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Apologies........from Marek

- Sorry I can’t be there
- I hope the meeting is excellent (I bet it is)
- I hope you enjoyed the talks
- See you all next time
- Thanks to Rolf for taking care of business
- Thanks to Gary Johnston for hosting and leadership
Space vehicle force modelling – key recent work (selection)


Galileo space vehicle force modelling – key recent work

- Good progress incorporating physical features of satellite into *a priori* models
- DLR box-plate model reduces SLR offset from 11cm to below 1cm
SV Geometry, materials and phase centre information

• As ever – an ongoing challenge
• Both the importance and the utility of such data is ever more clear as standards are raised
• Thanks to Zuheir Altamimi for his work in the ICG on trying to acquire access to data for all systems
• Overall we are making progress – UCL recently signed non-disclosure agreements with two manufacturers to acquire data – it is possible!
ESA Galileo Force Modelling Contracts

- ESA has let two contracts on surface force modelling for Galileo IOV and FOC space vehicles
  - Group 1: Bern/Airbus
  - Group 2: UCL/GMV/ESOC (Positim)
- Very detailed information on SV materials, structure and attitude released to the groups
- Agreement brokered with ESA to make all resulting models available to IGS
- Model development, testing and release in 2016 - 2017
New PhD started at UCL on BeiDou orbit dynamics (in collaboration with Wuhan)

- Zhen Li
- Working on MEO, IGSO and GEO satellites
- Next generation Earth radiation forcing methods

If any other groups are carrying out PhDs related to orbit dynamics – please contact Marek/Rolf – happy to give support/access to resources
Discussion points

• Insights from REPRO2 analyses? What worked? What needs improving/development?

• Orbit dynamics at GEO/IGSO – may require new thinking – a more aggressive radiation environment (particulate, solar wind, alternative attitude behaviour)

• New area of development at UCL: Lorentz forcing – coupling of surface charge with magnetic field – early work seems significant – anyone interested in testing ideas?

• Next generation Galileo force models will become available late 2016 – worth testing? Who is interested?

• What about the “traditional” systems, GPS and GLONASS (Block III, GLONASS-K)?
Orbit modelling: discussion
SLR–Residuals in mm

Orbit validation from recent repro using extended ECOM: GLONASS

Sorry for the quality.
SLR–Residuals in mm

Orbit validation from recent repro using extended ECOM: GLONASS–M
SLR–Residuals in mm

Orbit validation from recent repro using extended ECOM: GLONASS–M

Sorry for the quality.
SLR residuals during the year 2014 for two different GLONASS satellites in the slot R21.

SLR validation
## Miracle about GLONASS satellites

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- many single frequency data
- dead satellites do spin very quick
- Does any other ACs have also problems with these satellites?