

# Ice speed variation driven by tidal currents near the terminus of Jakobshavn Isbræ, Greenland, observed with terrestrial radar interferometry

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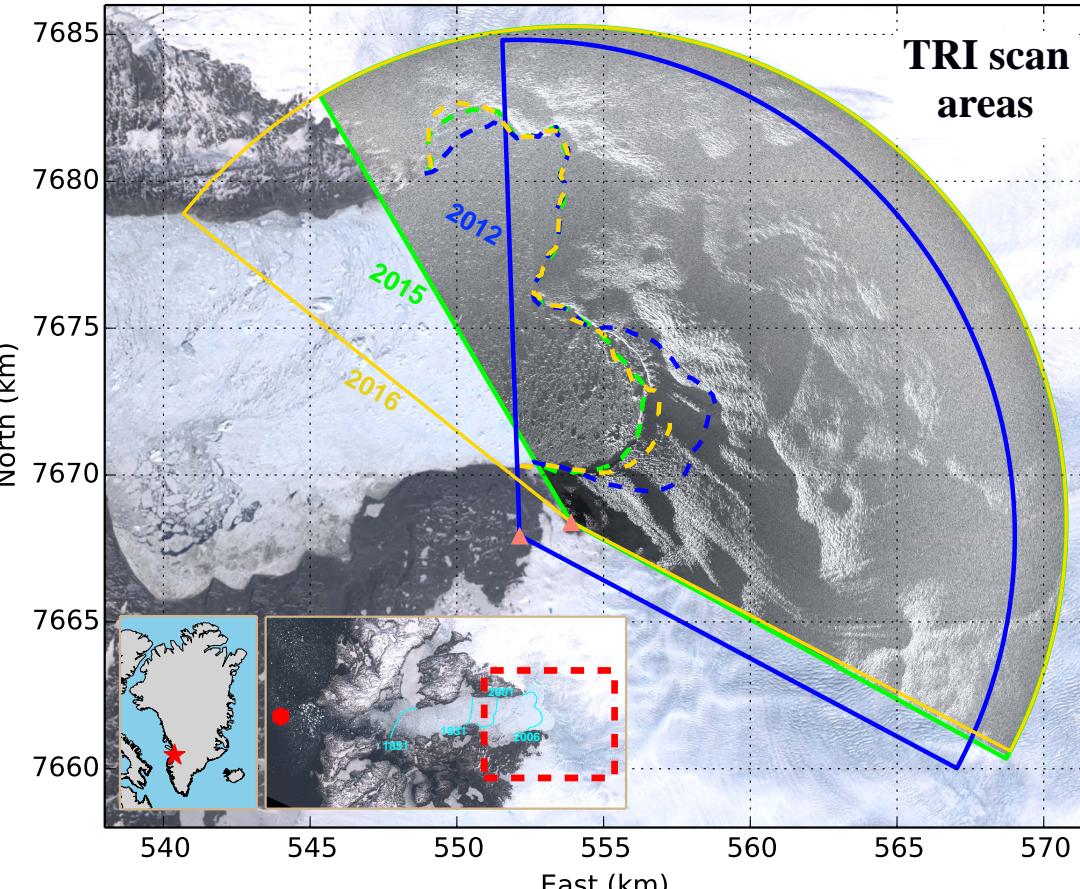
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## Abstract:

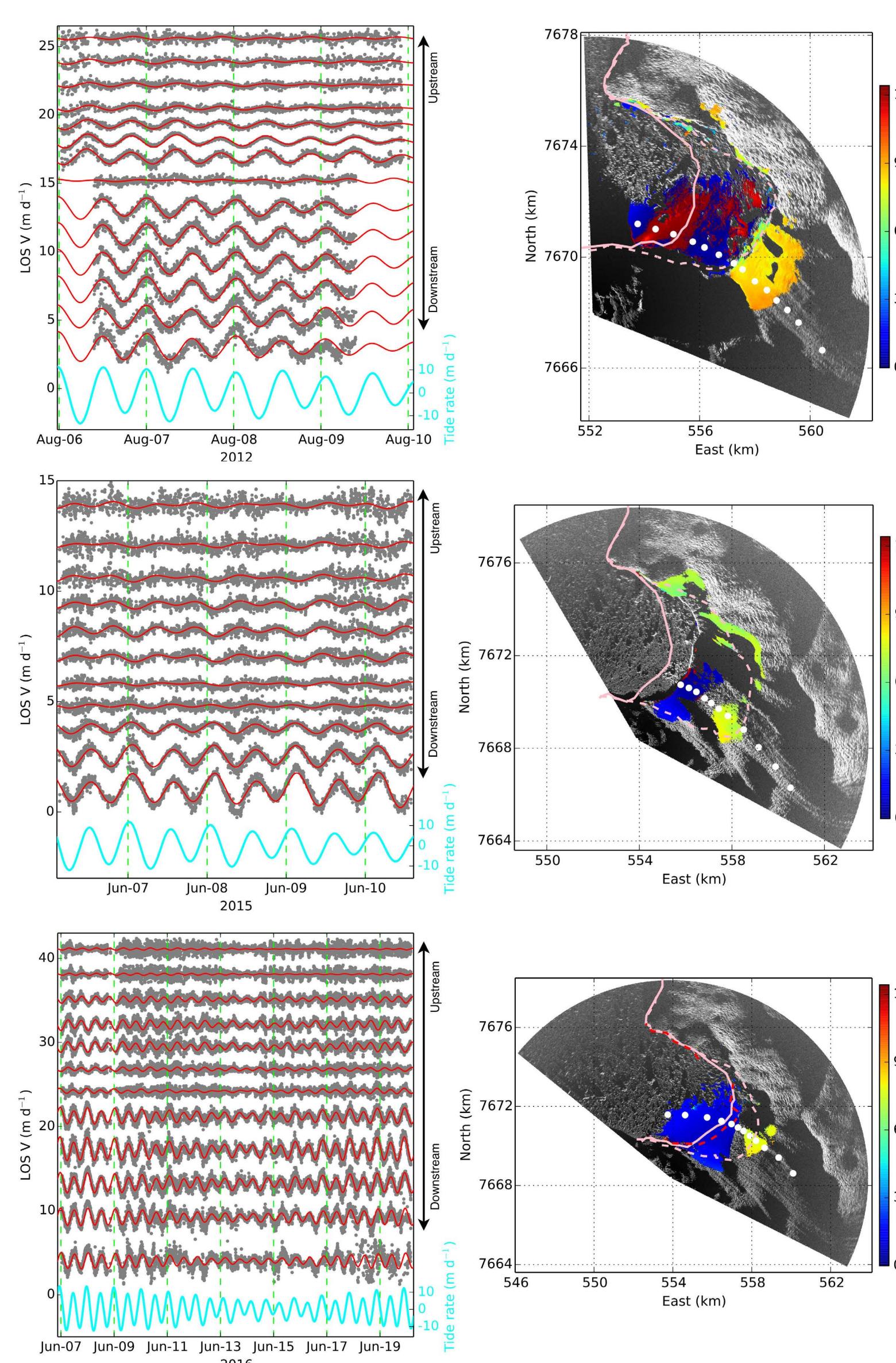
1. The terminus of Jakobshavn Isbræ was observed with TRI in three summer campaigns in 2012, 2015, and 2016.
2. Ice velocity variations appear to be largely modulated by ocean tides.
3. We estimate a ~1 km wide floating zone in early summer of 2015 and 2016, and no evidence of a floating tongue in later summer 2012.



Radar in a radome  
(2015, 2016)



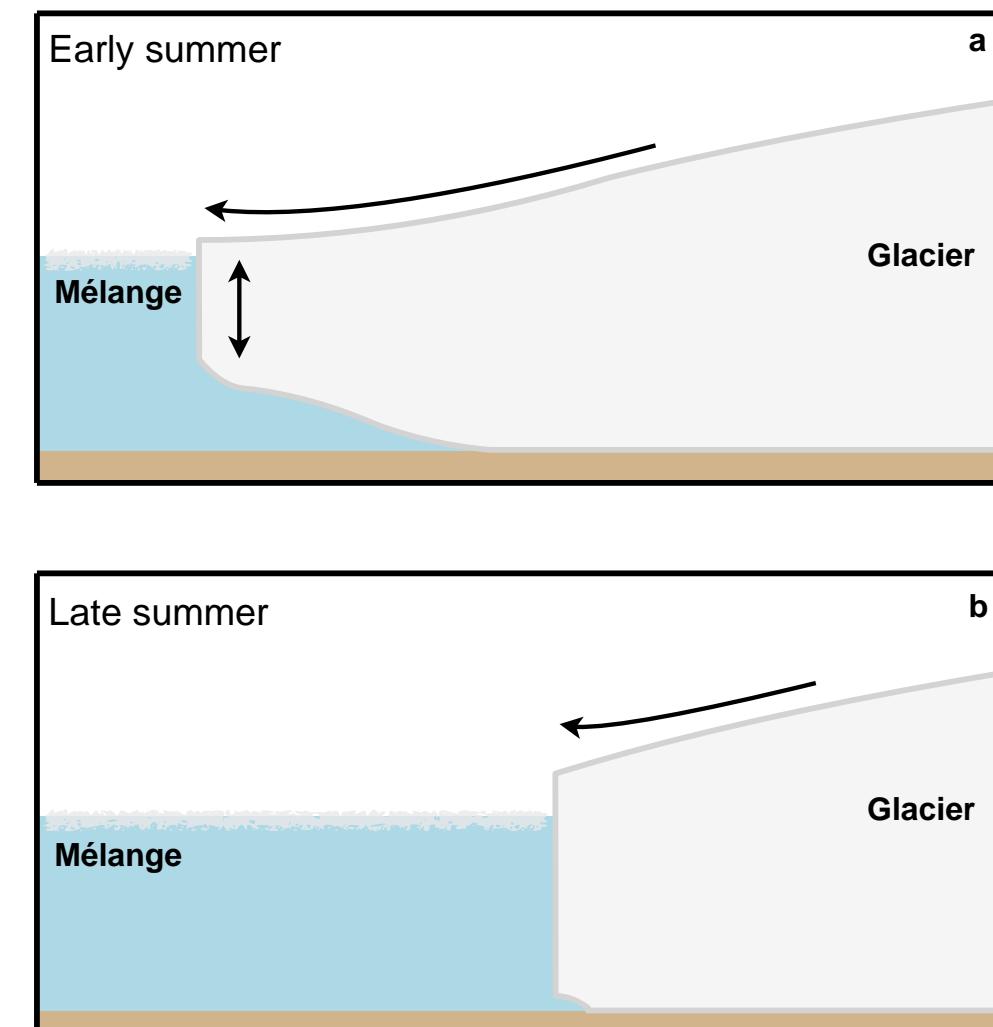
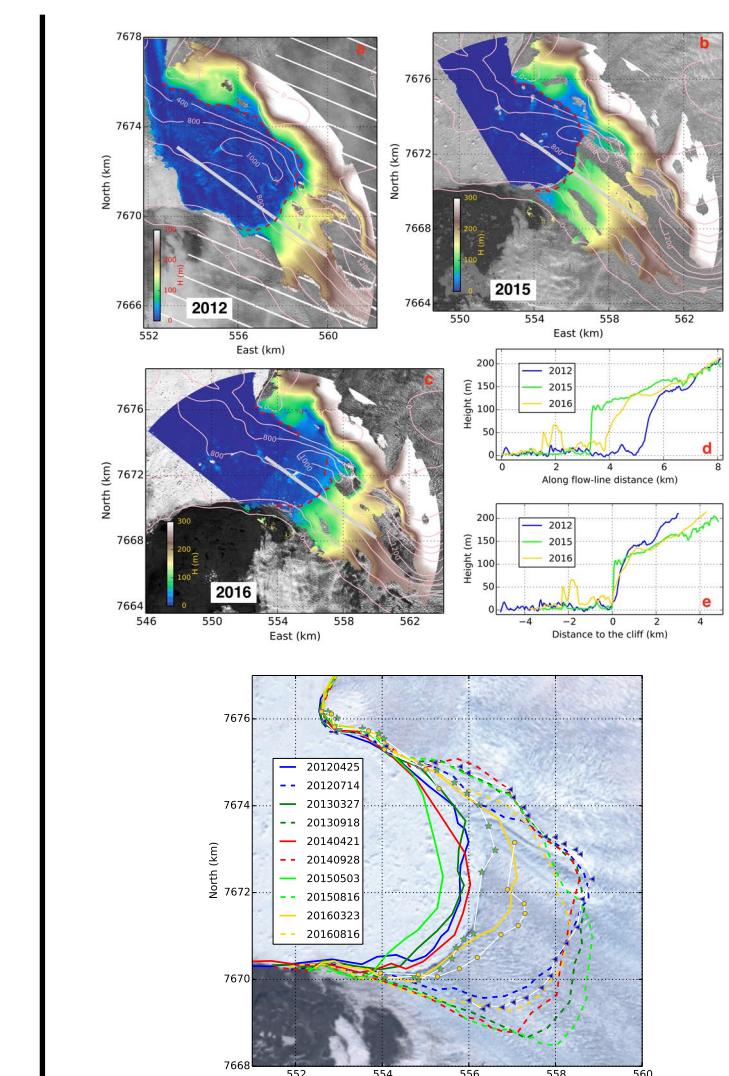
Radar on a tripod  
(2012)



## Tidal response analysis

**Left:** Line-of-sight (LOS) velocity time series for the profile marked by white dots on the right map. Grey dots are TRI measured, red curve shows best fit.

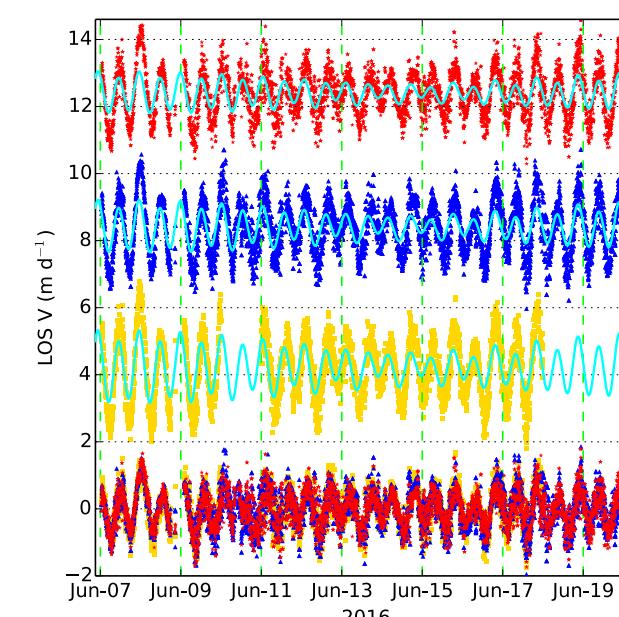
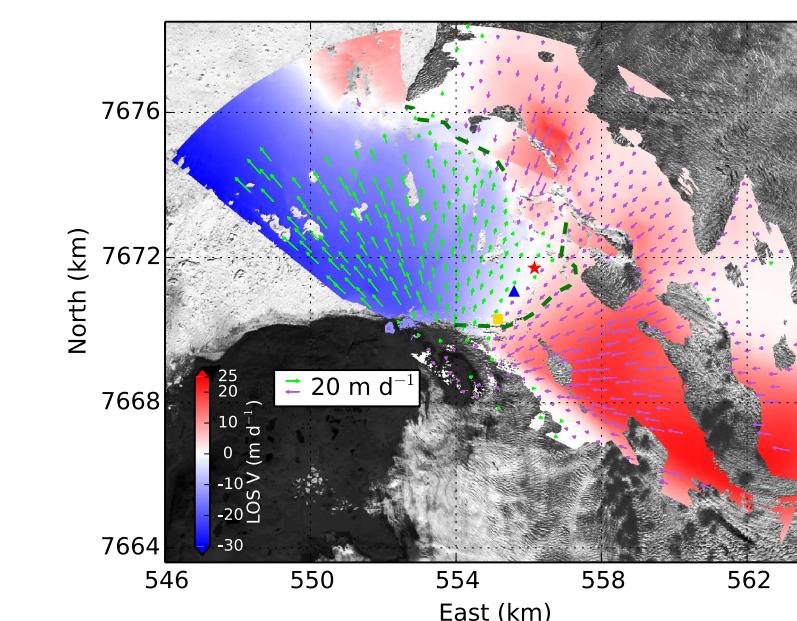
**Right:** Phase lag map for M2 tidal frequency signal. Areas where SNR<1.5 are omitted. Solid and dashed pink lines show maximum and minimum extents of glacier front for the corresponding year (estimated from Landsat images).



## Conclusions:

- 1) Early June 2015/2016, ice front moves in phase with ocean tides, and glacier front is thin.
  - **A floating ice tongue forms in winter and is >1 km wide in early summer.**
- 2) Early August 2012, ice front moves out of phase with ocean tides, and glacier front is thick.
  - **In late summer, the entire Jakobshavn Isbræ is likely grounded.**

**Further work:** Across flow-line variation? Due to currents/bed?



## References

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