Transient tectonic switch in volcanic arcs: observations from the Southern Andes (33S - 38S).

Matteo Lupi, Daniele Trippanera, Diego Gonzalez-Vidal, Andres Tassara,

Sebastiano D'Amico, Cabello Catalina, and Stef Marc Muelle

*Department of Earth Sciences, University of Geneva, Rue de Maraîchers 13, Geneva, CH

Matteo.Lupi@unige.ch

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Crustal model of the Southern Central Andes derived from ambient seismic noise Rayleigh-wave tomography

Diego González-Vidal[a,*], Anne Obermann[b], Andrés Tassara[a,c], Klaus Bataille[a], Matteo Lupi[d,*]

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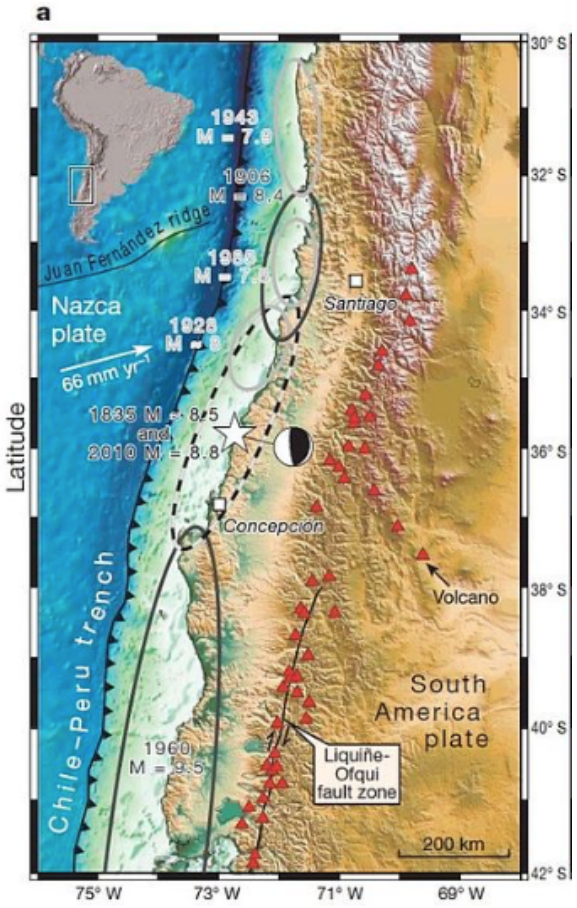
Transient tectonic regimes imposed by megathrust earthquakes and the growth of NW-trending volcanic systems in the Southern Andes

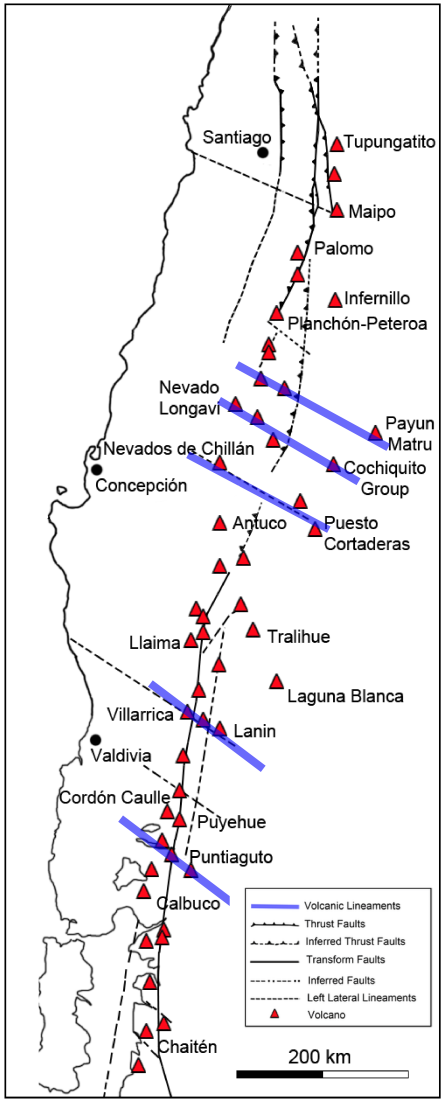
Matteo Lupi[a,*], Daniele Trippanera[b,c], Diego Gonzalez[d], Sebastiano D'amico[e], Valerio Acocella[c], Catalina Cabello[d], Marc Muelle Stef[d], Andres Tassara[d,f]

Few relevant aspects…

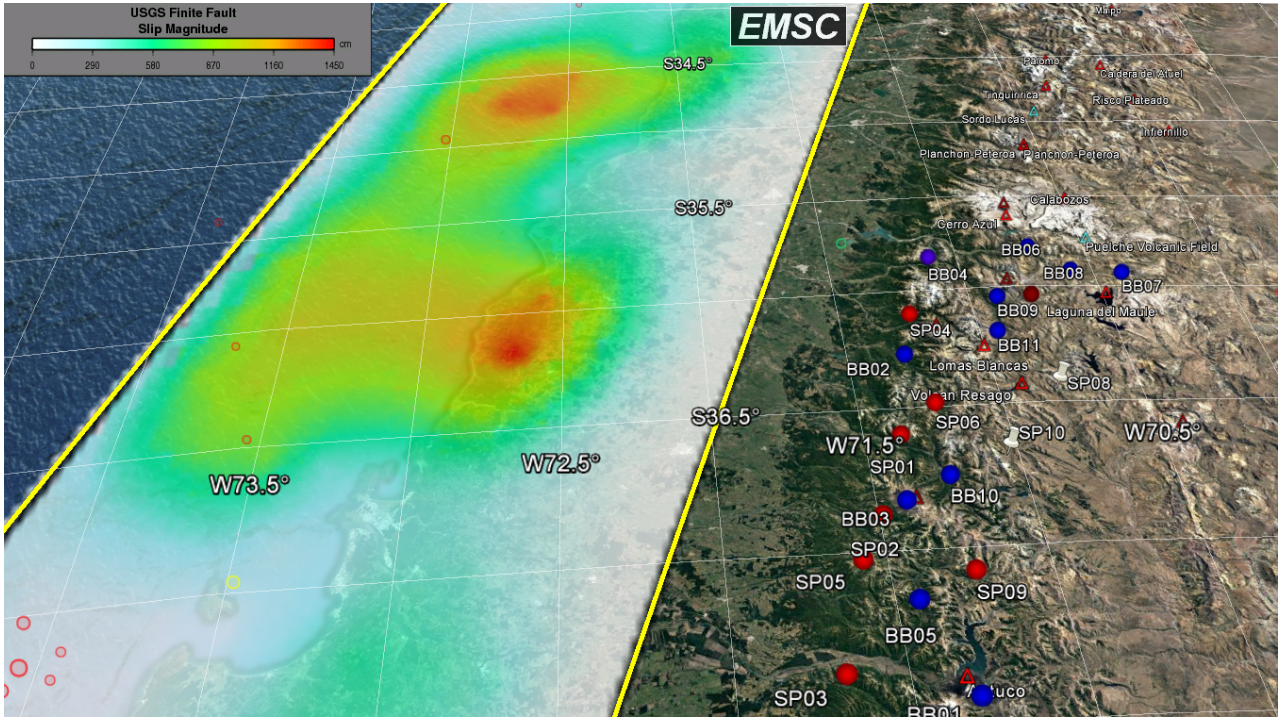
The M8.8 Maule earthquake in 2010



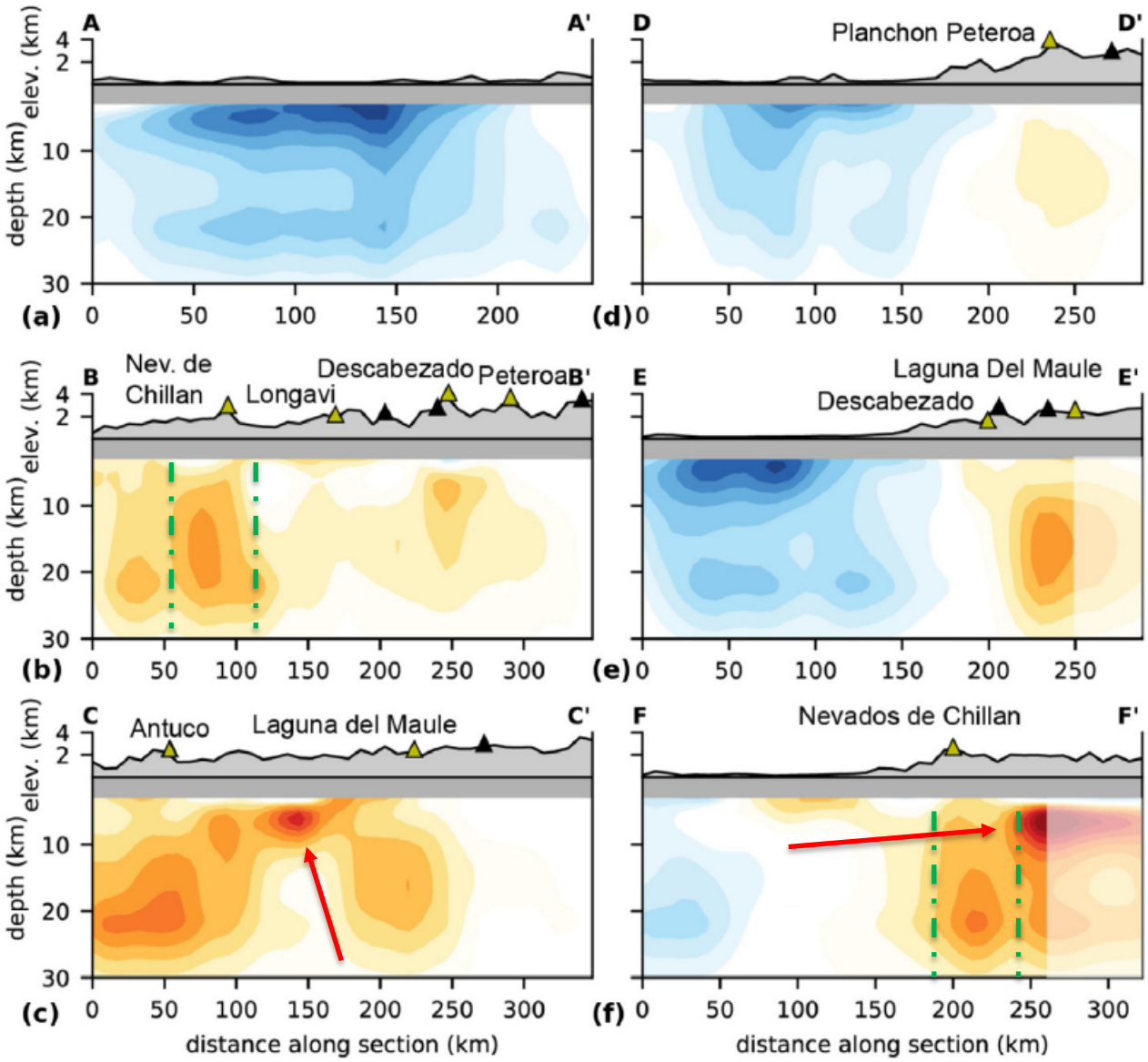
Moreno et al., 2012

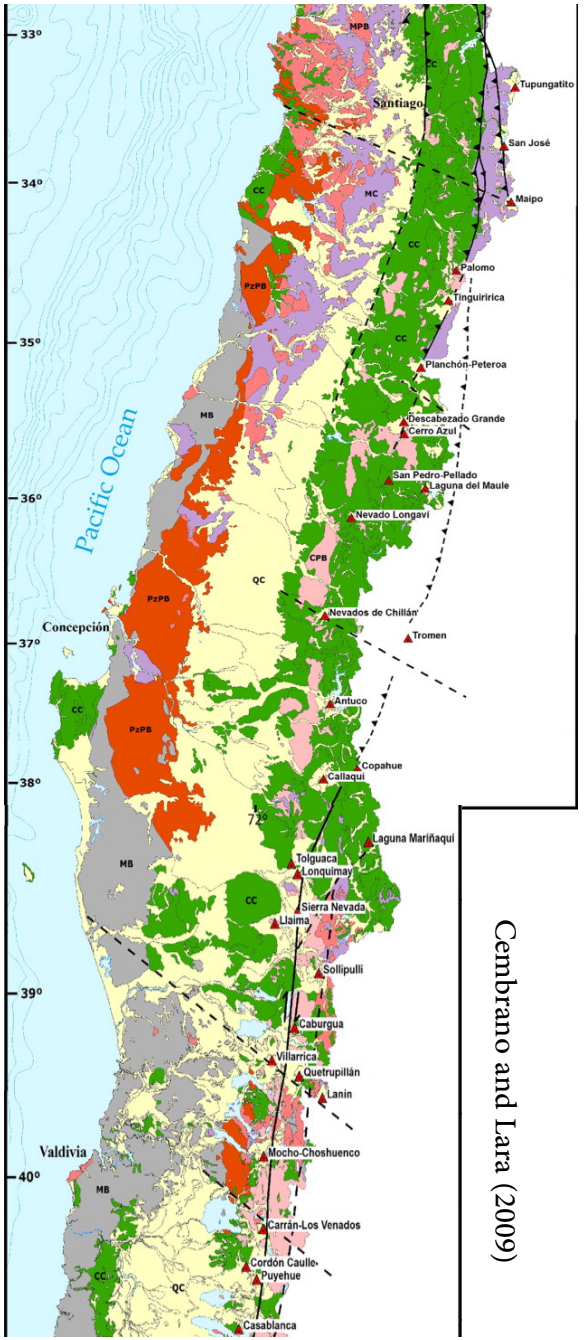


Ambient Noise Tomography



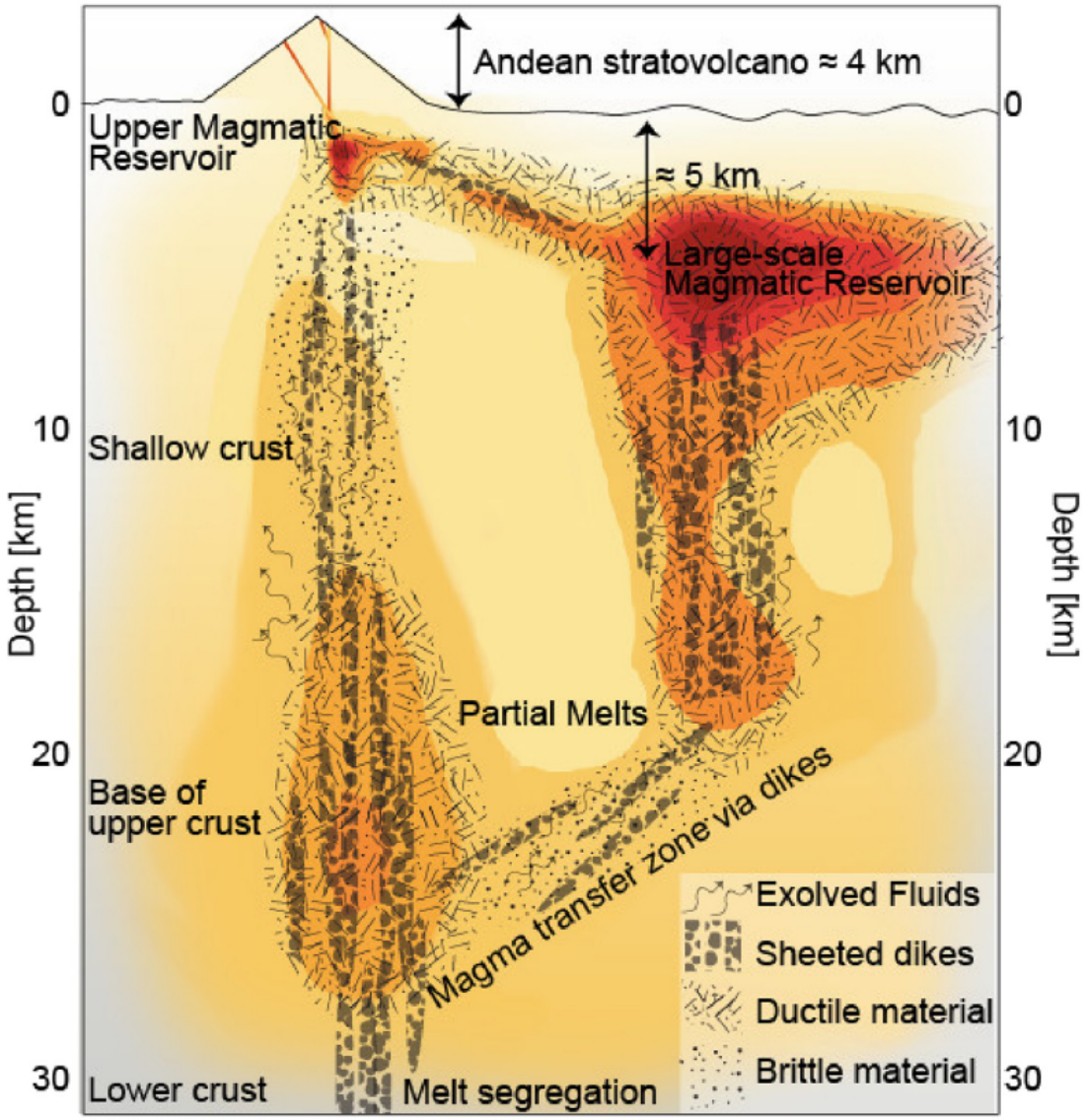
Ambient Noise Tomography Vs Tectonics



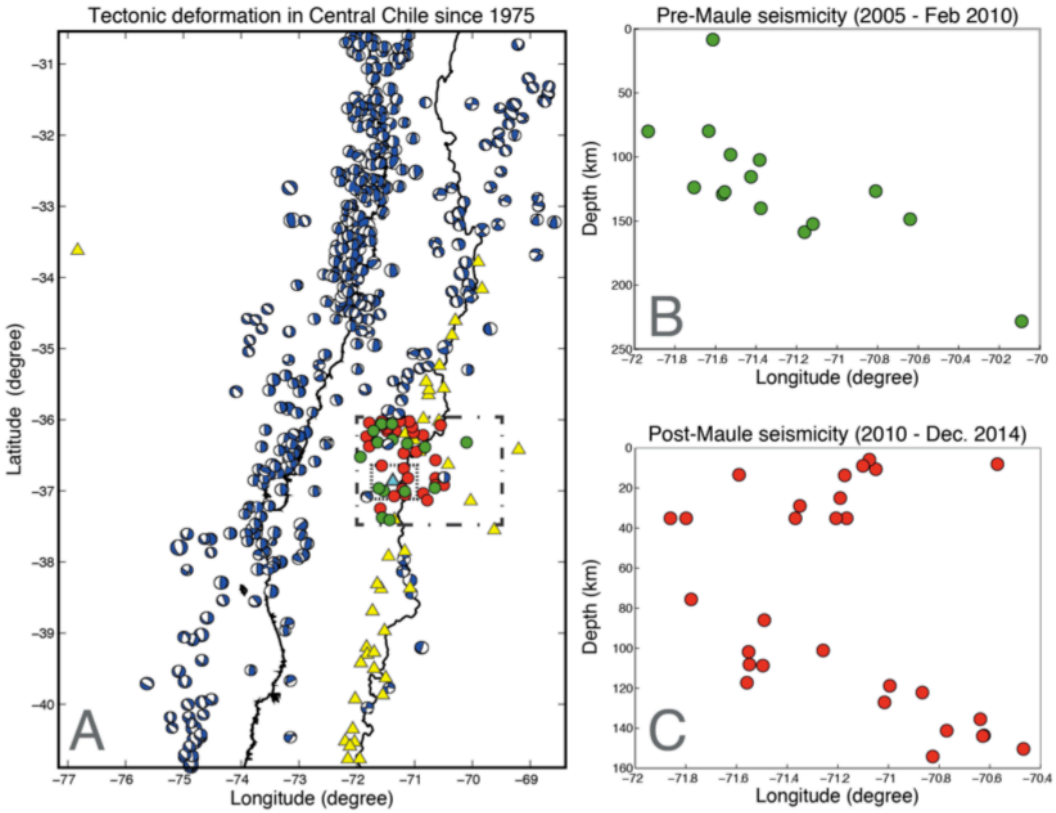


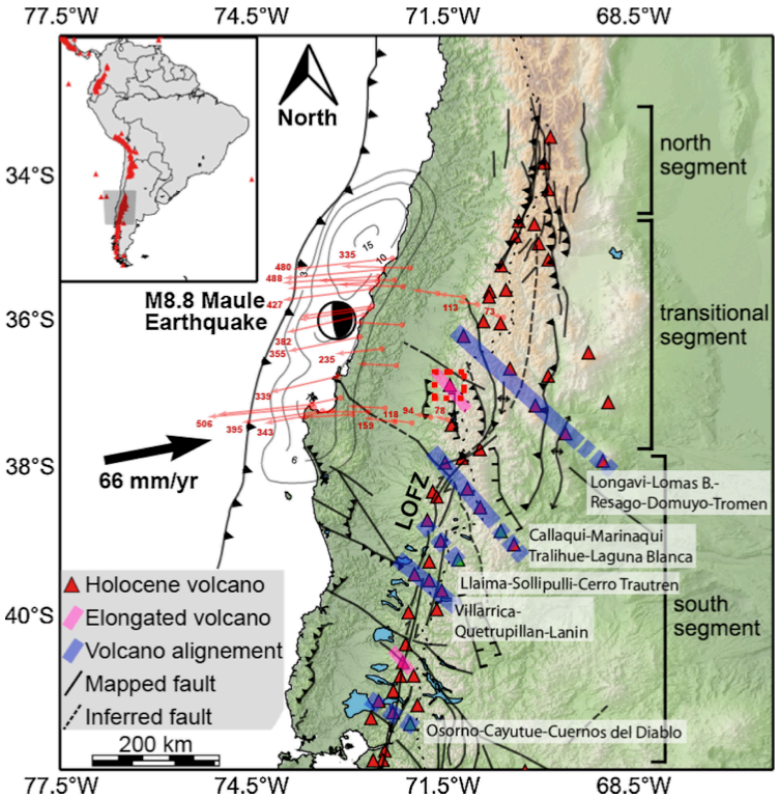
Cembrano and Lara (2009)

Conceptual model



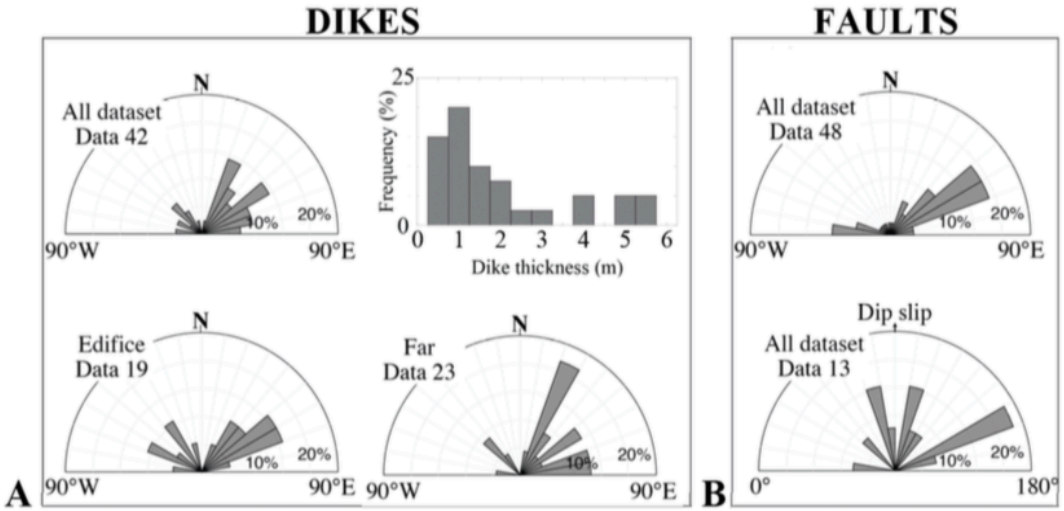
Seismic data (M≥M4.5, shallower than 35 km)



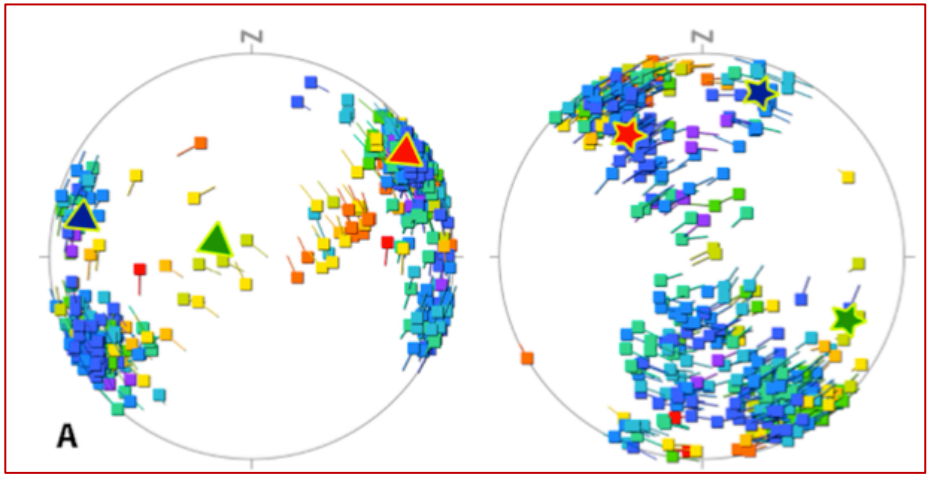


Faults, dikes and faults&dikes

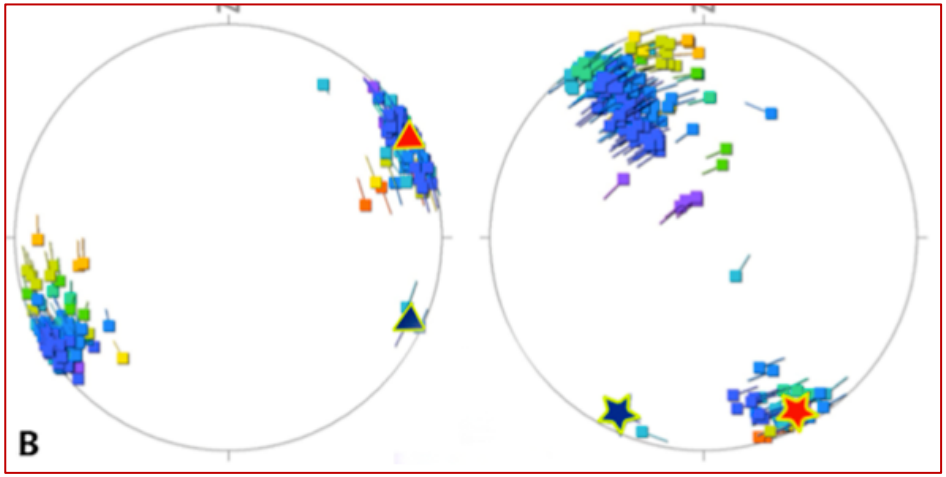
Field data



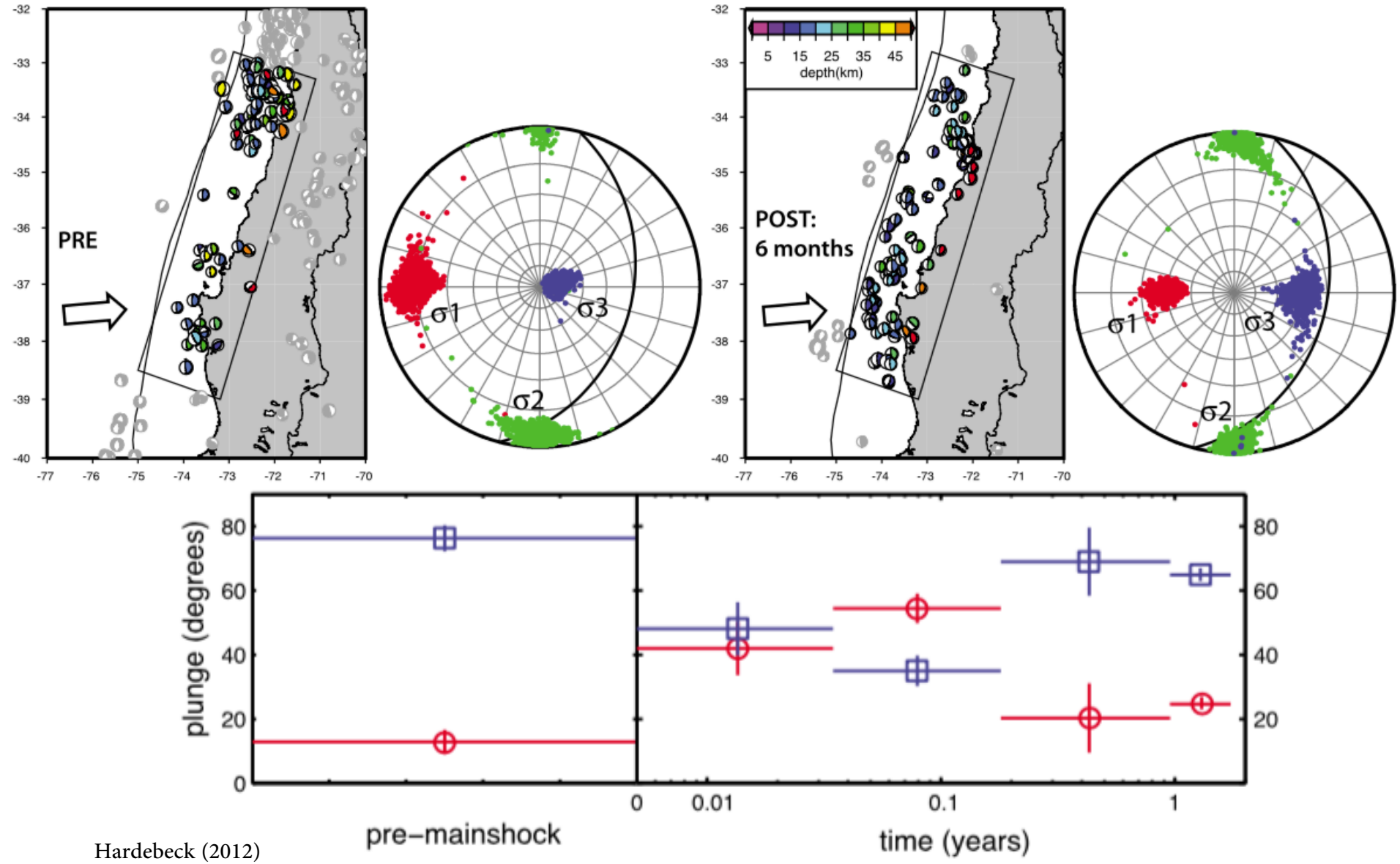
Farfield



Nearfield



Post-Seismic tectonic deformation

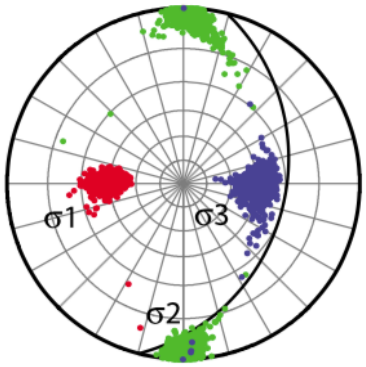


Hardebeck (2012)

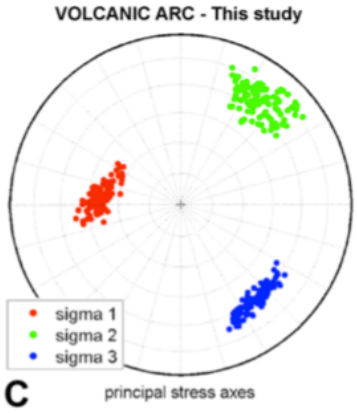
Post-Seismic tectonic deformation

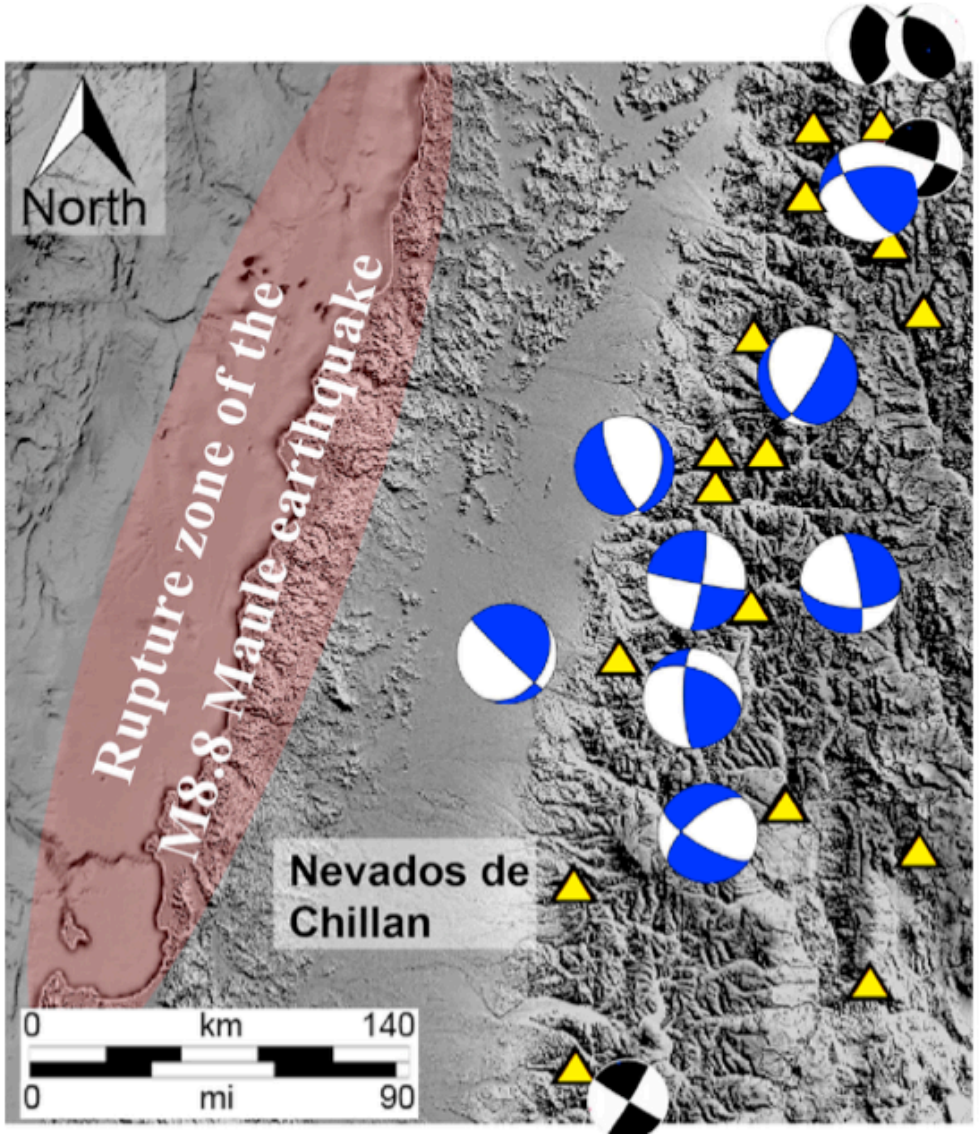
Table 1
List of M > M4.0 earthquakes shallower than 35 km occurred in the volcanic arc after the M8.8 Maule earthqual
In grey the focal mechanisms of the events shown in Fig. 8.

Date			Latitude	Longitude	Depth	M_ω
2010/02/27	9:25:18	UTC	37.701S	71.837W	35.00 km	4.9
2010/02/27	9:34:53	UTC	35.714S	71.105W	35.00 km	4.3
2010/02/27	14:18:40	UTC	35.786S	70.561W	35.00 km	4.0
2010/02/27	23:46:09	UTC	35.467S	70.285W	35.00 km	4.5
2010/02/28	1:52:00	UTC	36.177S	71.359W	35.00 km	4.2
2010/03/01	10:17:25	UTC	37.071S	71.367W	35.00 km	4.8
2010/03/05	8:15:53	UTC	36.990S	71.207W	35.00 km	4.4
2010/03/05	8:21:26	UTC	37.067S	71.165W	35.00 km	4.0
2010/03/20	1:41:07	UTC	37.825S	71.664W	35.00 km	4.5
2010/04/03	3:38:19	UTC	35.324S	70.339W	6.300 km	4.4
2010/05/29	17:15:11	UTC	35.454S	70.256W	10.00 km	4.1
2010/08/15	7:50:36	UTC	36.814S	71.101W	8.90 km	5.2
2010/08/15	7:50:36	UTC	36.820S	71.080W	10.00 km	5.2
2010/09/06	10:47:45	UTC	35.322S	70.491W	13.40 km	4.5
2011/01/21	10:25:22	UTC	37.692S	71.907W	17.50 km	4.8
2011/02/18	23:54:03	UTC	34.910S	70.390W	17.70 km	4.8
2012/06/07	19:25:25	UTC	36.036S	71.075W	5.80 km	5.0
2012/06/07	4:05:04	UTC	36.074S	70.570W	8.00 km	6.0
2012/07/14	22:34:40	UTC	36.077S	71.050W	10.50 km	4.8
2012/11/29	20:40:59	UTC	36.426S	71.082W	3.30 km	4.2
2013/11/14	4:20:57	UTC	36.700S	71.190W	25.00 km	4.0

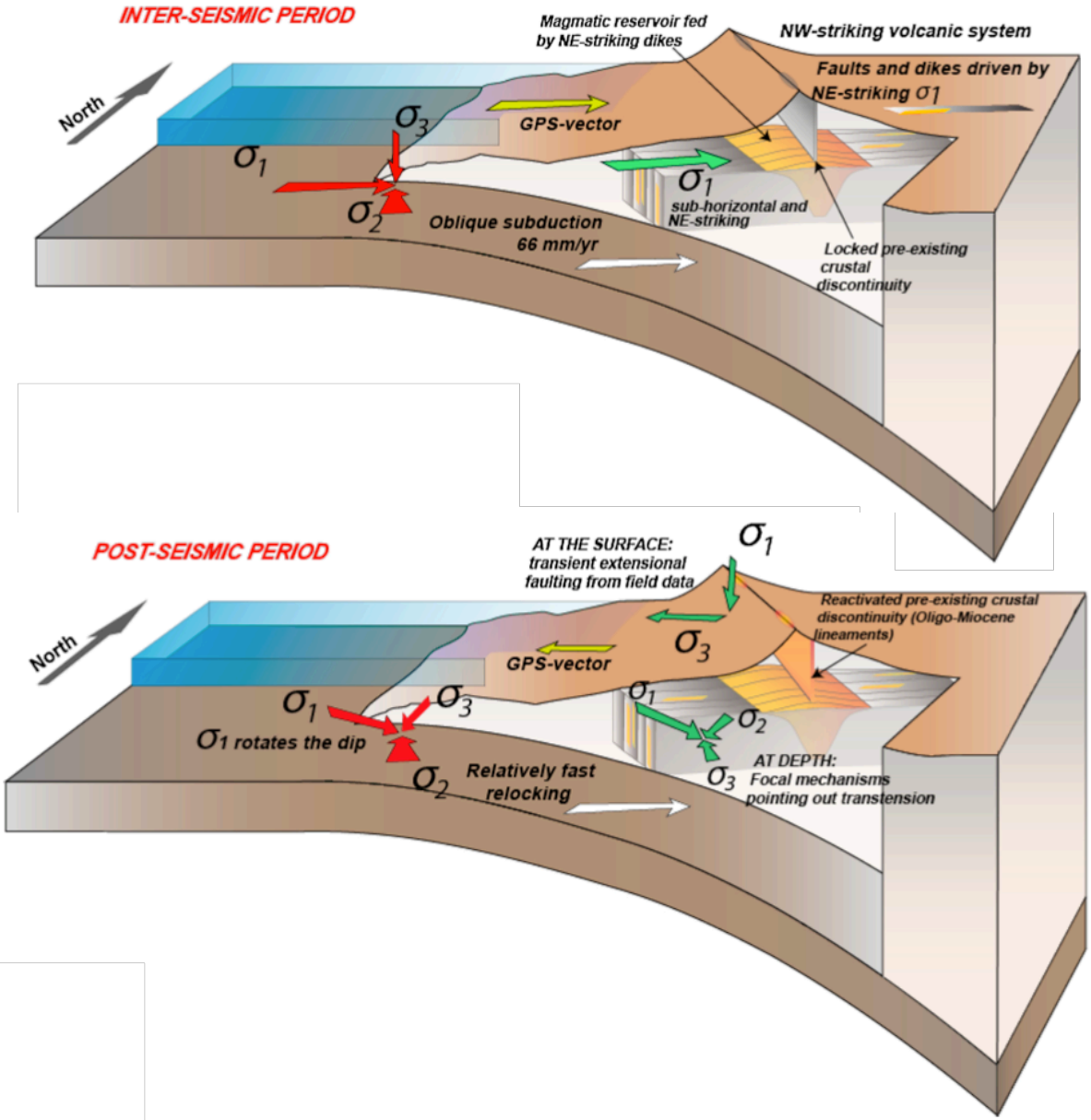


Hardebeck (2012)





Conceptual model



Take home messages

- Large magmatic reservoirs may not seat immediately below the volcanic edifice but they could be offset
- Strong tectonic control on the geometries of the magmatic reservoirs
- NW-striking volcanic complexes need some thoughts as they are antithetic/quasi-perpendicular to the direction of maximum compression
- Megathrust earthquakes may contribute to activate these structure strongly affecting the formation of volcanic arcs