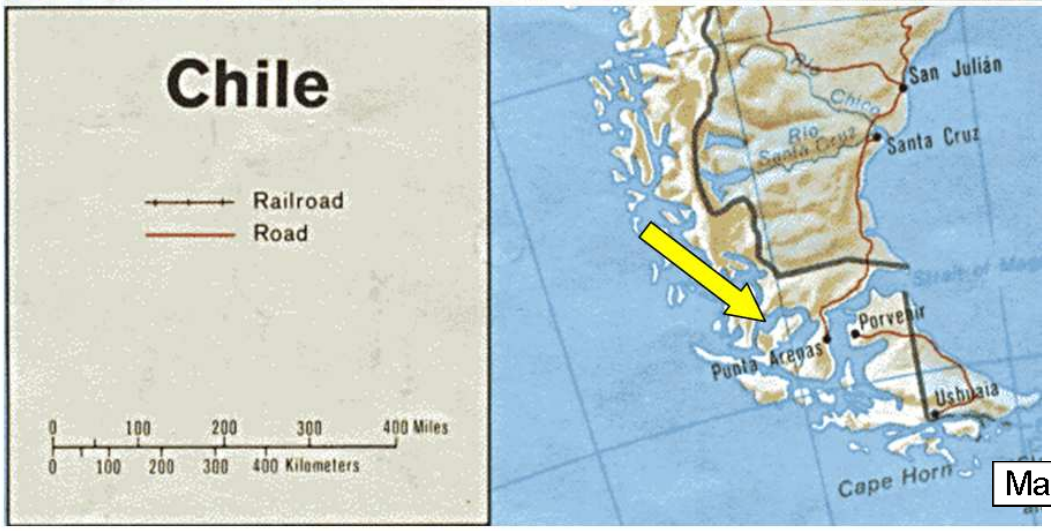
THEOREM OF THE DAY

The Borsuk-Ulam Theorem *Let $f : S^n \to \mathbb{R}^n$ be a continuous map. Then some pair of antipodal points on S^n is mapped by f to the same point in $\mathbb{R}^n$.*

For $n = 2$, this theorem can be interpreted as asserting that some point on the globe has precisely the same weather as its antipodal point. The 'weather' has to mean two variables ($\mathbb{R}^2$) that vary continuously (f) on the surface (S^2) of the earth. Perhaps temperature and humidity will do? The maps (right) show a pair of antipodal points with, far right, the nearby August weather as given by the WMO. As you can see, I have quite failed to match up the weather! Clicking on either map will take you to a nice website where any location is paired with its antipodal point: try if you can do better than me!



Maps from www.lib.utexas.edu/maps

Forecasts from http://worldweather.wmo.int

Ulan Ude

Weather Forecast

Issued at 12:49 (Local time) 28 Aug 2008

Date	Temperature °C		Weather
	Minimum	Maximum	
29 Aug (Fri)	6	19	FINE DRY
30 Aug (Sat)	4	19	FINE DRY
31 Aug (Sun)	6	23	FINE DRY

Punta Arenas

Weather Forecast

Issued at 18:00 (Local time) 27 Aug 2008

Date	Temperature °C		Weather
	Minimum	Maximum	
28 Aug (Thu)	-4	0	SHOWERS
29 Aug (Fri)	-3	1	SHOWERS
30 Aug (Sat)	-2	2	SHOWERS

"While chatting at the Scottish Café with Borsuk, an outstanding Warsaw topologist, he [Ulam] saw in a flash the truth of what is now called the Borsuk-Ulam theorem. Borsuk had to commandeer all his technical resources to prove it."

Web link: math.hmc.edu/su/research-papers-and-preprints/ (paper 2). The Ulam story is from www.emis.de/newsletter/current/current9.pdf.

Further reading: *Basic Topology* by M.A. Armstrong, Springer-Verlag New York Inc, 1997, Chapter 9.