

The detection of Rossby-like waves on the Sun

Leamon, R.J. (672), et al.

What is the science question?

What drives the solar dynamo and the attendant activity cycle that affects our technological society? Given the unique orientation of SDO and the twin STEREO spacecraft from 2011-2013, we sought to trace the evolution of coronal brightpoints (small magnetic elements which are tracers of rotationally driven large-scale convection) seeing “all the sun all the time.”

What were your findings?

We identified, and followed wave-trains of brightpoints propagating westwards (analogous to terrestrial Rossby waves). **Such global-scale waves had long been predicted** simply because the sun is a spinning ball of fluid, but had defied unambiguous detection.

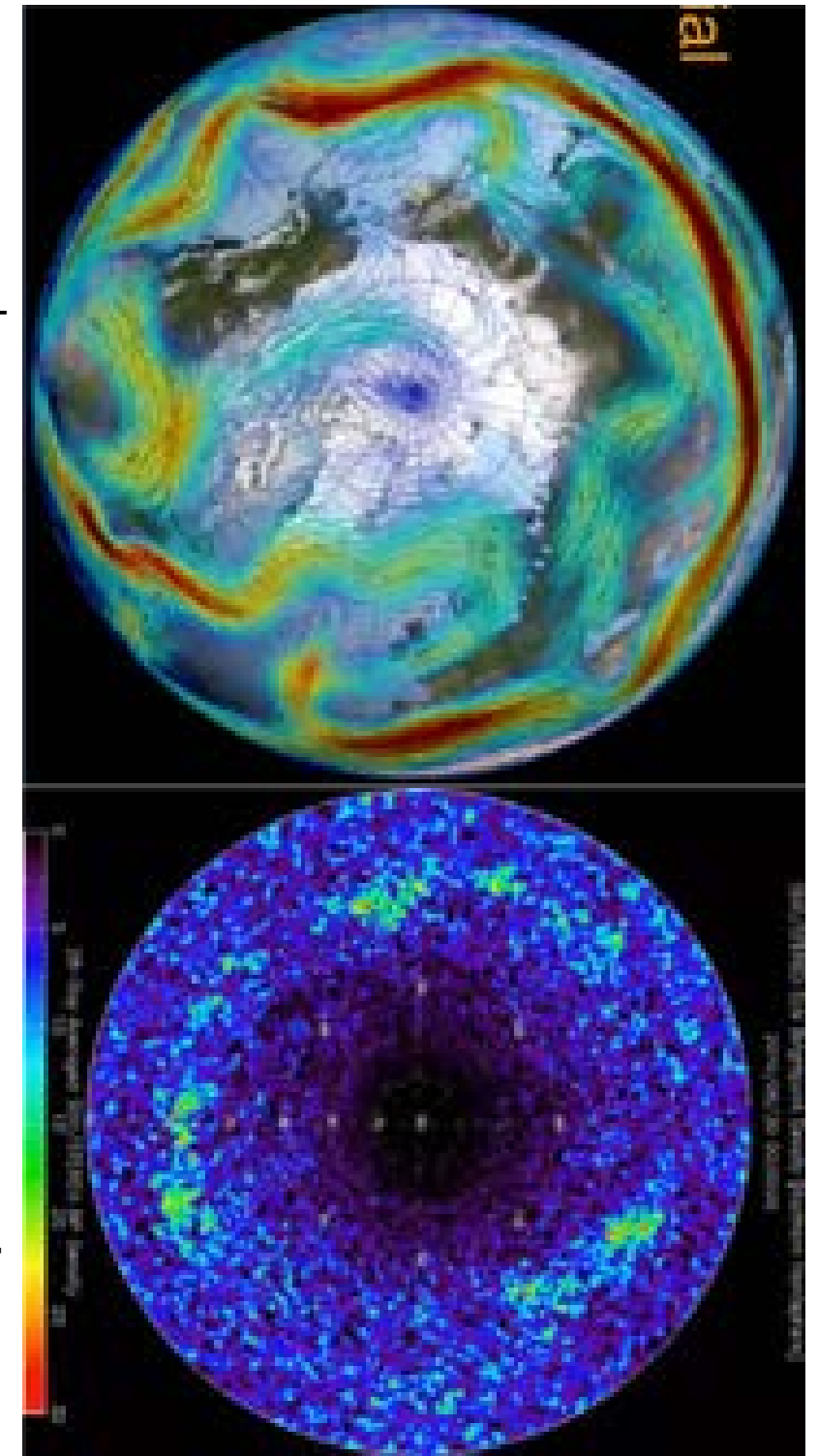
What was the impact?

Proved the existence of the solar analogy of the jet stream and that surges in magnetic activity occur at persistent “hot” (or active) longitudes.

Why does it matter to non-scientists?

When terrestrial satellites were first used half a century ago to observe the jet stream on Earth, it allowed huge advances in predictive weather forecasting. These magnetized Rossby-like waves show such **forecasting advances for solar activity and related space weather phenomena may also be possible** with observations of the entire sun simultaneously, **thus helping better protect satellites and manned missions vulnerable to high-energy particles released from solar activity.**

McInotsh, S.W., Cramer, W.J., Marcano, M.P., and Leamon, R.J. (672), “The detection of Rossby-like waves on the Sun,” *Nature Astronomy*, 10.1038/s41550-017-0086



The top image shows the zig-zag structure of the jet stream in Earth's atmosphere – Rossby waves. The bottom image shows a jet stream of bright points on the sun providing a solar analog to terrestrial Rossby waves.