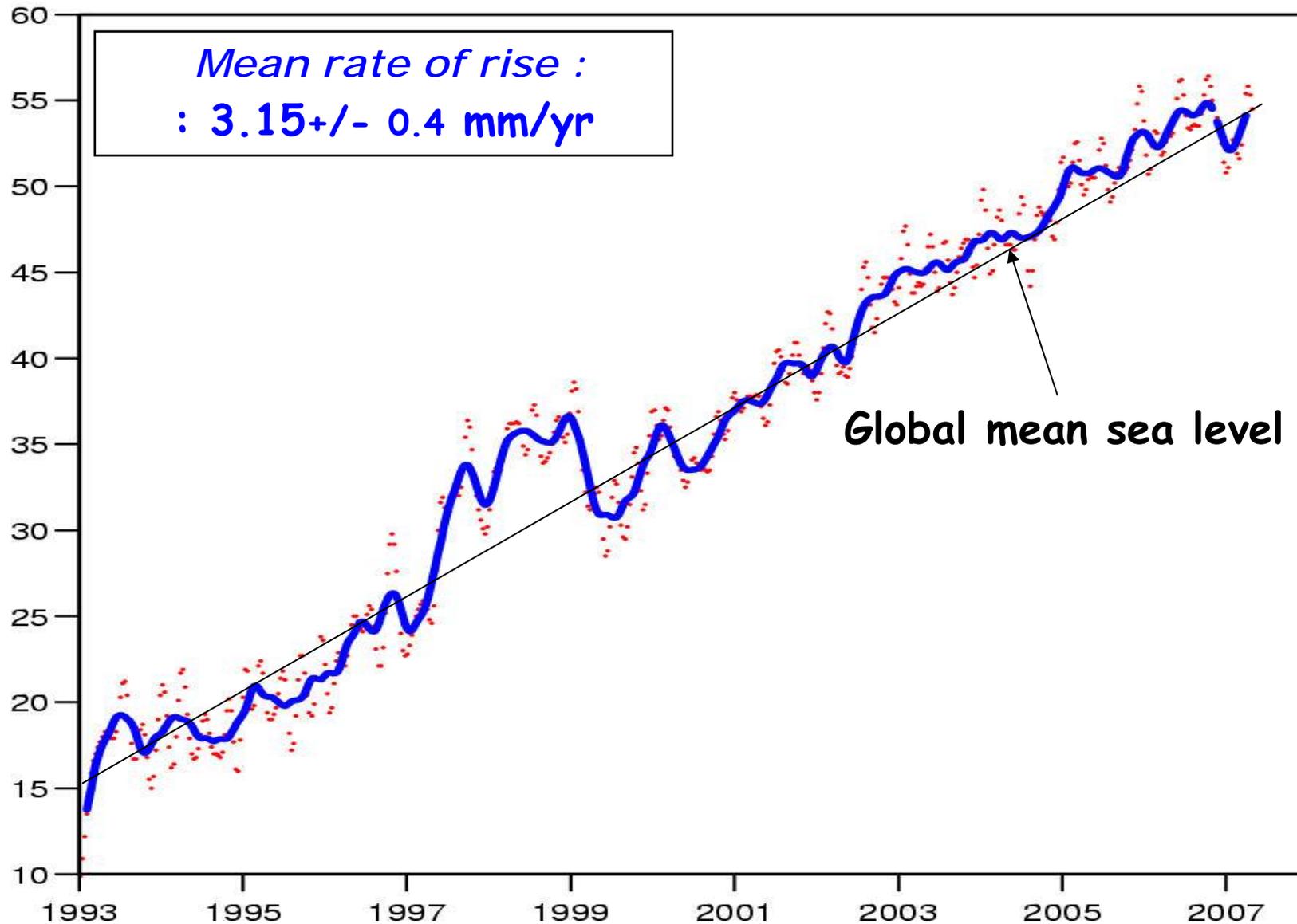


Contribution of lakes and reservoirs to present-day sea level change estimated from satellite altimetry

E. Burrillon, A. Cazenave, J.F. Crétaux and M. Berge-Nguyen

LEGOS-CNES, Toulouse

Sea level rise from Topex/Poseidon and Jason-1 satellite altimetry (1993-2007)



Causes of sea level rise...

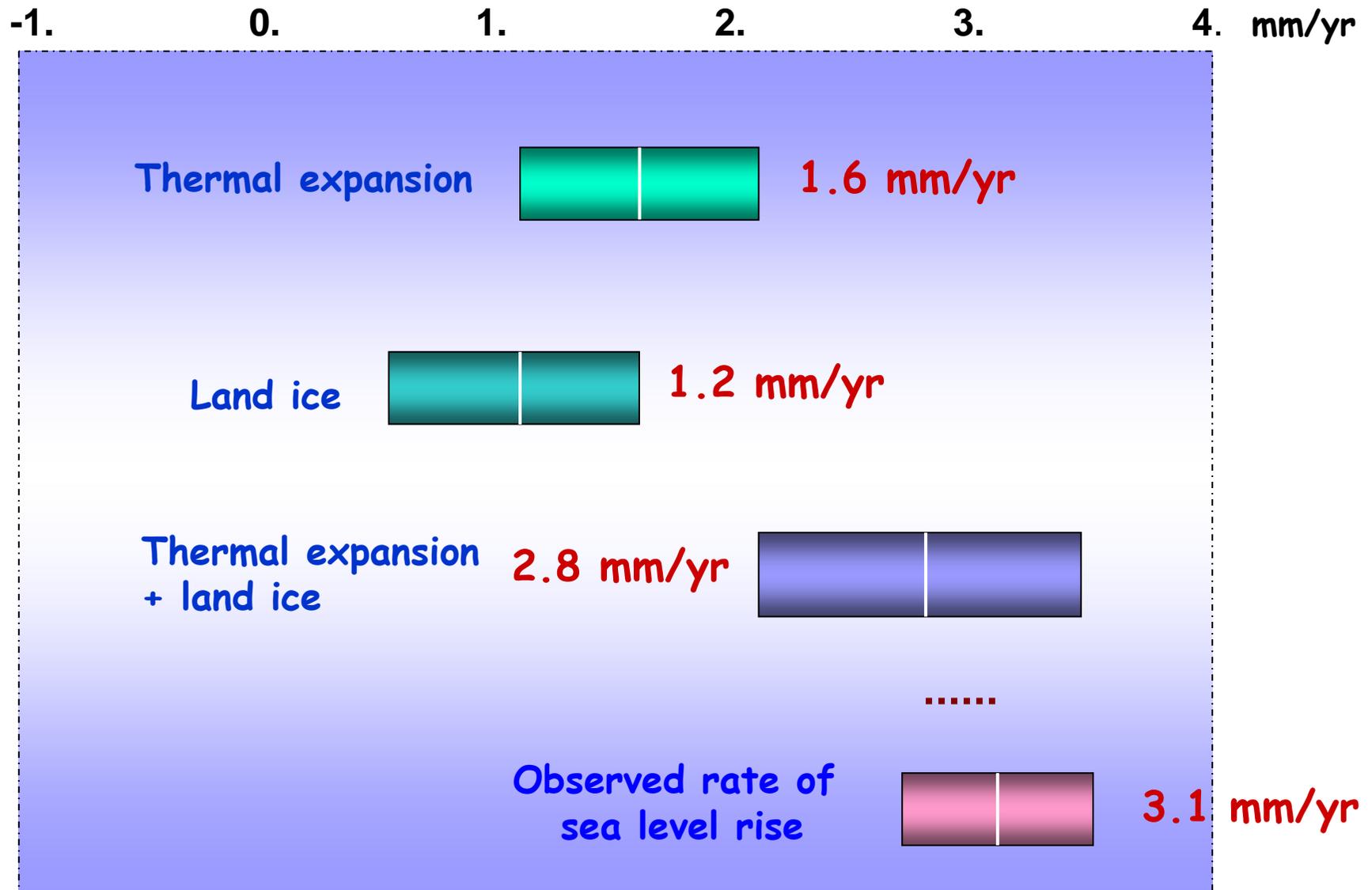
- Thermal expansion of sea water due to ocean warming
- Ocean mass increase due to:
 - land ice melt
 - **terrestrial water storage change**

Sea Level Budget



Recent Years

SEA LEVEL BUDGET (recent years)



**Contribution
of
Land water storage?**

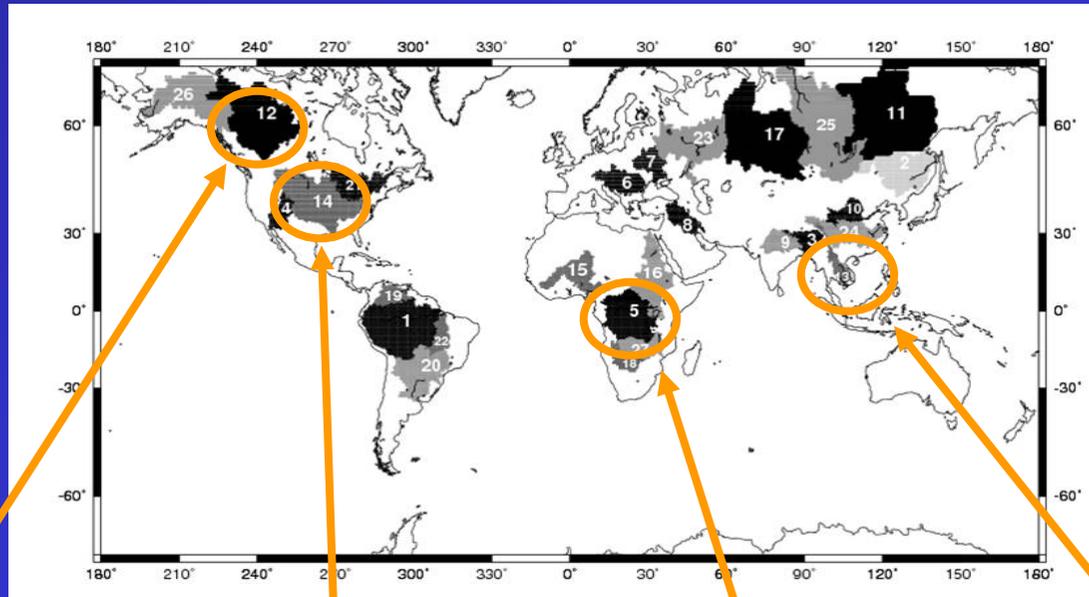
Land waters : two components

1. Surface waters
2. Soil + ground waters

- Satellite altimetry  Surface water change
 - GRACE  Total (surface + soil + ground) water mass change
- 

Summary of recent GRACE results

Basin-scale water mass change from GRACE (2002-2006)



Equivalent water height (mm)

Time (yr)

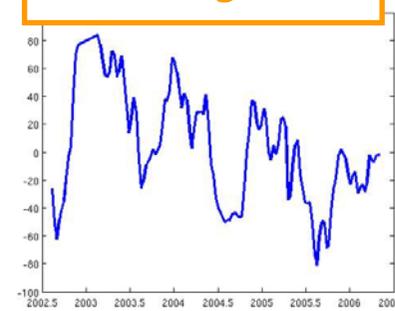
Mac Kenzie



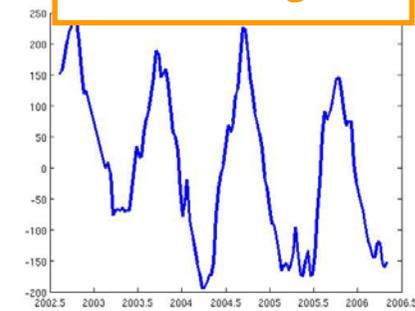
Mississippi



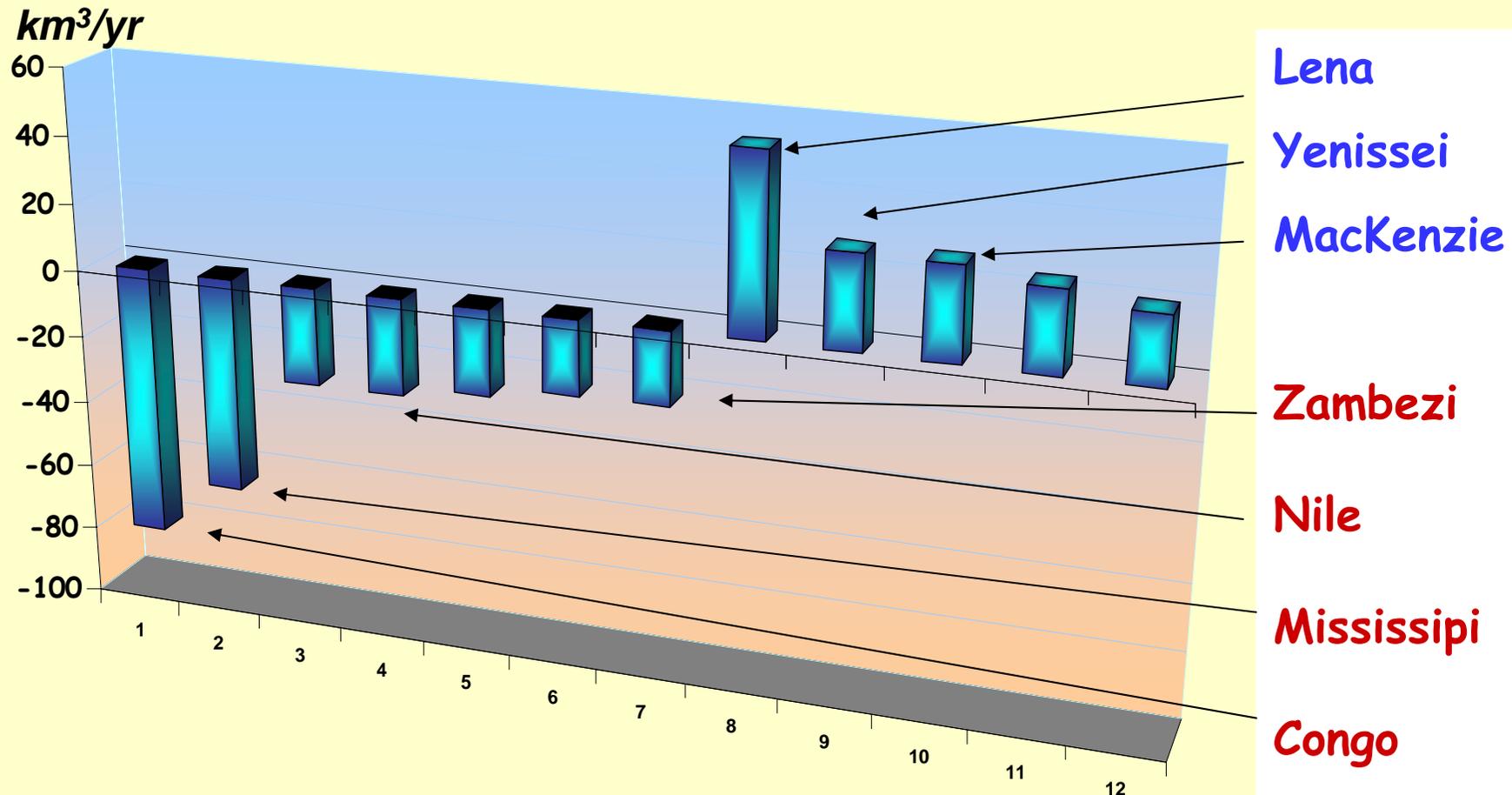
Congo



Mekong

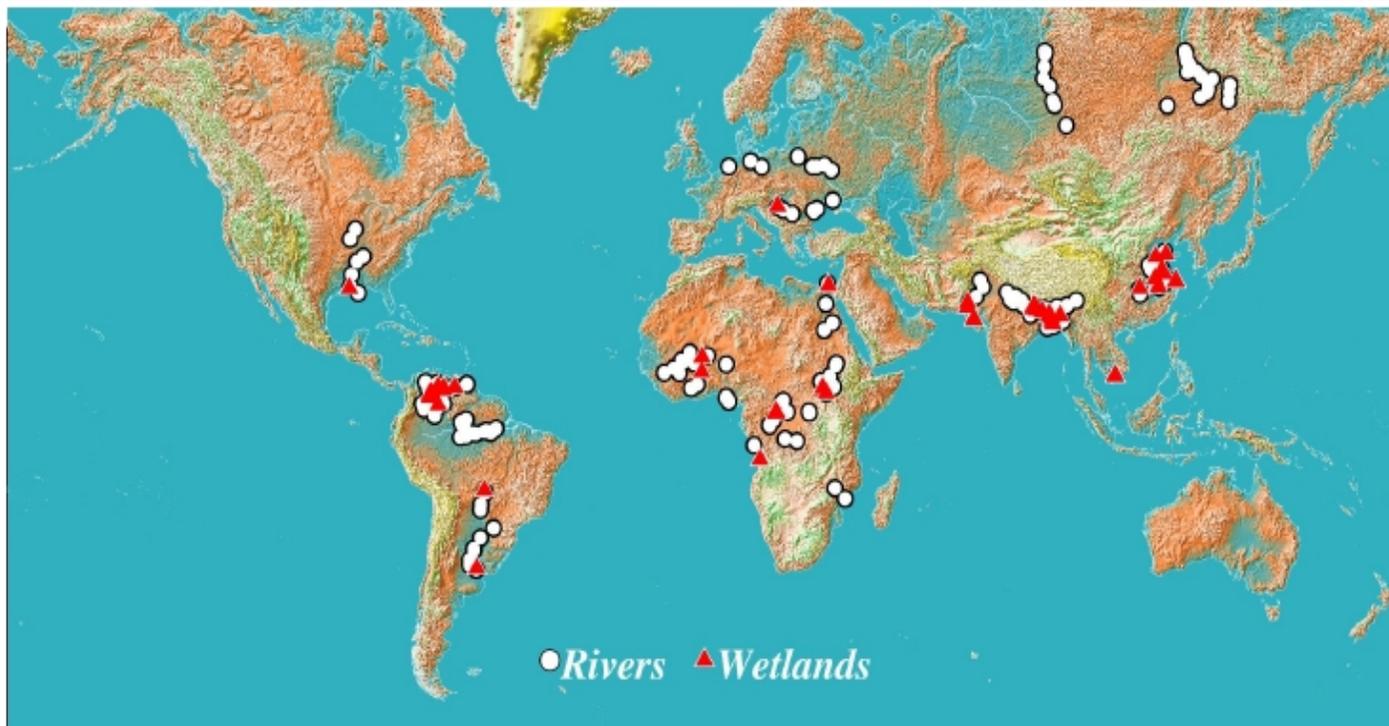
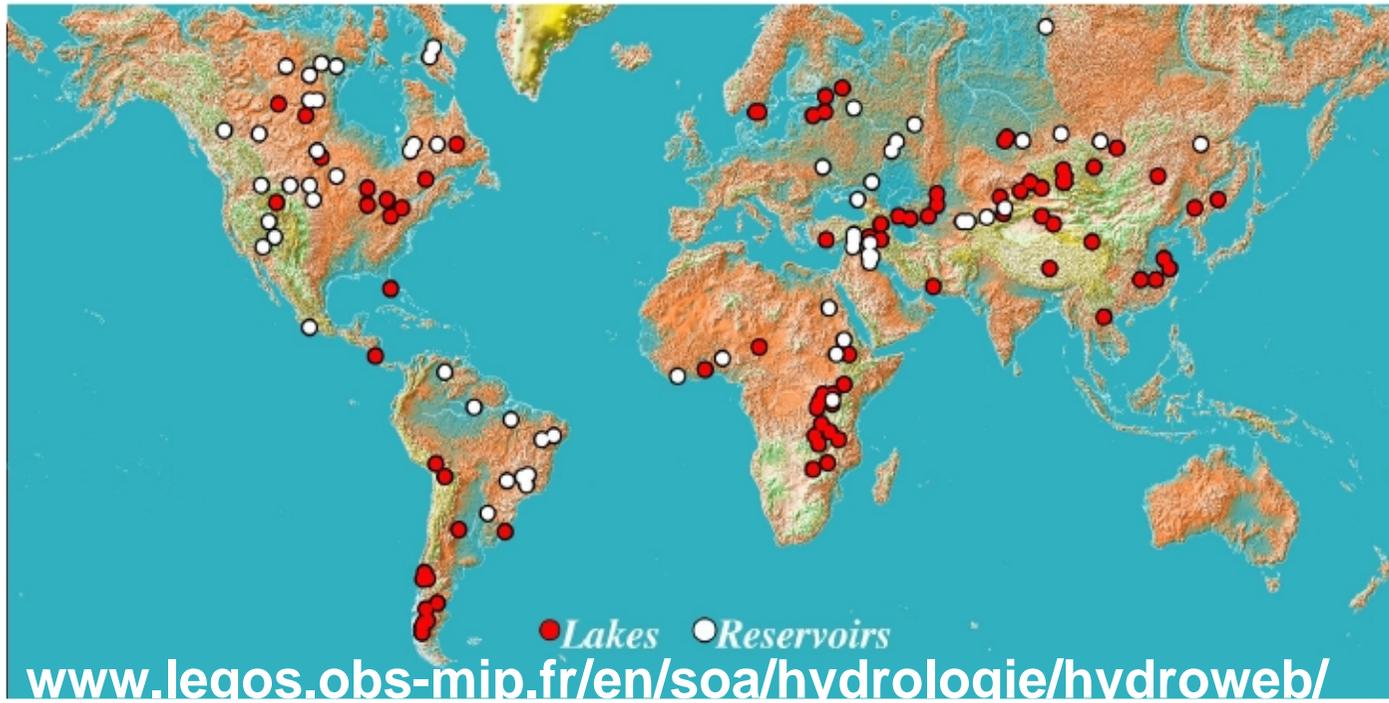


Water mass trends over 2002-2006 from GRACE (largest river basin contributions)



*On average, land water mass decrease (over 2002-2006):
..... Corresponds to + 0.2 mm/yr sea level rise*

**Contribution of surface
waters based on satellite
altimetry**



HYDROWEB
data base:

Altimetry-based
water levels

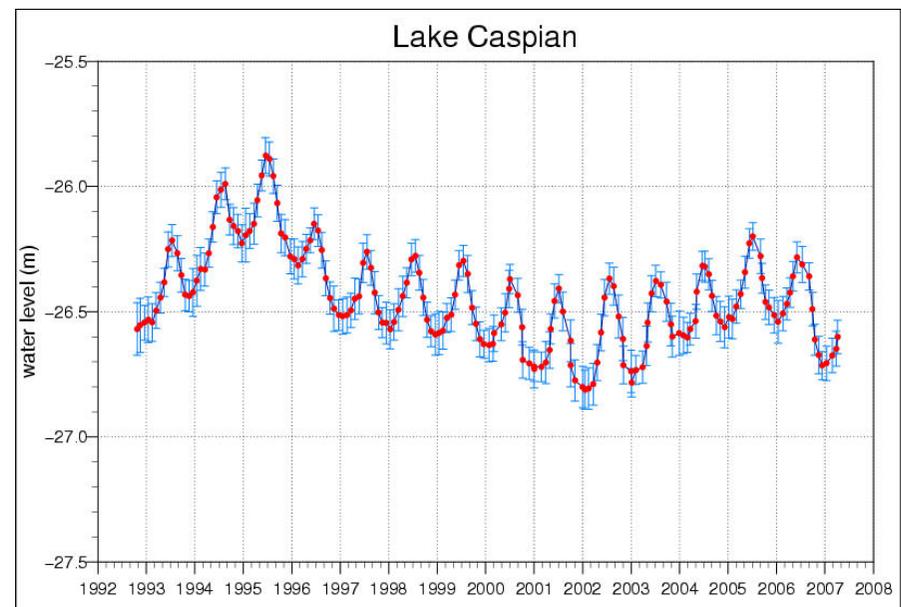
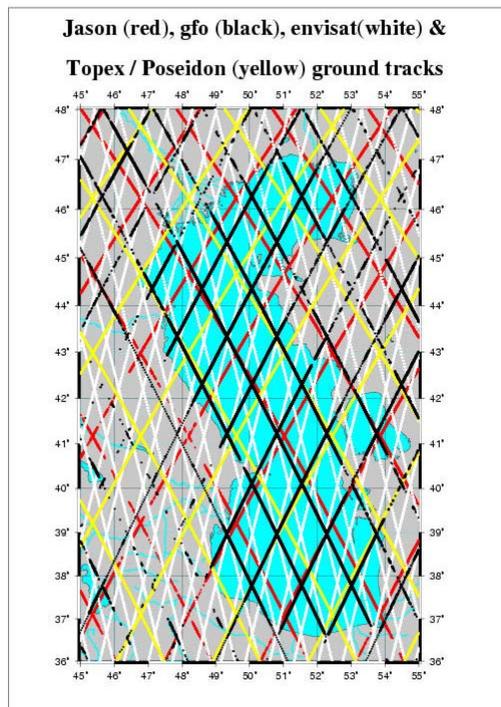
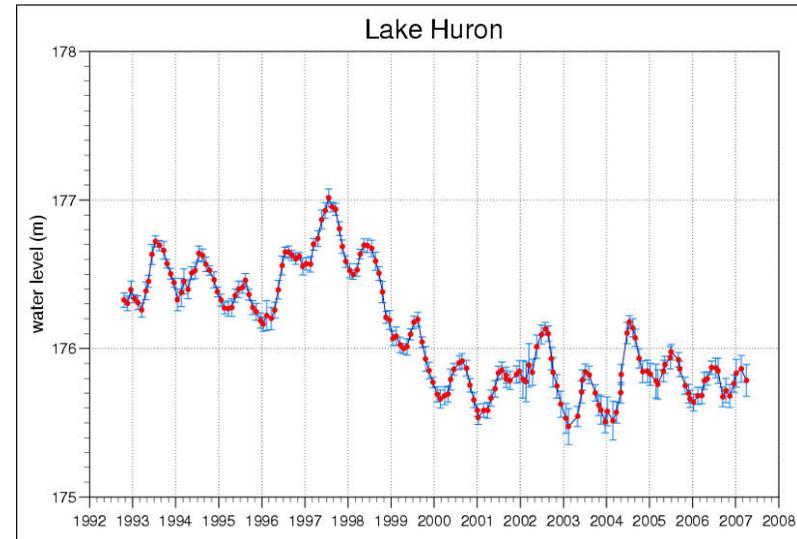
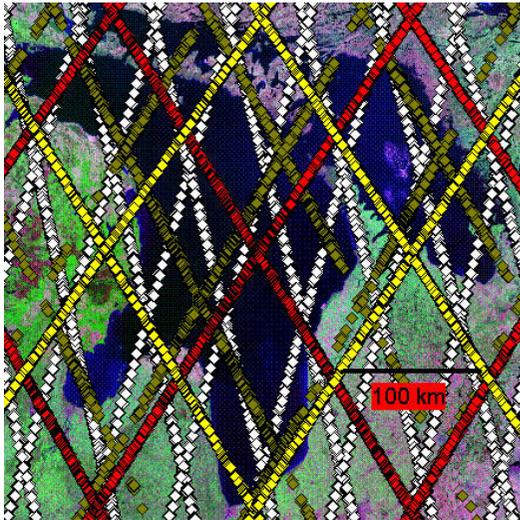


**100 lakes,
50 reservoirs,
250 sites on rivers,
several sites
on wetlands,
30 largest river
basins**

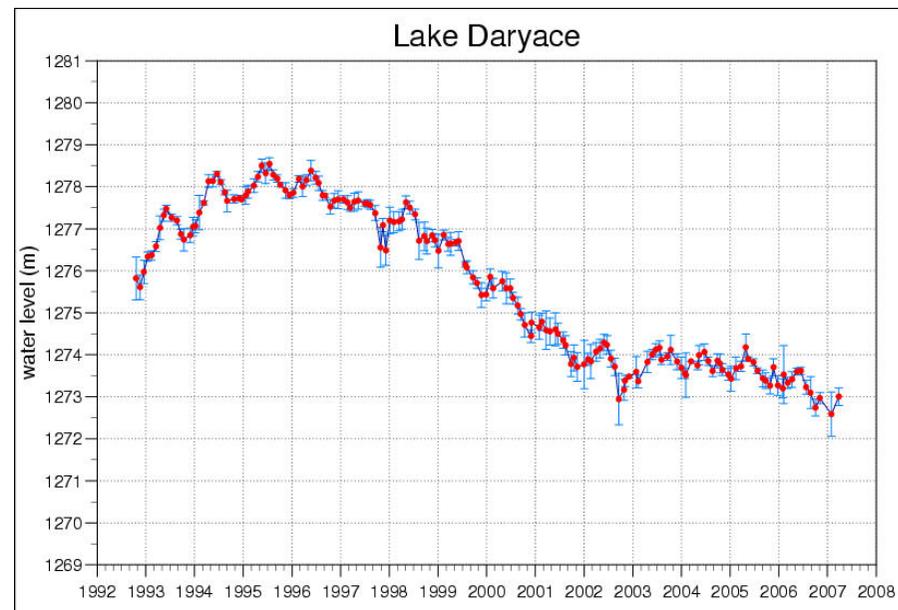
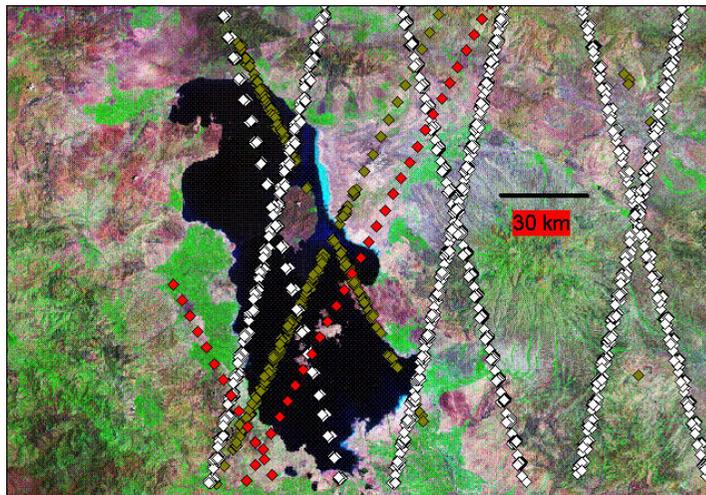
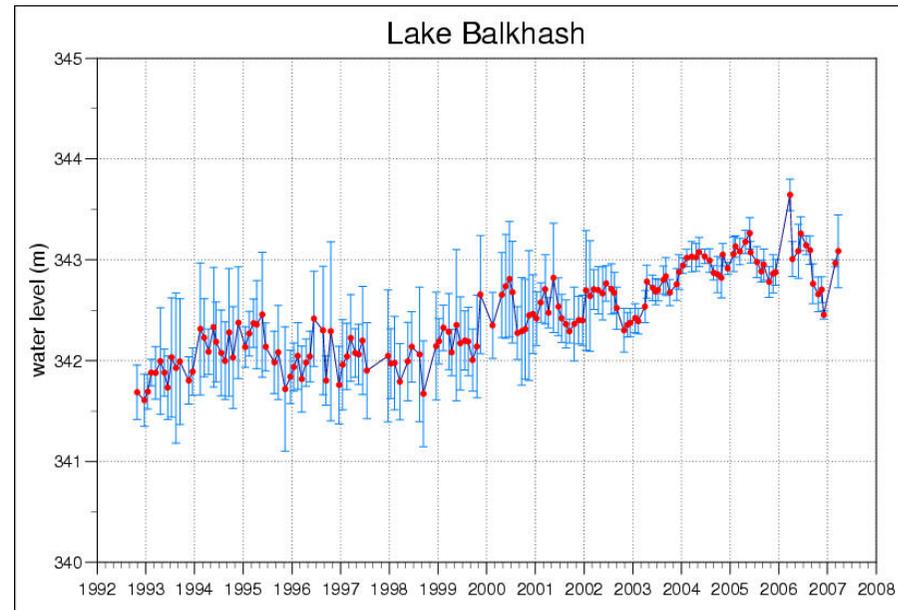
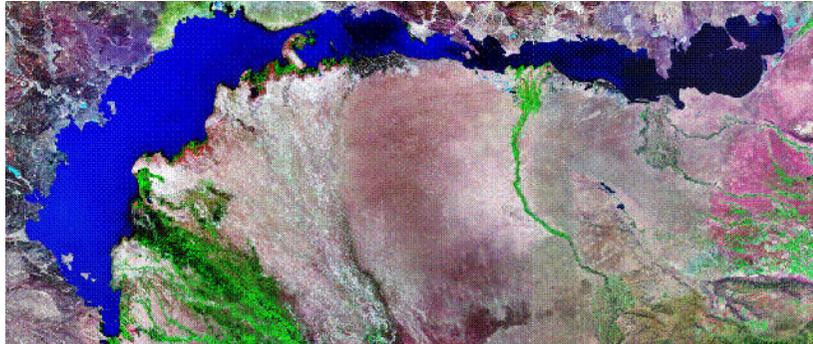
LEGOS
JF Cretaux/MC Gennero

- **82 largest lakes/reservoirs**
- **Lake level variations over 1993-2006**
- **Multi satellite altimetry (Topex/Poseidon, Jason-1, Envisat, GFO)**

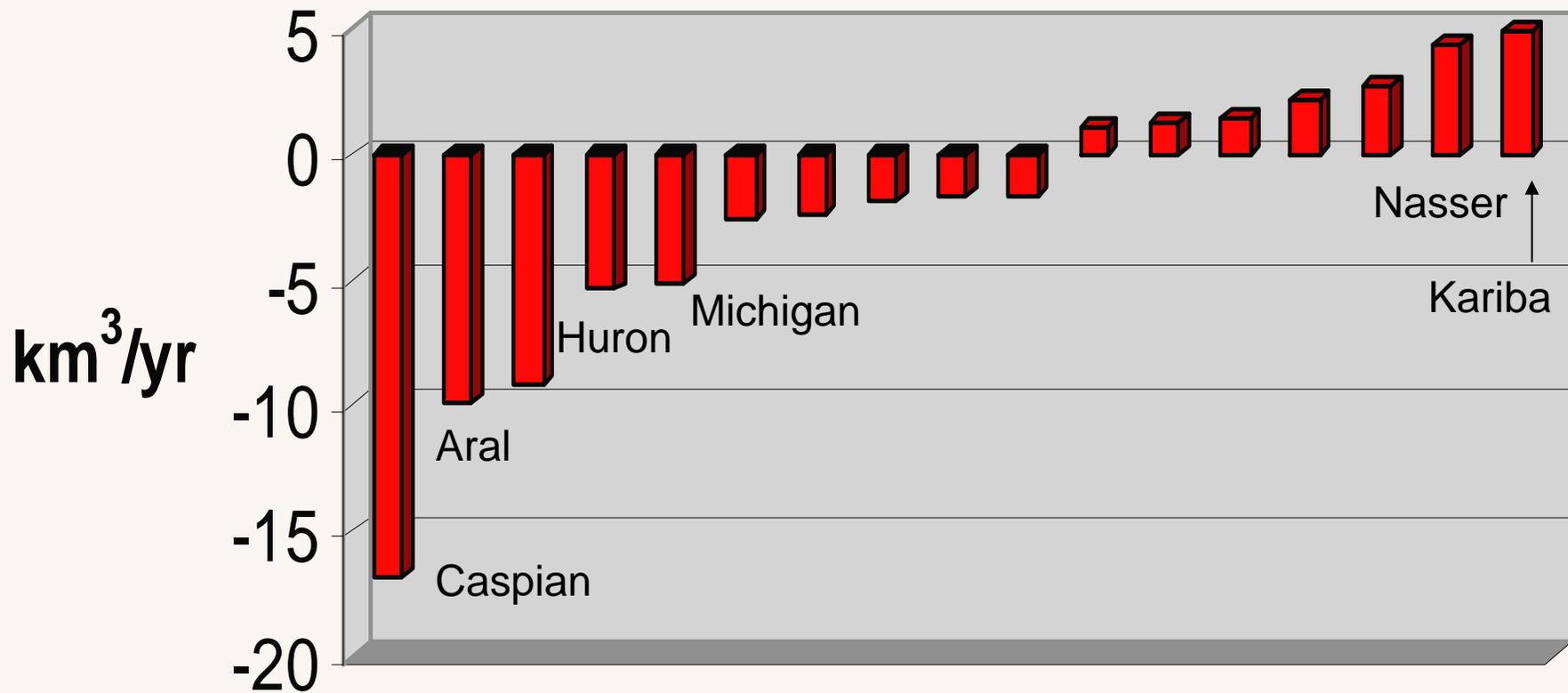
Examples of lake level time series (1993-2006)



Examples of lake level time series (1993-2006)



Lake volume trends (1993-2006)



16 largest contributions

**Total contribution of lakes
to sea level rise
(1993-2006):**

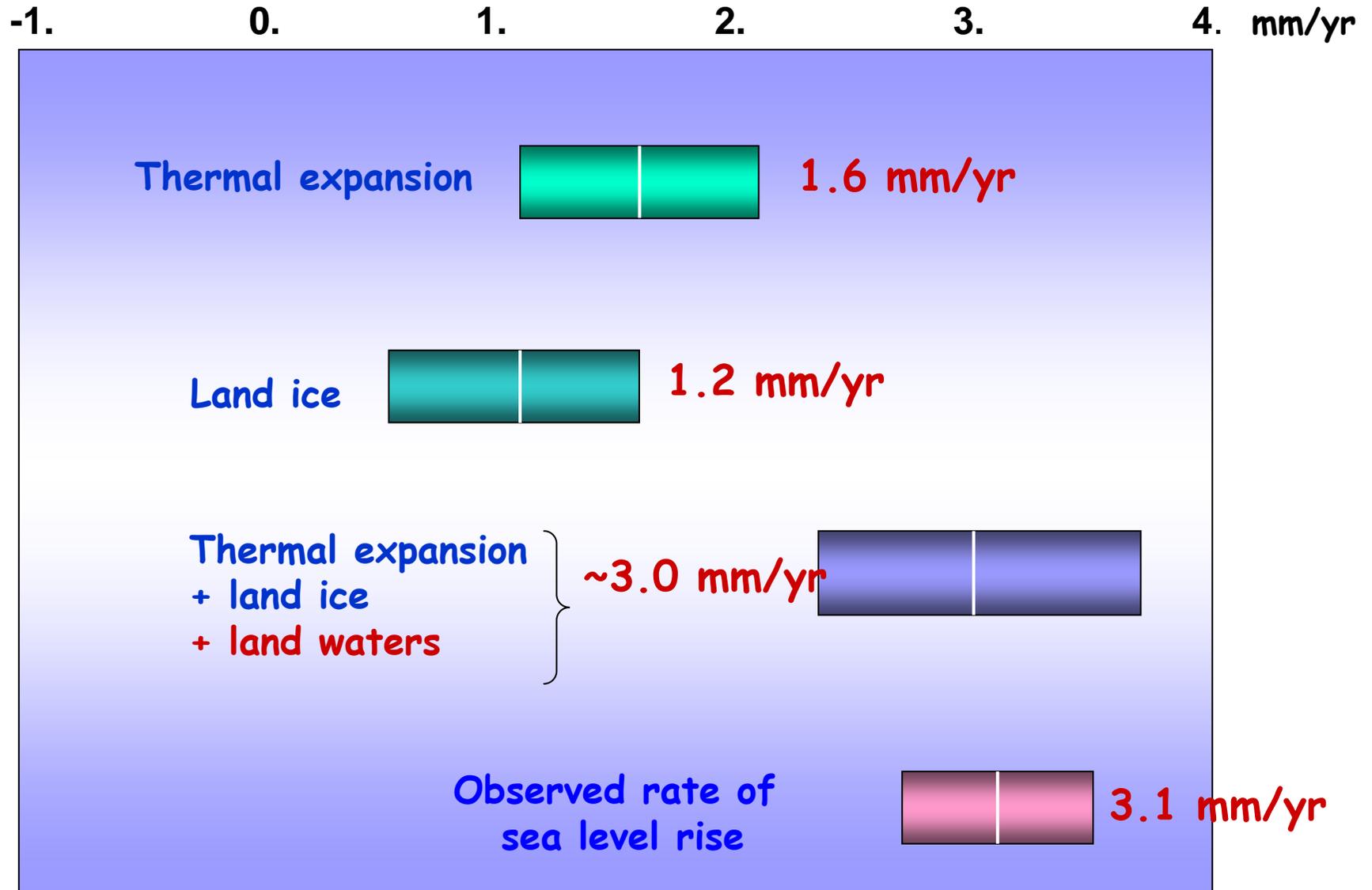
+0.11 +/- 0.04 mm/yr

**Over 2002-2006
lakes contribution**

~ 0.1 mm/yr ?

**i.e., about 50% of total land water
storage trend estimated from GRACE
over the same time span (Ramillien et al.,
2007, GPC, in press)**

SEA LEVEL BUDGET (recent years)



End