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COMPARISON/EVALUATION OF DIFFERENT ATMOSPHERE/OCEAN DE-ALIASING PRODUCTS USING ALTIMETER MISSIONS

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CONTEXT OF STUDY

METHODOLOGY

RESULTS

CONCLUSION

CONTENTS



CONTEXT OF STUDY

CNES Geophysical Data Records version E integrates 'AGRA model' : atmospheric gravity 6hr NCEP pressure fields (72 x 72) from https://gemini.gsfc.nasa.gov/agra/ web site + S1 and S2 tides from Biancale-Bode with inverted barometer hypothesis, hydrostatic sea surface response to the atmospheric pressure increase/decrease.

Inverted barometer, a static response that does not take into account high frequency atmospheric signals : wind effects totally ignored, could be improved ?

De-aliasing products update delay has improved : now available to be used in GDR orbits.

 \Rightarrow Evaluate impact of atmospheric pressure model and barometric model like de-aliasing products 3hr ECMF + 3hr TUGO P. Gegout (GET/CNRS)

CONTEXT OF STUDY EXAMPLE

de-aliasing products P. Gegout (GET/CNRS) :



Thanks a lot Jean-Michel !

Cones

METHODOLOGY *NEW PREPROCESSING, INPUTS*

Altimetry missions in GDR-E CNES standard

JASON-2 DORIS GPS dynamic and reduced dynamic orbits, altitude 1330km

CRYOSAT-2 DORIS dynamic orbits, altitude 720km

Improved models :

models	models	Time increment	Period availability
ATTMO University Strasbourg	ECMWF + TUGO	3hr	january 2002 \rightarrow january 2017
GFZ RL05 Postdam	ECMWF + OMCT	6hr	january 1979 → mid-may 2017
GFZ RL06 Postdam	ECMWF + TUGO	3hr	january 1976 → « yersterday »
P.Gegout GET/CNRS	ECMWF + TUGO	3hr	january 1980 → july 2016

RADIAL DYNAMIC ORBIT DIFFERENCES, IMPACT OF MODEL 1/3

Radial differences between ~0.5cm and ~1cm for JASON-2 and CRYOSAT-2 GDR-E dynamic orbits :



except for P. Gegout de-aliasing products, anomaly (integration or model) on last term 2014 ?



YEARS



GEOGRAPHICALLY CORRELARED DIFFERENCES, IMPACT OF MODEL 1/3

JASON-2 GDR-E Dynamic, AGRA vs GFZ5, DRIFT AMPLITUDE



DORIS GPS DYNAMIC GDR-F, AGRA vs GFZ RL05 dealiasing products (3.5-by-3.5 deg grids), cycles 001-074

East/West patch in constant evolution (every 2 years here) \rightarrow Temporal behavior of the orbit impact difficult to analyze

GEOGRAPHICALLY CORRELARED ERRORS, IMPACT OF MODEL 1/3

JASON-2 GDR-E Dynamic, AGRA vs P.GEGOUT, DRIFT AMPLITUDE



DORIS GPS DYNAMIC GDR-E, AGRA vs P.GEGOUT dealiasing products (3.5-by-3.5 deg grids), cycles 001-074

East/West patch in constant evolution (every 2 years here) \rightarrow Temporal behavior of the orbit impact difficult to analyze



RESULTS VALIDATION

Impact of model is not significant on JASON-2 reduced dynamic orbits



VALIDATION, ORBIT DIFFERENCES, RADIAL RMS



Mean RMS differences are sub-millimetric between models, though ATTMO model gives better result Replacing AGRA in GDR standards should be done in the next GDR-F standards

VALIDATION, CRYOSAT-2 ORBITS DYNAMIC, SLR RMS

CORE NETWORK:

• AGRA

• ATTMO

• GFZ RL05

• **GFZ RL06**

- AGRA mean RMS 1.870cm
- ATTMO mean RMS 1.838cm
- GFZ RL05 mean RMS 1.852cm
- GFZ RL06 mean RMS 1.844cm
- P.GEGOUT mean RMS 1.858cm

CORE NETWORK HIGH ELEVATION:

P.GEGOUT mean RMS 1.051cm

mean RMS 1.067cm

mean RMS 1.042cm

mean RMS 1.063cm

mean RMS 1.044cm



CRYOSAT-2 DORIS DYNAMIC GDR-E, RMS SLR CORE NETWORK HIGH ELEVATION



Core network: L7090 L7105 L7810 L7839 L7840 L7941 Same conclusion as precedent slide

VALIDATION, CRYOSAT-2 ORBITS DYNAMIC, SLR RMS

CORE NETWORK:

• AGRA

• ATTMO

• GFZ RL05

• **GFZ RL06**

- AGRA mean RMS 1.498cm
- ATTMO mean RMS 1.473cm
- GFZ RL05 mean RMS 1.476cm
- GFZ RL06 mean RMS 1.470cm
- P.GEGOUT mean RMS 1.478cm

CORE NETWORK HIGH ELEVATION:

P.GEGOUT mean RMS 1.108cm

mean RMS 1.098cm

mean RMS 1.091cm

mean RMS 1.091cm

mean RMS 1.092cm



JASON-2 DORIS GPS DYNAMIC GDR-E, RMS SLR CORE NETWORK HIGH ELEVATION



Core network: L7090 L7105 L7810 L7839 L7840 L7941 Quite the same conclusion as precedent slide, GFZ RL06 shows better results in Core network all elevation figures

AWG DORIS, 23th may 2017

Ccnes

JASON-2 DORIS GPS DYNAMIC GDR-E, RMS SLR CORE NETWORK

CONCLUSION

Several atmospheric/ocean de-aliasing products could be used instead of the one used in the GDR-E standards (providing that they are available on time...)

In operational point of view and available periods for reprocessing, GFZ RL06 de-aliasing products are very interesting.

ATTMO de-aliasing give in general the best results in used criterions. But performance difference with another products are small.

GFZ RL06 could be integrated in the future GDR-F CNES standards, to be continued...

THANK YOU FOR YOUR ATTENTION, ANY QUESTIONS ?

