Global lake storage change

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• **Purpose:**
  – Estimate a global relationship between lake area and lake storage change
  – Roughly estimate the % of storage change SWOT could see

• **Methodology (1/2):**
  1. Global relationship between lake area (A) and the number of lake with this area (N) from a power law: \( N = \alpha A^\beta \) (Downing et al., 2006).

Biancamaria et al., JSTARS, 2010
Methodology (2/2):

2. Estimate the yearly lake water height variation \( (dH) \) from 3 datasets: USGS gauges, World Lake Database and T/P measurements (~200 lakes)

- Lake water height variation follows a log-normal distribution

3. Compute the total storage change \( (dS_i) \) for all lakes with an area \( A_i \):

\[
dS_i = A_i \cdot \sum_{j=1}^{N_i} dH_i(j)
\]

where \( N_i \) is the number of lakes with an area \( A_i \) (from 1.) and \( dH_i \) follows the log-normal distribution (from 2.)
• Results:

- Nadir altimeters miss more than 60% of lakes and can see area > 100 km² -> see only 15% of the global lake storage change
- SWOT = global coverage and see area > 250m x 250m -> see 65% of the global lake storage change