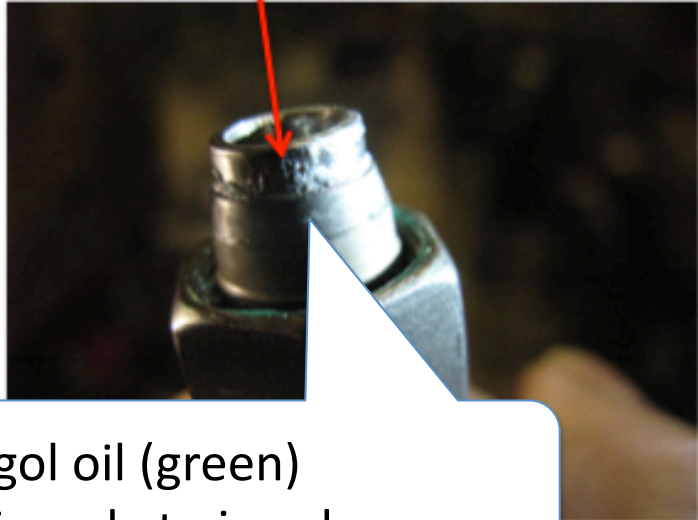
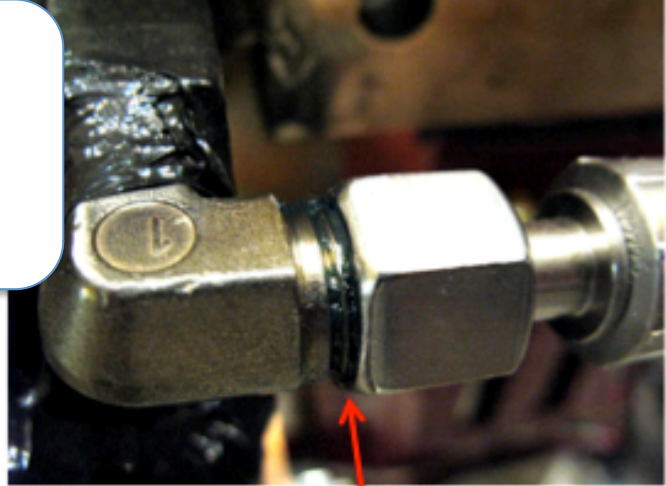
Turned out that Igol Machine oil was used.



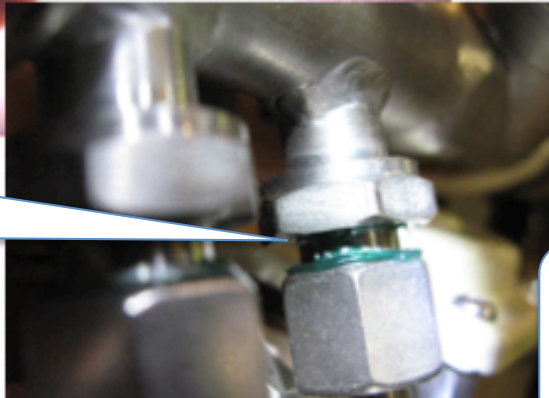
Grease used in the “pure” cooling water system!



Igol oil (green)
A shocking amount of grease found inside of the flow-switches.



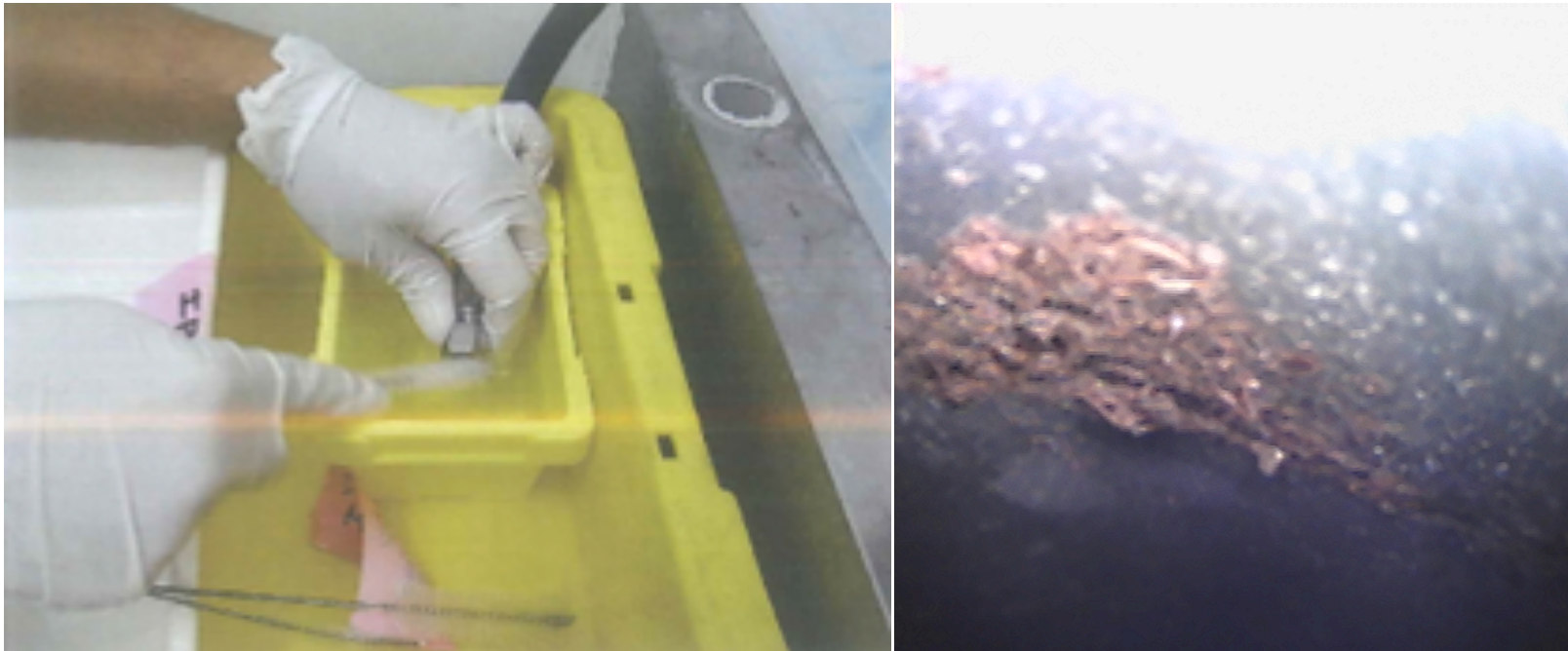
Igol oil (green)
Found at pipe sleeves



Igol oil (green)
Found at pipe sleeves

Private communication with CERN magnet group
“We would **not permit** the use of grease or oil for the assembly of cooling systems.”

Grease contamination **in the cooling water system** (Sigma Phi wigglers & quadrupoles)



Hoses, connecting parts being washed using special solvent.
Insides of the hoses were examined using optical scope
before and after washing.
Extra work has been created by this problem.

Other problems

Lamination peeled off from the core (BINP steering magnets)
BINP sent people to KEK to examine this case & found 2 out of 220 were defective. We will replace them with spares.



Other problems



Gap in lamination in the Sigma Phi wiggler. Not critical but unprofessional.

Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

Others

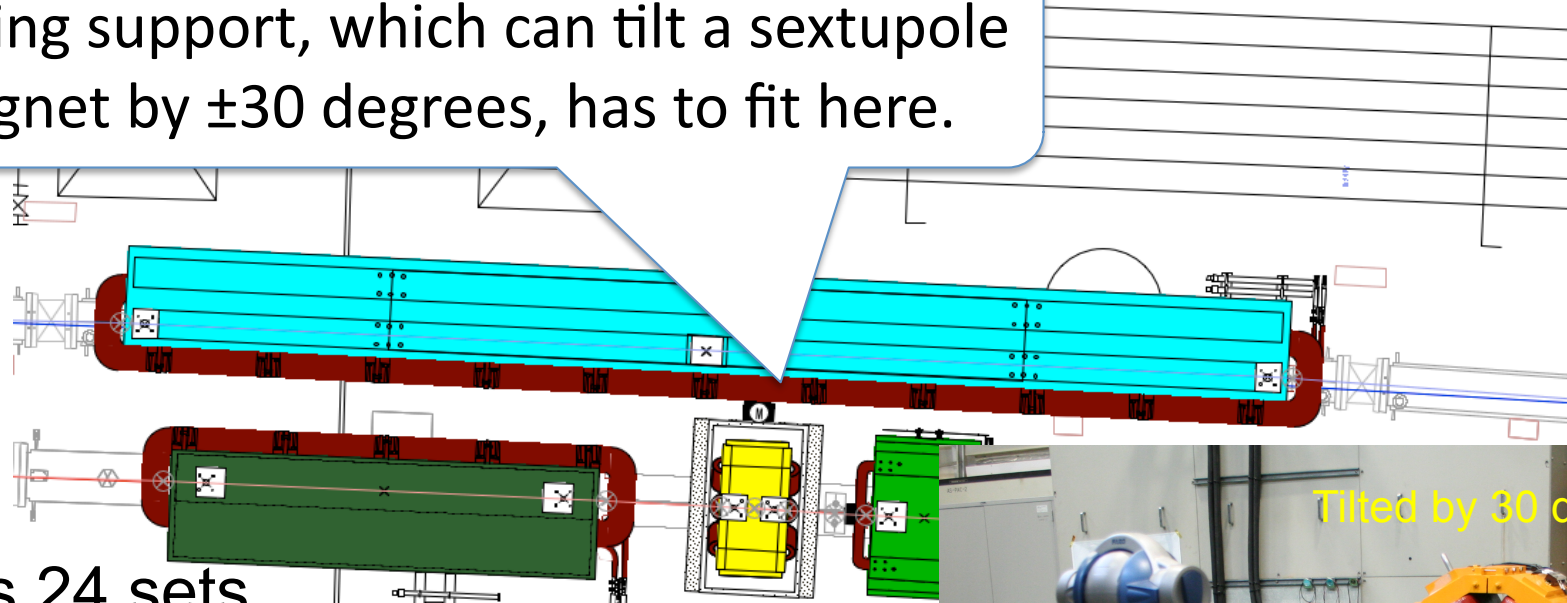
R&D

FY2013

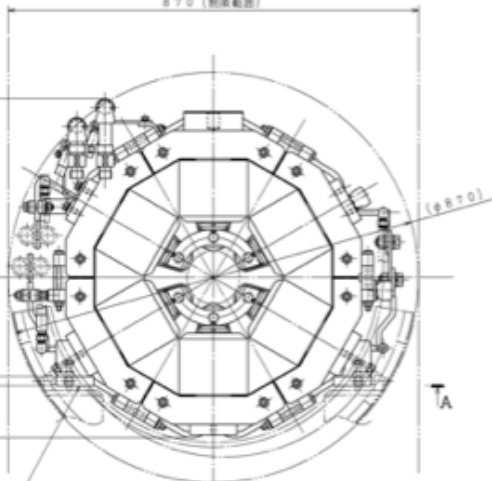
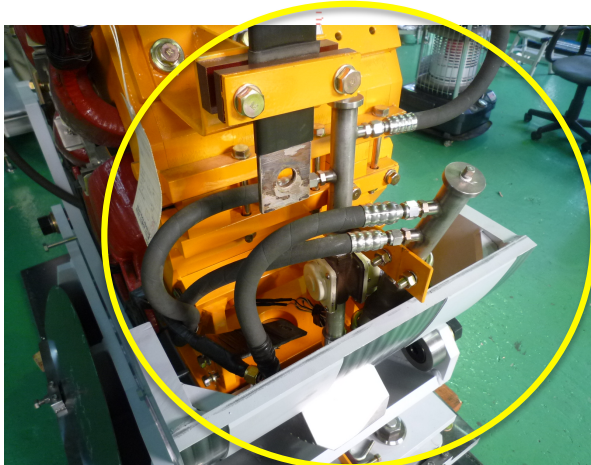
Schedule

Tilting support

Tilting support, which can tilt a sextupole magnet by ± 30 degrees, has to fit here.



Needs 24 sets

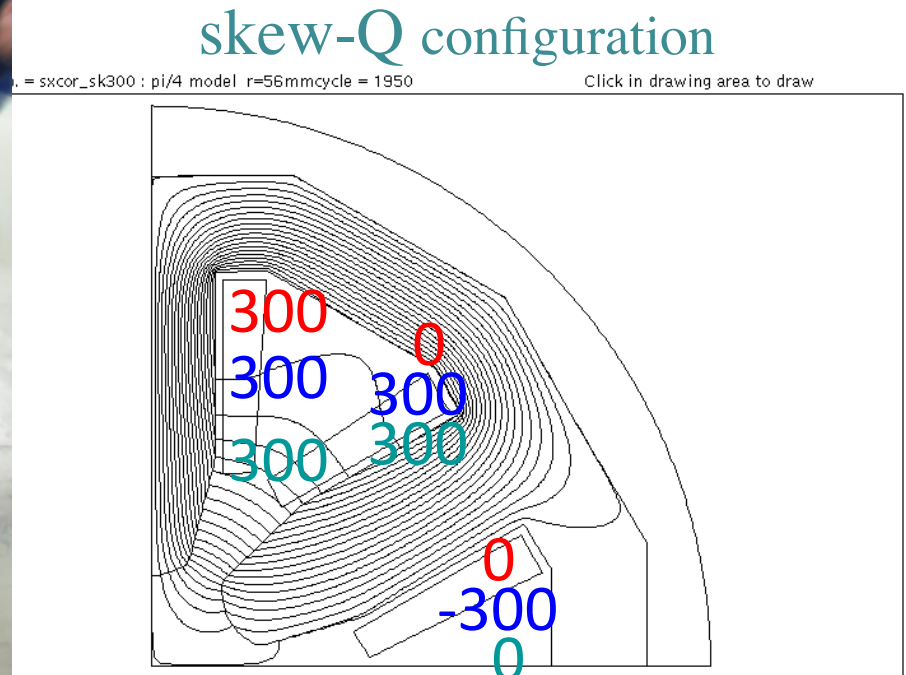
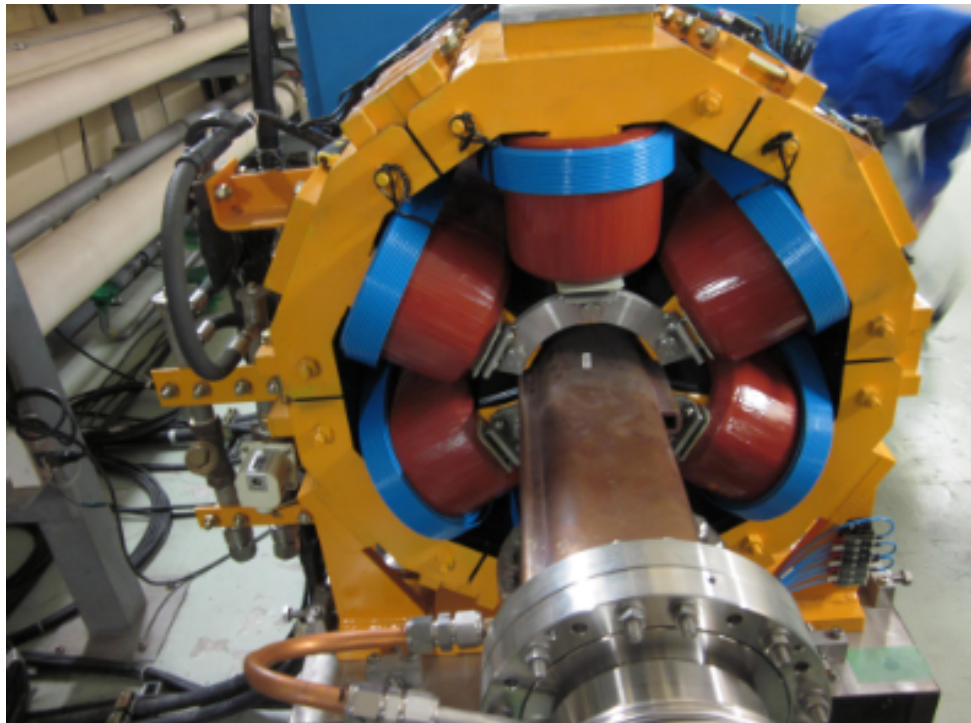


These have to be moved somewhere else.
The KEKB sextupole magnets need to be modified.

R&D work by
R. Sugahara

R&D

Auxiliary winding to create skew quadrupole field



Test winding in the tunnel.

Winding can be done without removing the top part of the magnet, less work in the tunnel.

Using flat cable (12 cables/layer, 4 layers/pole \Rightarrow 48 turns/pole)
by K. Tsuchiya.

The flat cables will be sent to KEK by the end of March.

Since 2012 Review

Progress

Magnet installation

Survey

Problems

Grease contamination

Others

R&D

FY2013

Schedule

FY2013 schedule

- Magnet installation to the Tsukuba section.
 - ~60 dipoles, ~100 quadrupoles, ~80 steering magnets
- More magnet fabrication ⇒ presented by K. Egawa
- Top part of the LER magnets in the arc sections to be removed for vacuum chamber installation (and put the magnets back together again).
~500 magnets.
- LER horizontal steering magnet installation (~200).
- HER vertical/horizontal steering magnet installation (~400).
- Connecting each magnet to the cooling water system (entire ring)
- Survey and alignment (precise) of the all magnets in the tunnel.
⇒ Alignment accuracy depends on the tunnel temperature. Right now, it is not controlled at all and the temperature varies by ~9 degree between winter and summer...
- Tunnel level makers (~200) will be adjusted to the new SuperKEKB level.
- Tilting support for 24 sextupole magnets will be fabricated.
- 24 KEKB sextupole magnets will be modified to fit in the tilting support.
- Skew winding will be done for all the sextupole magnets (~200).
- Power supply work ⇒ presented by T. Oki.
- And more.

