July the 4th message to the SPURS list:

Somehow the ocean needs, on an annual basis, to get rid of ~0.226 Sv of freshwater water [just one Amazon] to maintain a 'steady-state, with the biggest challenge in the boreal summer months. SPURS 2 task is to detail the ocean processes that do the job. The water vapor is mainly derived from flux across the southern boundary and across Central America [from the Atlantic], both about equal.

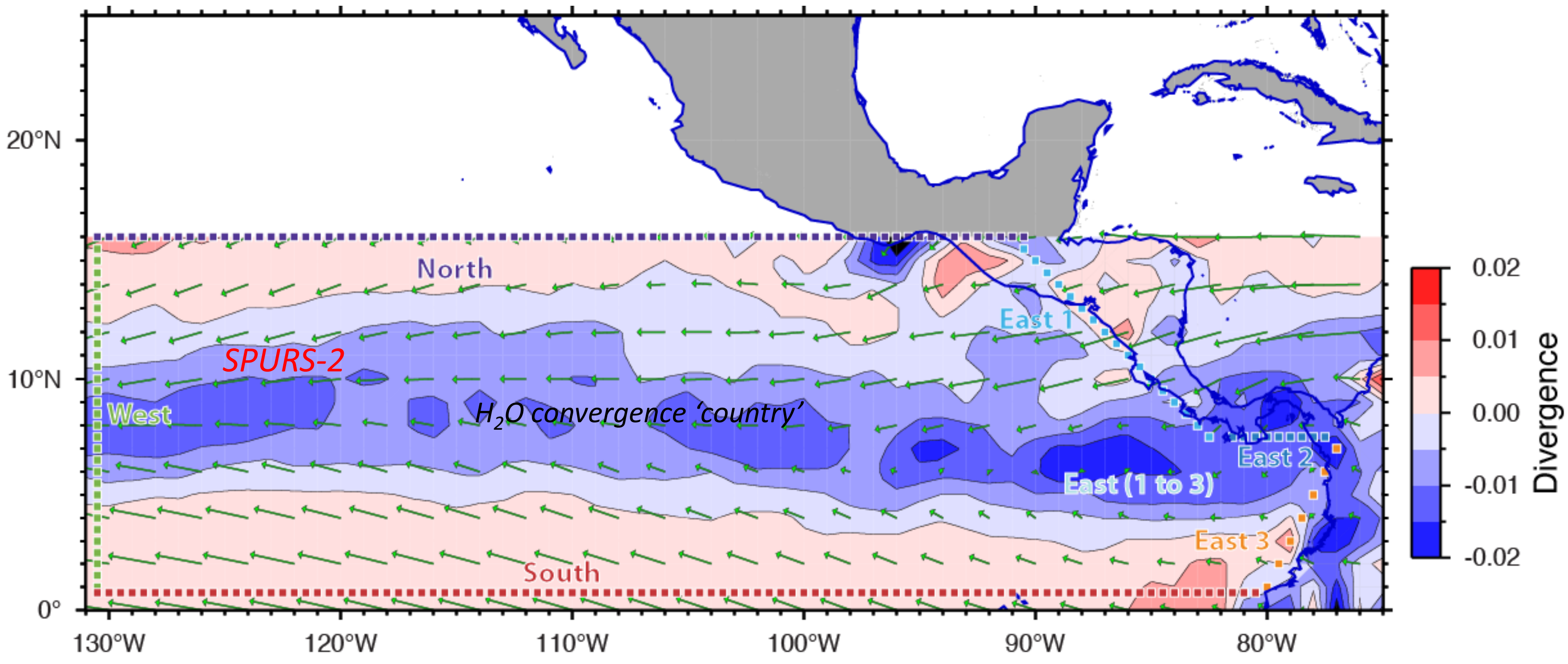
With Claudia Giulivi, I have been looking at the water vapor convergence into the eastern tropical Pacific, the SPURS-2 box. We are using the ERA-Interim monthly means of the vertical integral of the water vapor flux , kg /ms. [Data at http://www.ecmwf.int/. Dee, D. P., et al.. (2011) The ERA-Interim reanalysis: configuration and performance of the data assimilation system. Q.J.R. Meteorol. Soc., 137: 553–597. doi: 10.1002/qj.828.]

Arnold 4 July 2014…

ERA-Interim vertical integral of water vapor flux (vectors) and divergence (color) for 1979-2014. The color squares show the boundaries surrounding the Spurs-2 area used to estimate water vapor transport into the region.

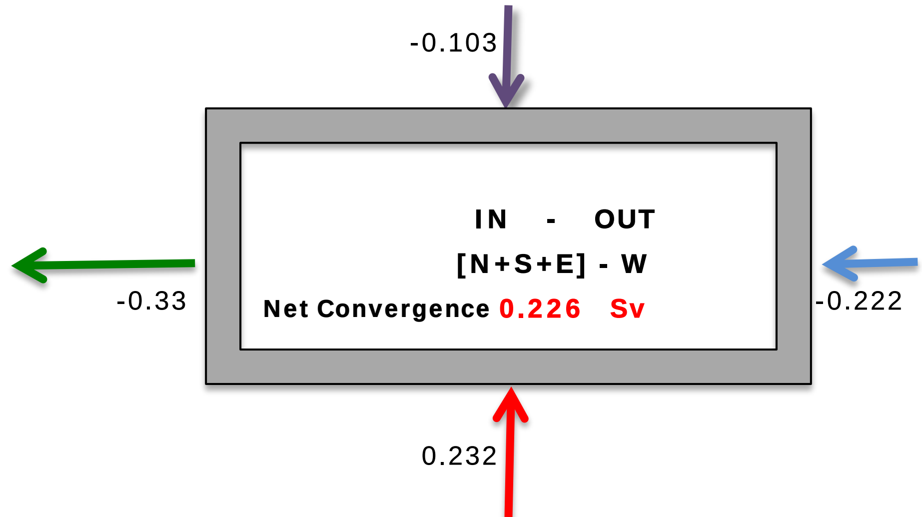
The transport, in Sv, is calculated integrating along each of the sections, the product of the water vapor flux component normal to each individual grid cell times the with of the cell (approx. ~0.5deg) and dividing by density (1000 kg/m3).

For the zonal or meridional sections we use the meridional or zonal component across the section; for the eastern boundary sections (1 and 3) we use a rotated component normal to section.



In the table below, are monthly (and annual) water vapor transports (Sv) across each section, as well as net convergence of H_2O vapor. The East section is composed of 3 parts: 1 Central America, 2 Panama, and 3 South America).

	Water Vapor Transports [Sv]			Central America	Panama	South America		Net Convergence
Month	**North**	**South**	**West**	***East 1***	***East 2***	***East 3***	**East**	**[In-Out]**
1	**-0.082**	**0.131**	**-0.417**	*-0.238*	*-0.073*	*-0.019*	**-0.330**	**0.127**
2	**-0.100**	**0.032**	**-0.408**	*-0.203*	*-0.075*	*-0.040*	**-0.318**	**0.042**
3	**-0.134**	**-0.023**	**-0.401**	*-0.169*	*-0.073*	*-0.046*	**-0.288**	**0.044**
4	**-0.138**	**0.114**	**-0.380**	*-0.158*	*-0.053*	*-0.034*	**-0.245**	**0.118**
5	**-0.151**	**0.317**	**-0.332**	*-0.110*	*-0.008*	*-0.024*	**-0.143**	**0.279**
6	**-0.104**	**0.374**	**-0.281**	*-0.137*	*0.007*	*-0.042*	**-0.171**	**0.367**
7	**-0.026**	**0.369**	**-0.275**	*-0.247*	*0.000*	*-0.050*	**-0.297**	**0.417**
8	**-0.029**	**0.358**	**-0.240**	*-0.195*	*0.007*	*-0.039*	**-0.227**	**0.375**
9	**-0.062**	**0.359**	**-0.167**	*-0.074*	*0.017*	*-0.014*	**-0.071**	**0.326**
10	**-0.146**	**0.317**	**-0.263**	*-0.101*	*0.018*	*0.020*	**-0.063**	**0.264**
11	**-0.156**	**0.252**	**-0.385**	*-0.215*	*-0.015*	*0.029*	**-0.200**	**0.224**
12	**-0.108**	**0.178**	**-0.418**	*-0.262*	*-0.051*	*0.005*	**-0.307**	**0.175**
Annual Avg.	**-0.103**	**0.232**	**-0.330**	*-0.176*	*-0.025*	*-0.021*	**-0.222**	**0.226**



The contribution across the eastern boundaries is perpendicular to each of the three boundary segments.

Left: transports across each section (color coded by section) and net convergence against months; *right*: annual transport values (gray bars) across each section.

From the annual averages there is a net convergence of water vapor into the selected SPURS2] region of **~0.23 Sv,** with two main contributtors from the Central America (East 1) and across the southern boundary. The monthly distribution of the net convergence indicates almost a balance of transports for the first quarter of the year, increasing in boreal summer as the ITCZ shifts northward.