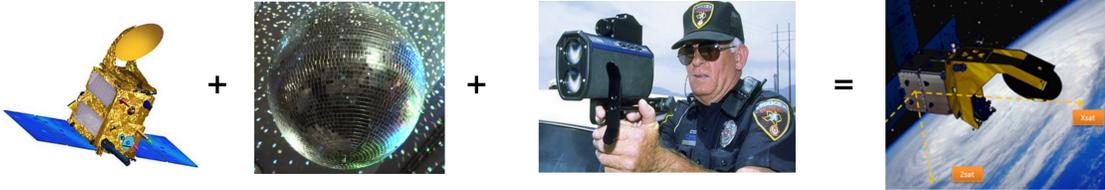


measuring **currents** and **waves** from space: The Sea surface Kinematics Multiscale monitoring (**SKIM**) concept

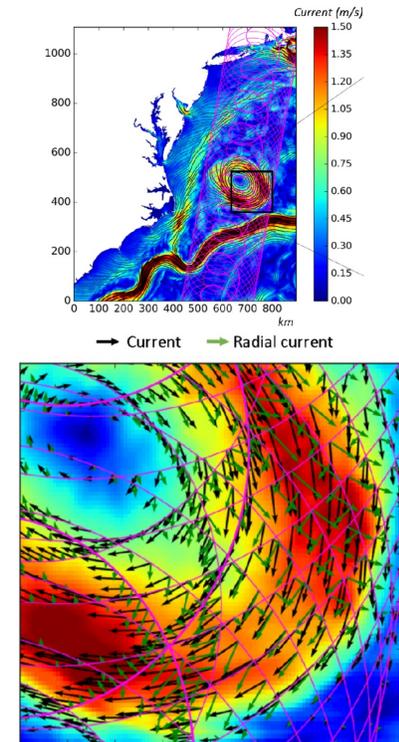
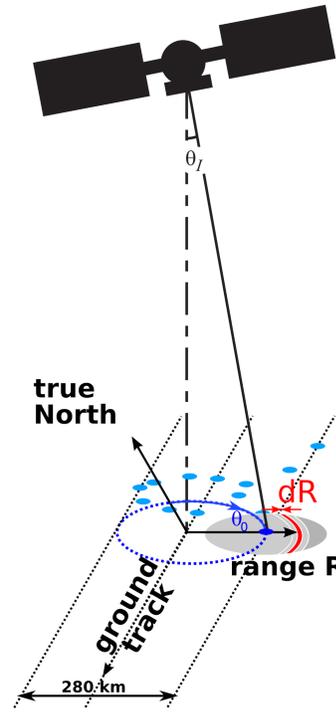
Fabrice Ardhuin, Eric Caubet, Clement Ubelmann, Justin Stopa, Bertrand Chapron, Frederic Nouguier and the SKIM Team
www.umr-lops.fr

WHAT? An altimeter on steroids ... a HF radar in space ...

A combo of **radar altimeter**, **disco ball**, and **speed gun** ...

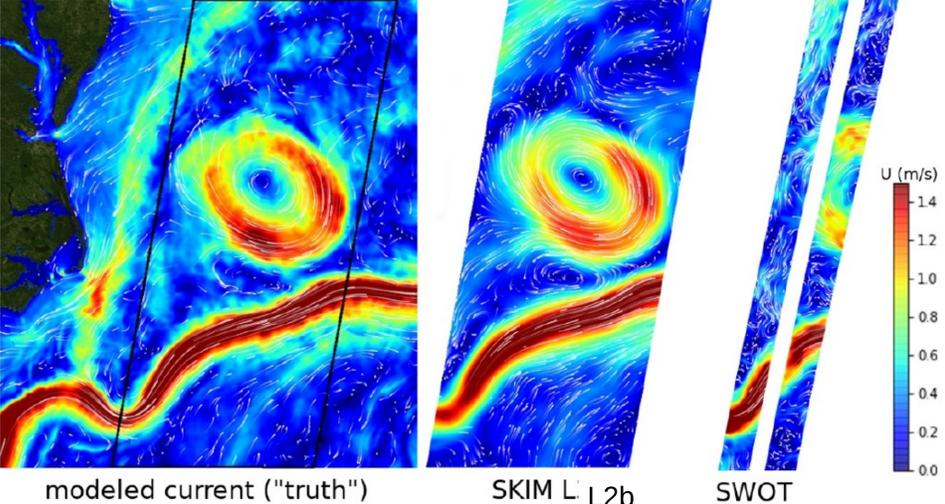


- **altimeter** : the best nadir altimeter ever flown (high PRF at Ka-band)
- « **disco ball** » : rotating plate with horn feeds: 8 beams, nadir to 12° incidence
- « **speed gun** » : Doppler (pulse pair + delta-K) processing: currents and waves



A PATHFINDER MISSION FOR DOPPLER OCEANOGRAPHY

SKIM will measure the **total surface current** (not just the geostrophic part)... just like a coastal HF-radar.
With a 98° inclination orbit (sun synchronous) and a 270 km wide swat:
revisit time < 1 day for latitudes 75 to 82°, 3 days at mid latitudes and < 6 days at equator...

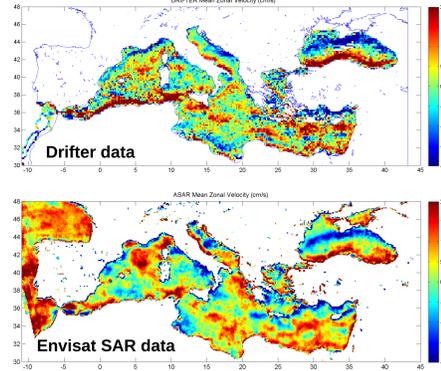


... so that SKIM resolves smaller structure than SWOT, and monitors all currents from equatorial currents, to marginal ice zones (Doppler on ice → ice drift).

Measurement of wave spectra ($L > 20$ m), extending CFOSAT capabilities, allows a correction of wave-induced Doppler bias, but also investigation of wave-current interactions, sea state bias...

Proof of concept done with Envisat (Chapron et al. 2005, Rouault et al. 2010)

Right: climatology of currents in the Med. courtesy of A. Mouche, N. Reul & F. Collard.

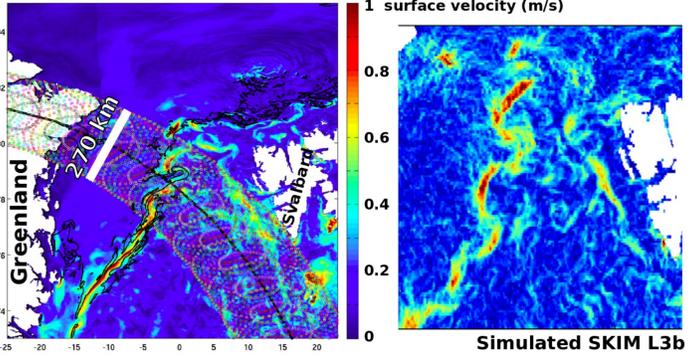


WHEN? 2025!

The **Surface Kinematics Multiscale** is now under evaluation by ESA as part of the ESA EE9 competition. Decision to go into "phase A" should be announced with a week or so.

If selected next year, SKIM can be launched in 2025 and may fly at the end of SWOT lifetime, allowing great synergy with SSH + roughness + current measurements.

Interested? Join the SKIM TEAM!



With a revisit time under 1 day at 75° N: great coverage & high effective resolution over the Arctic Marginal Ice Zone

<https://www.facebook.com/SKIM4EE9>
<http://tinyurl.com/SKIMonRG>

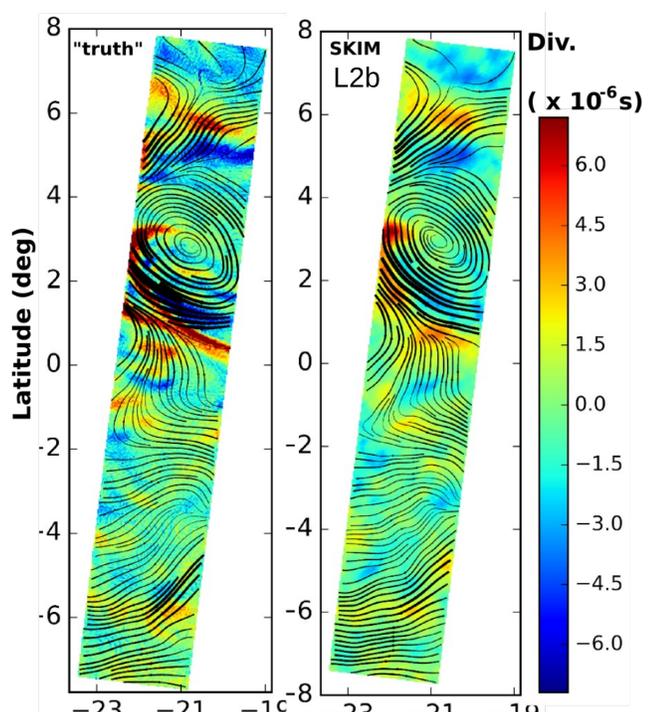


Illustration of SKIM capability to recover snapshot of current divergence in the equatorial upwelling.

COOL PAPERS

Ardhuin et al. (2017) : Measuring currents, ice drift, and waves from space: the Sea Surface Kinematics Multiscale monitoring (SKIM) concept. doi : 10.5194/os-2017-65
Nouguier et al. (in review) : Sea surface kinematics from near-nadir radar measurements
Ubelmann et al. (in review) : Mapping surface currents from Doppler measurements...
Chapron, B., Collard, F., and Ardhuin, F., "Direct measurements of ocean surface velocity from space: interpretation and validation," J. Geophys. Res., 110, C07008, 2005.
Yurovsky, Y. Y., Kudryavtsev, V. N., Grodsky, S. A., and Chapron, B., "Normalized radar backscattering cross-section and doppler shifts of the sea surface in Ka-band," in Proceedings of the Progress In Electromagnetics Research Symposium (PIERS), May 2017, St Petersburg, Russia, IEEE, 2017.