

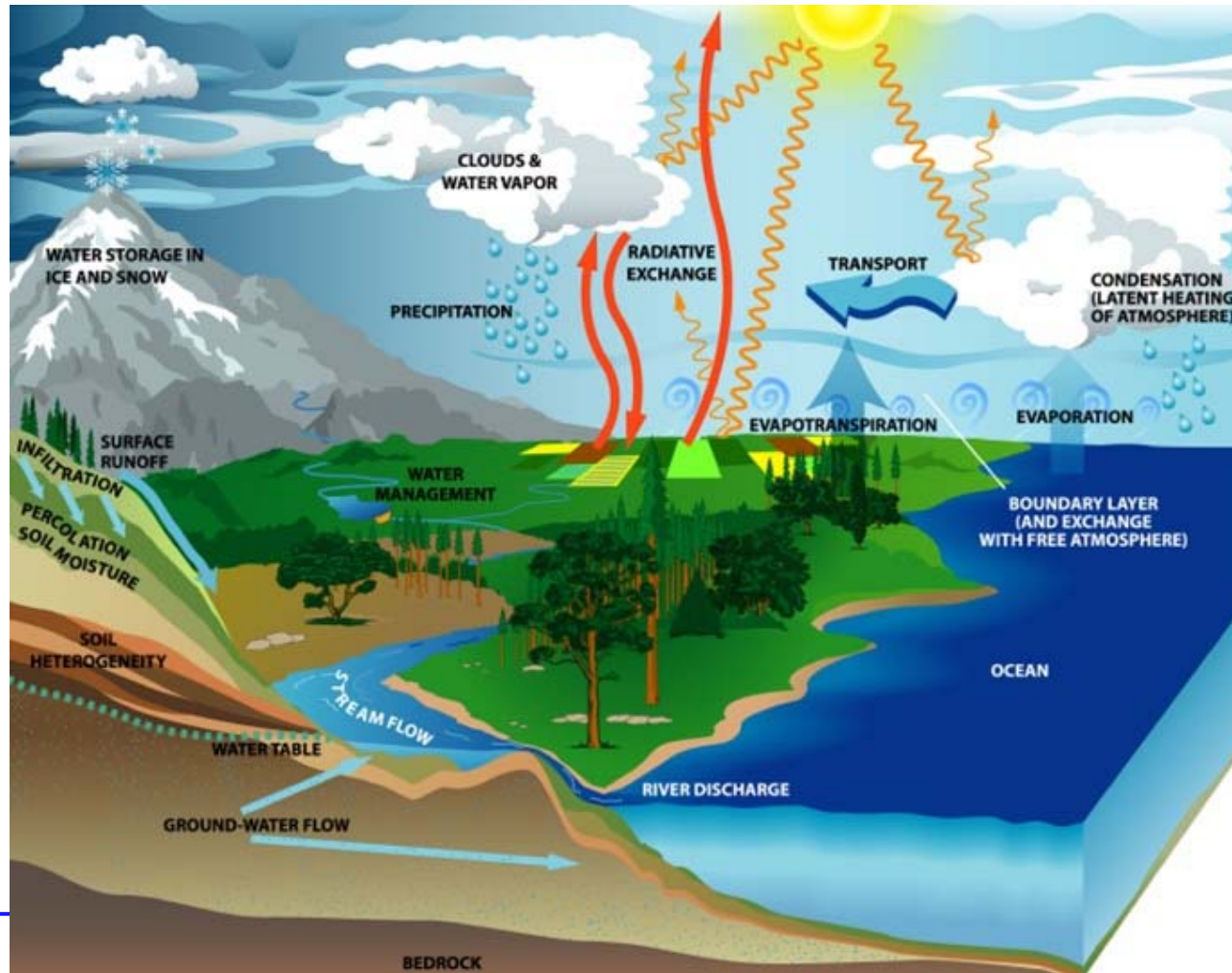
What can the GGFC do for Global Gravity Missions?

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Global Time Varying Gravity Missions are affected by almost every aspect of the Earth System



Short and Long Period Effects

- **Many variations in mass occur at fairly high frequency**
 - Typical gravity solution interval = 2 to 4 weeks
 - Variability in the range of few hours to several weeks can create aliasing
- **Other variations are longer period and thus not *aliased* per se, but we would still like to remove them since they can be observed by other data types**
 - Could be seasonal to secular



Short and Long Period Signal Examples

- **Short:**
 - Ocean tides
 - Nontidal ocean
 - Atmospheric pressure variations
 - Hydrology
- **Long**
 - Atmospheric pressure
 - Loading effects, especially PGR



So, what does GRACE do about these?

- **Short:**

- Ocean tides - many tide constituents (up to 100's or even 1000's), expanded to high degree (~90)
- Nontidal ocean - baroclinic or barotropic model run *daily*, driven by ECMWF pressure and winds
- Atmospheric pressure variations - ECMWF
- Vertical integration
- Hydrology - none yet, may use GLDAS-type model

- **Long**

- Atmospheric pressure - ECMWF
- Loading effects, especially PGR - ICE5G



What is interesting about the list on the preceding page?

- There is a GGFC SB for each of these effects, yet in essentially no case do we use a product from one of the SB's.



Why is that?

- **Answer: Not entirely clear. Possible answers:**
 - 1) A mission like GRACE requires an almost operational-type commitment to computing and delivering products - beyond scope of most SB's
 - 2) A mission like GRACE requires a long span of continuous model output - beyond scope
 - 3) The SB's are not familiar with what GRACE needs and what we are already doing (in essence - "how high the bar is")



If Scope is the Issue, Is there a Compromise?

- **Answer: Yes**
 - Most of the analysis centers run a number of solution variants, and most of the analysts are very interested and willing to run alternate dealiasing models provided after the fact

But

- The models have to be at least one year in span, self consistent over that span, and able to be merged in format with standard GRACE dealiasing products
- The key is understanding and interacting with the analysis teams to know what variants are useful

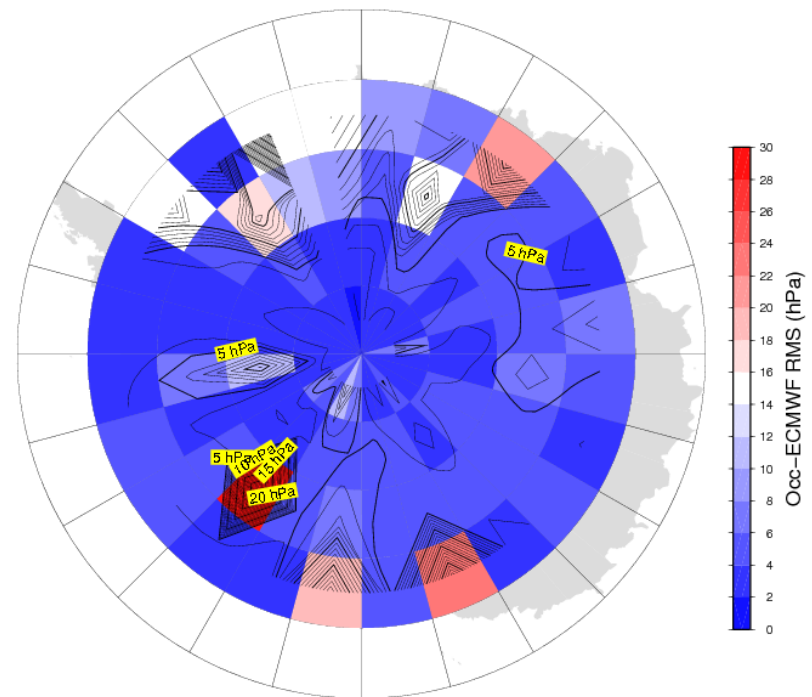


What are examples of areas where better dealiasing products are needed?

Atmospheric pressure over Antarctica

Evidence from GPS occultations (which are sensitive to geopotential height) that there are routinely 2 - 10 mbar errors in pressure on hourly to seasonal scales

Months 10–12 Occ–ECMWF Near Surface p difference RMS



What are examples of areas where better dealiasing products are needed?

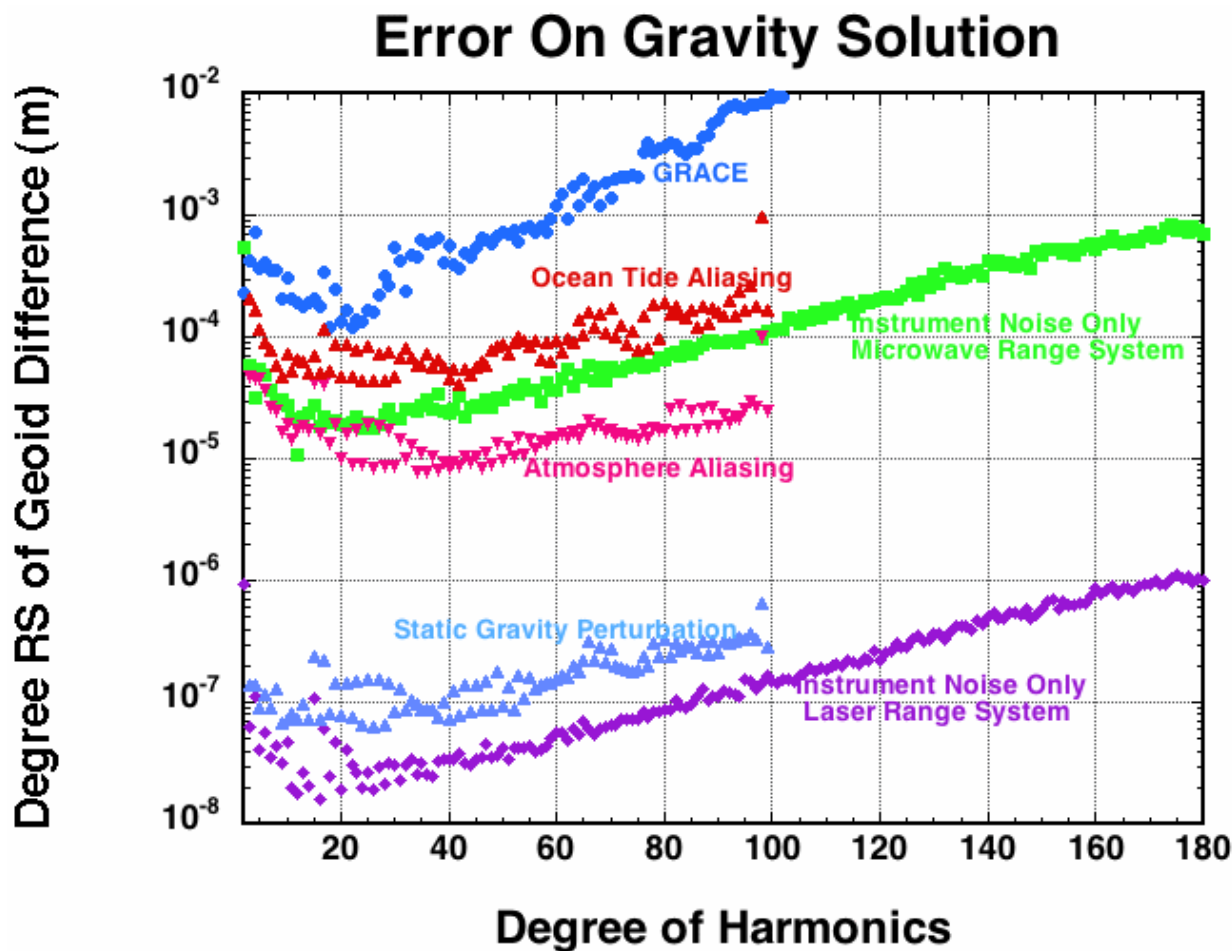
Ocean tides

Open (deep ocean): possibly limited by baroclinic modes - need to run a daily tide model

Shallow/regional - many areas without T/P - Jason altimeter coverage are degraded (essentially just a model, like FES)



Are things getting better or worse?



What should GGFC do?

1) Reassess our customer base

Q: Are we still focused (in some way) on geodetic users? In other words, are we archiving ocean models for the arbitrary oceanographer

A: Yes, we retain a gravity/rotation/reference frame focus

2) Within major projects, a distinction is made between system engineering and “manufacturing” or implementation

Q: Are the GGFC’s going to play a major role in implementation?

A: May depend on product, but recommend focus on SE relation with preferred providers



What should GGFC do?

Watkins recommendation:

The GGFC product SB's should achieve:

- state of the art in model quality they generate or archive from providers
- consistent and continuous in product generation

The IERS should strongly consider becoming an integral part of the analysis system of upcoming missions through a demonstration focused on re-analysis and possibly growing to a more operational role (as for Earth orientation)

Operational roles force discipline and professionalism, and provide a framework to advocate national agency support

