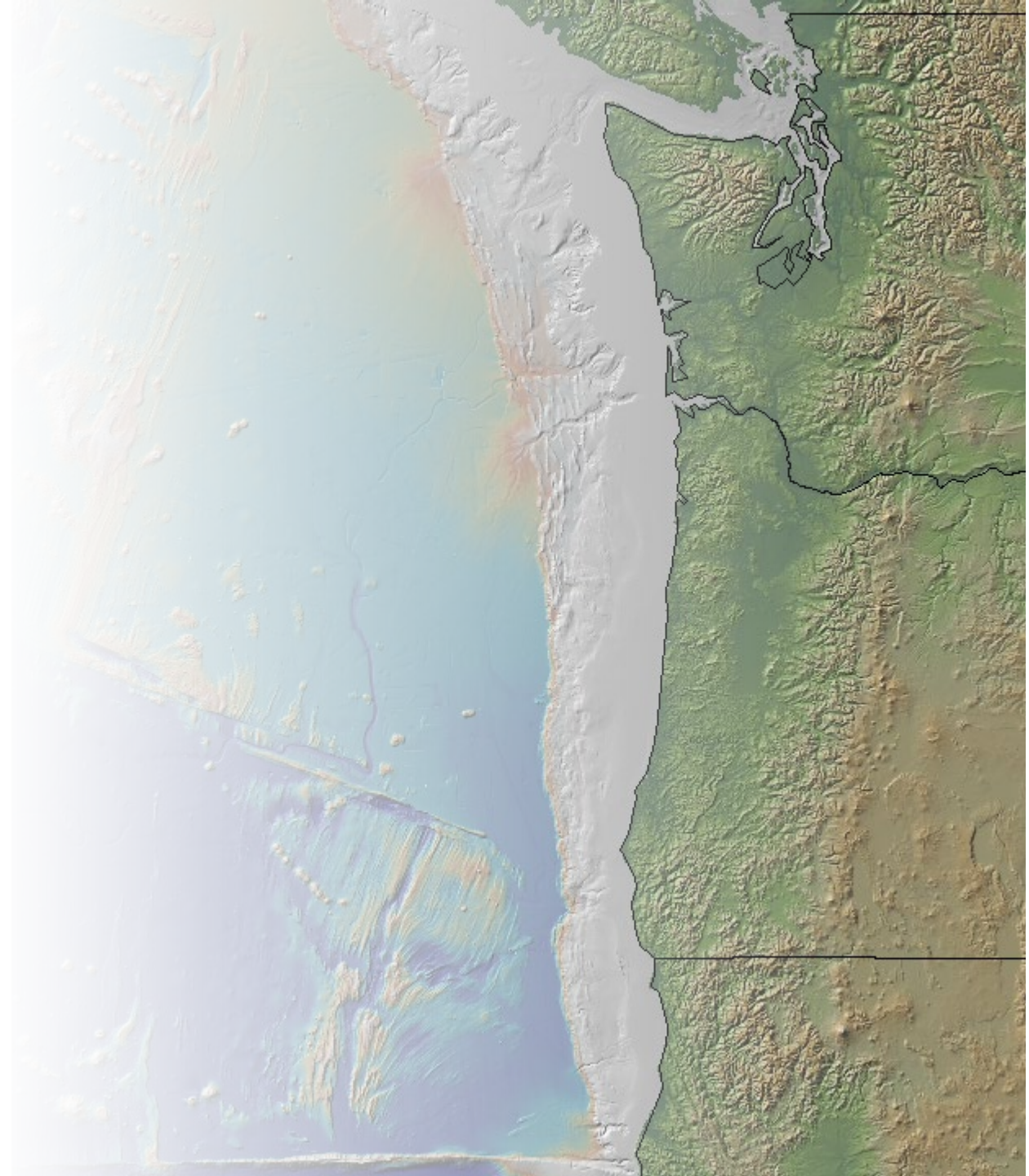


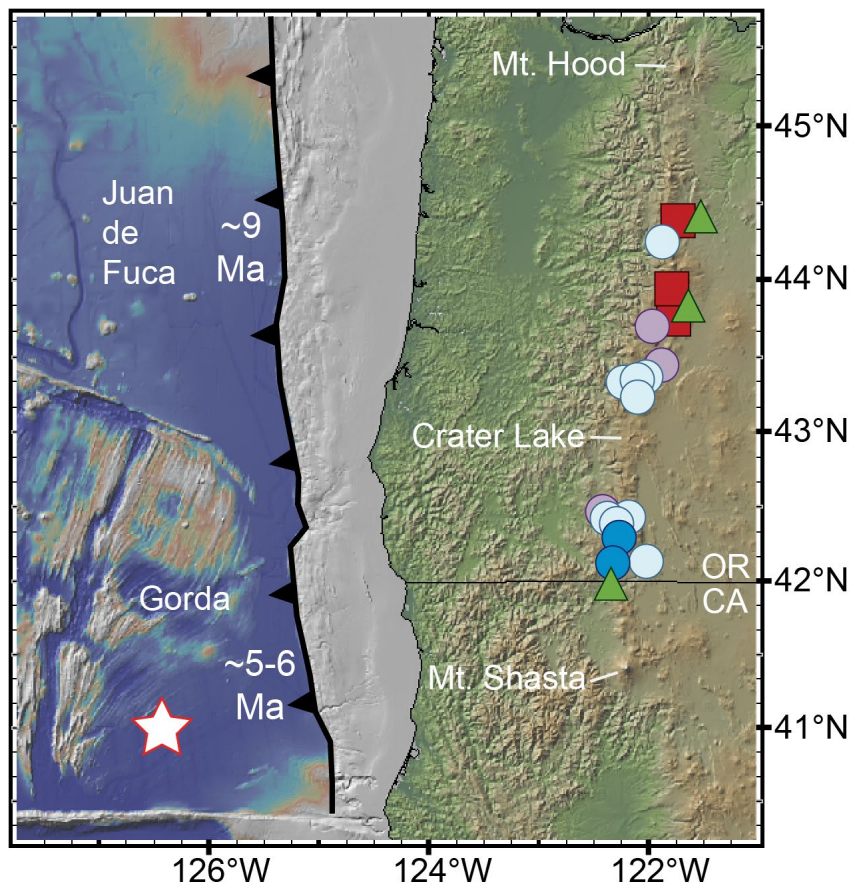
# Investigating subduction contributions using Cascade arc magma geochemistry

Emily R. Johnson  
USGS Cascades Volcano Observatory

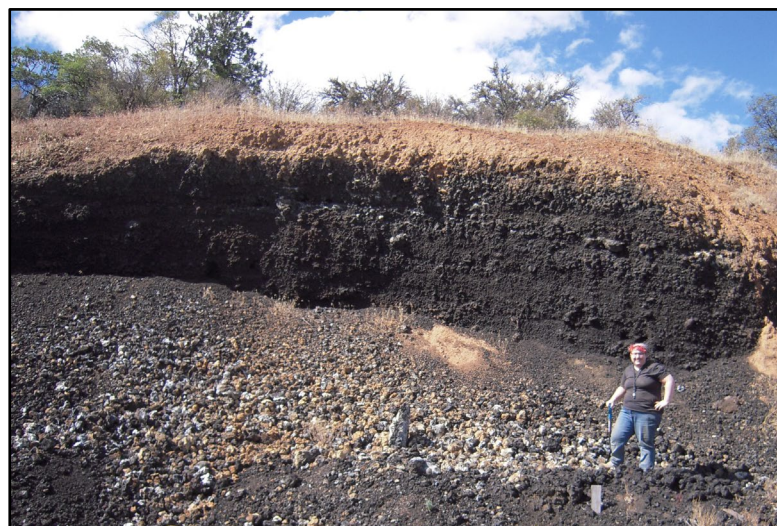
Contributions from: Meredith Cole, Jamie Shaffer,  
Frank Ramos



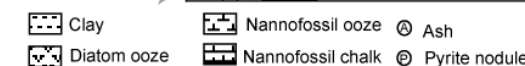
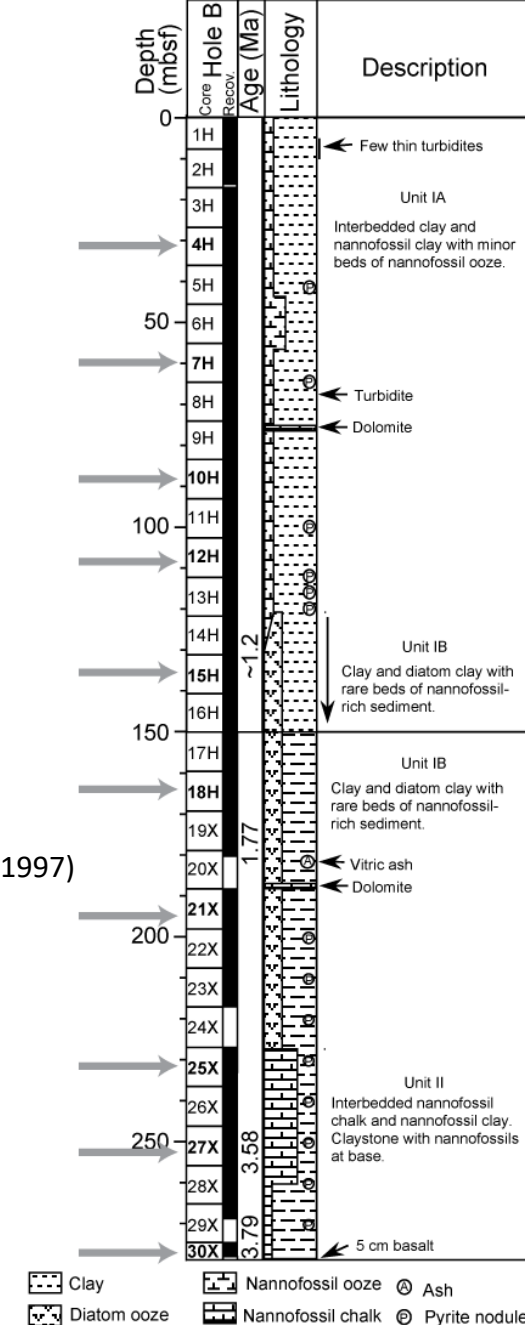
# Study



Use geochemistry of *arc basalts*, *seafloor sediments*, *oceanic crust* to model mantle and subduction contributions



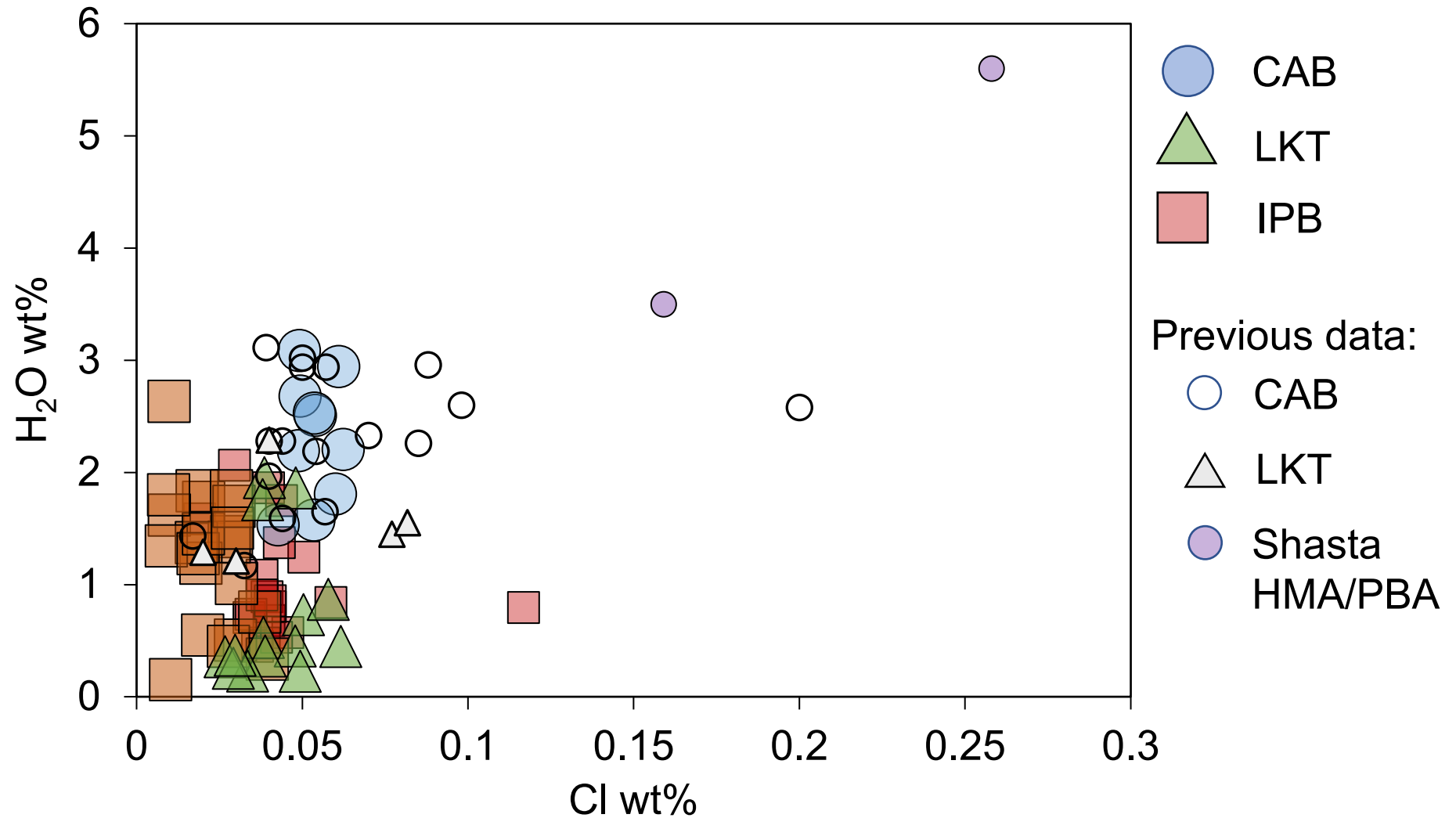
From Lyle et al. (1997)



Three Central OR samples provided by D. Ruscitto for isotope analyses that were previously analyzed in Ruscitto et al (2010)

# Volatiles

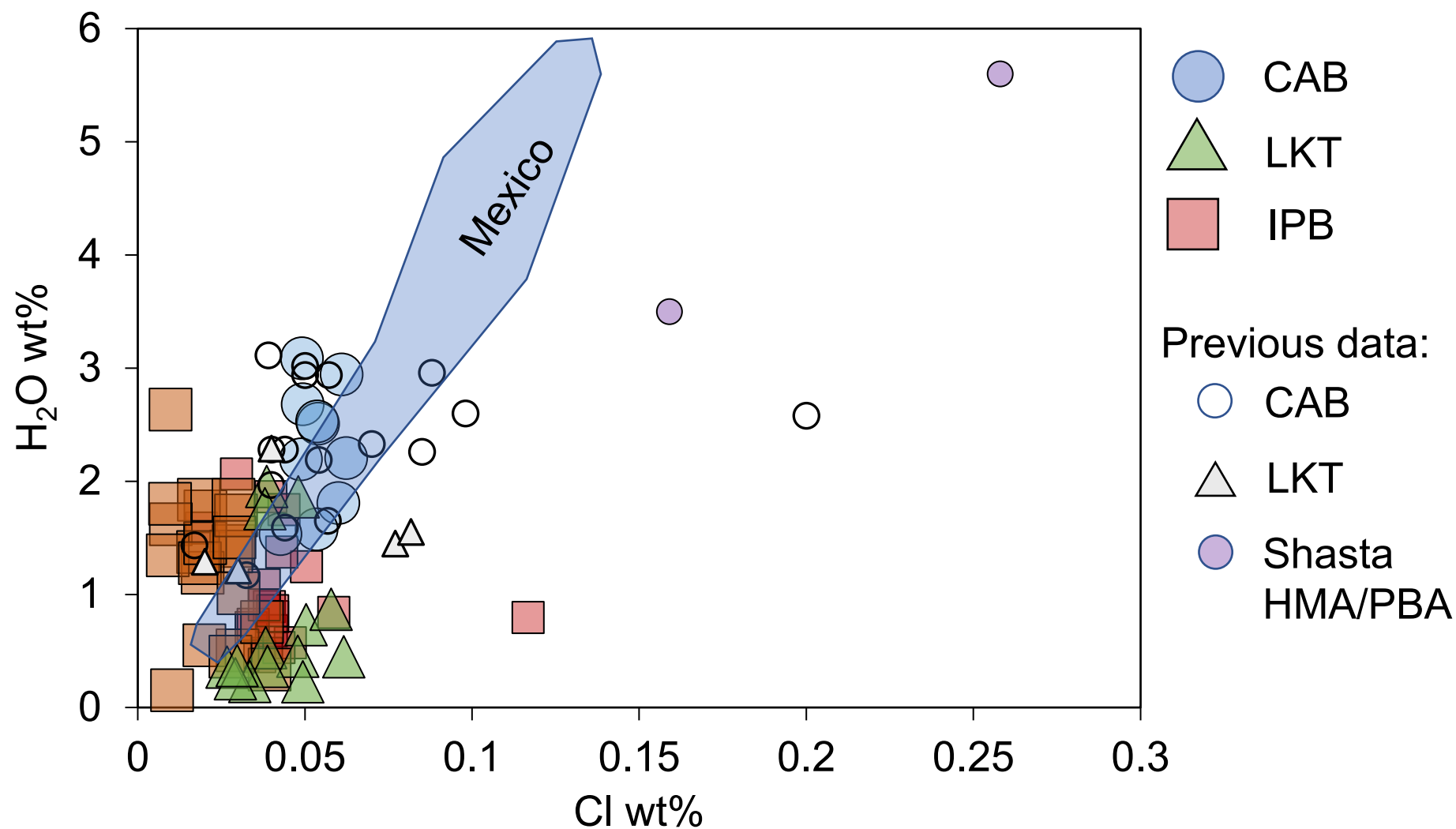
- CAB => slightly higher H<sub>2</sub>O
- Overall low H<sub>2</sub>O (<~3 wt%), except Shasta



Other Cascades data: Ruscitto et al. (2010, 2011); Shaw (2011); Walowski et al. (2016)

# Volatiles

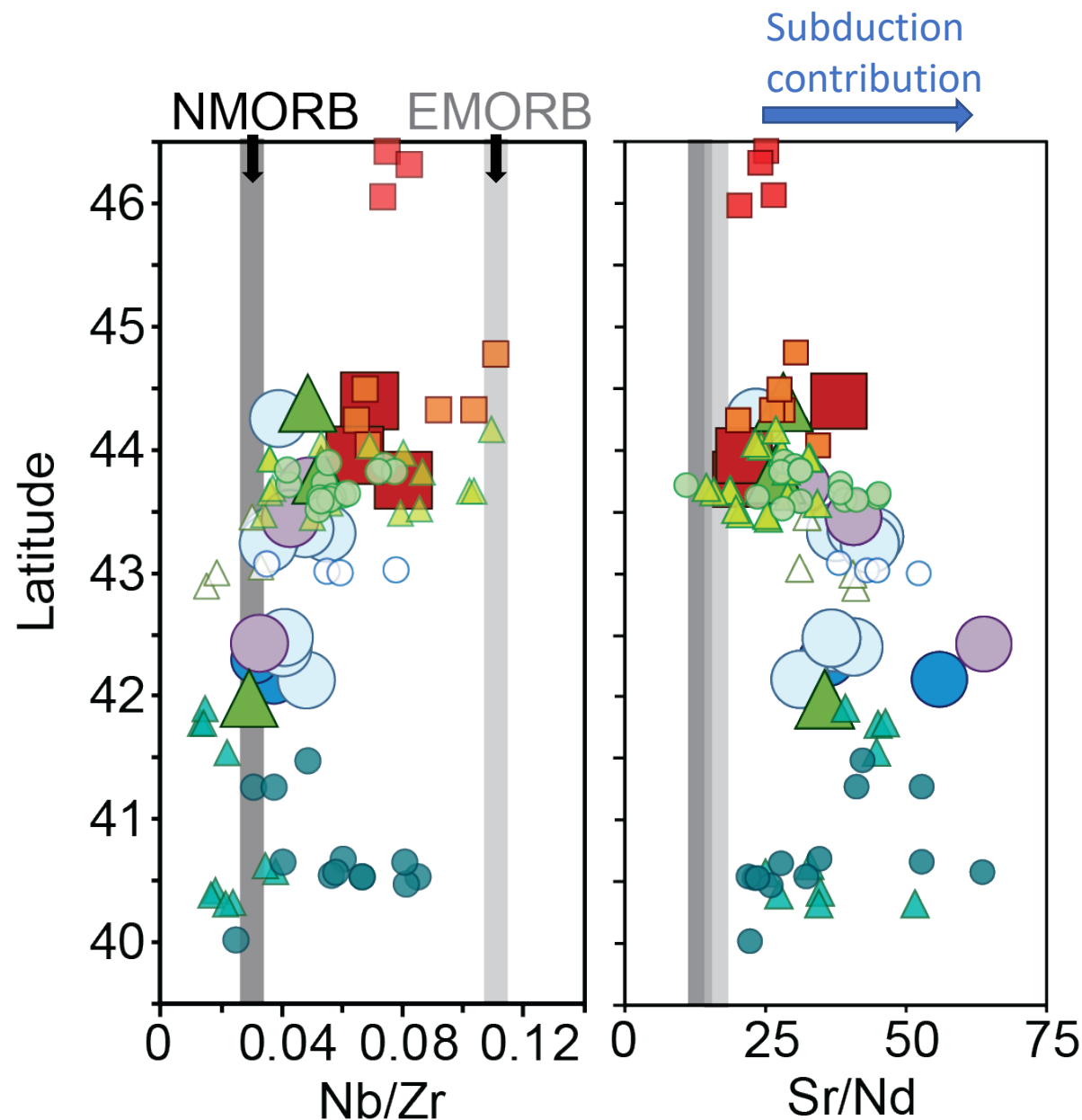
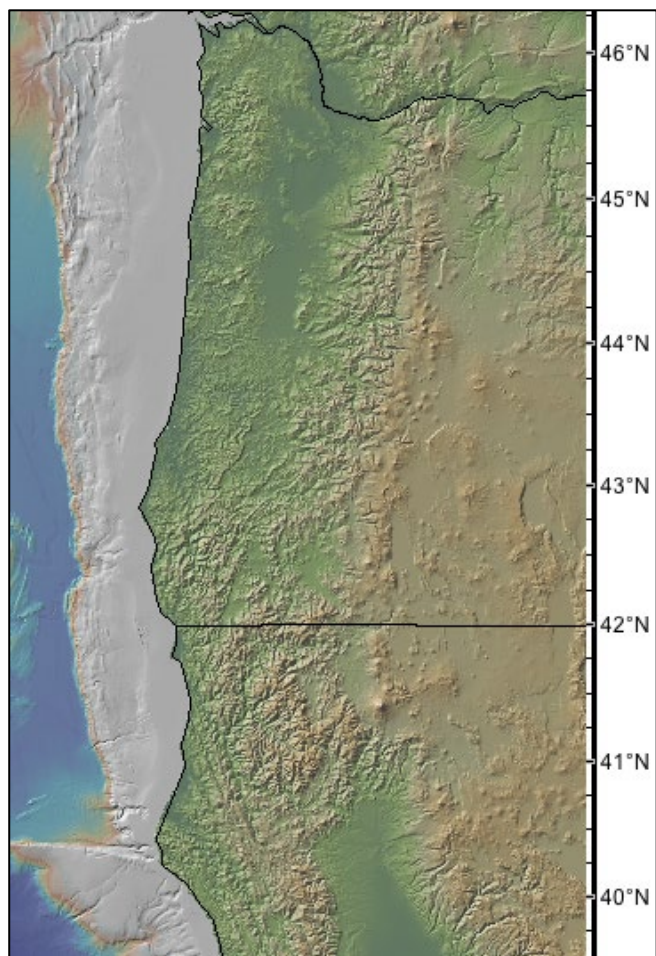
- CAB => slightly higher H<sub>2</sub>O
- Overall low H<sub>2</sub>O (<~3 wt%), except Shasta
- Lower H<sub>2</sub>O and Cl than other “hot” arcs -> lesser subduction contribution?



Other Cascades data: Ruscitto et al. (2010, 2011); Shaw (2011); Walowski et al. (2016)  
Mexico data: Johnson et al. (2009)

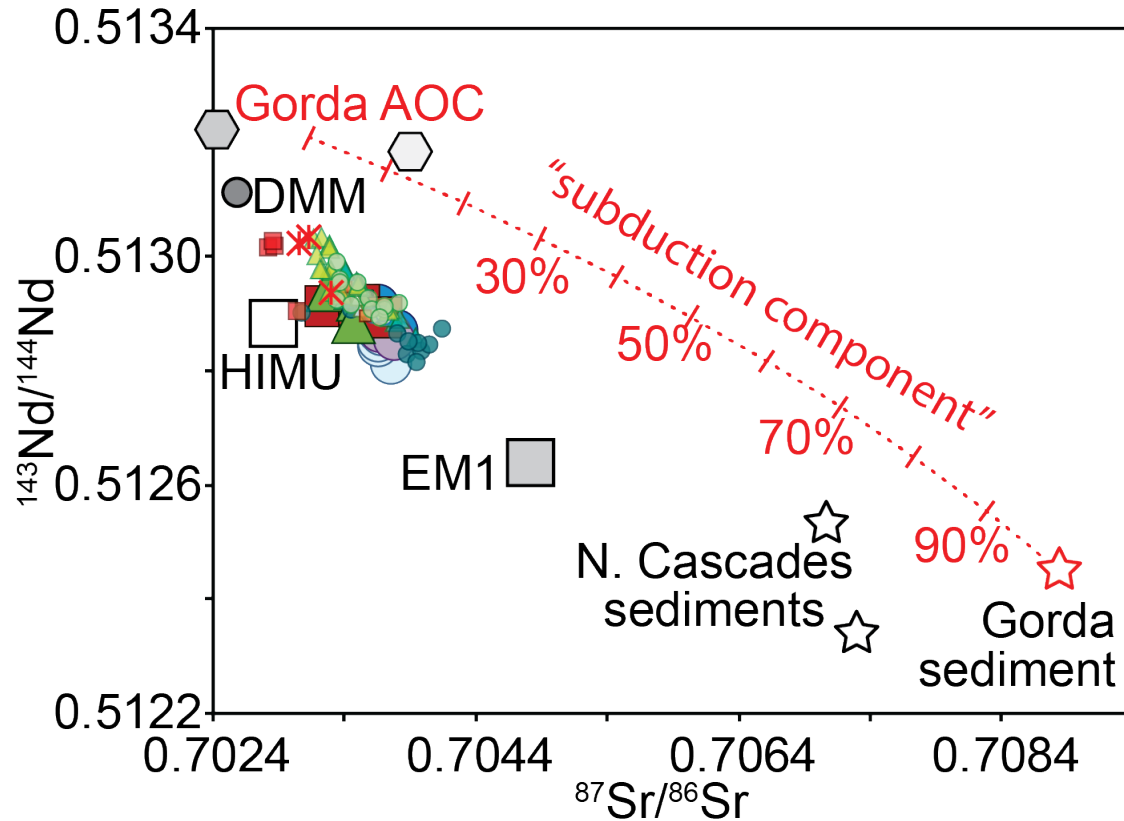
# Inputs

- Variably enriched mantle
- Variable subduction contributions
  - Minimal in central OR
  - Highest in CAB magmas



Previous Cascades data: Jicha et al. (2009), Rowe et al. (2009), Mitchell & Asmerom (2010), Mullen et al. (2017), Walowski et al. (2016), Carlson et al. (2018)

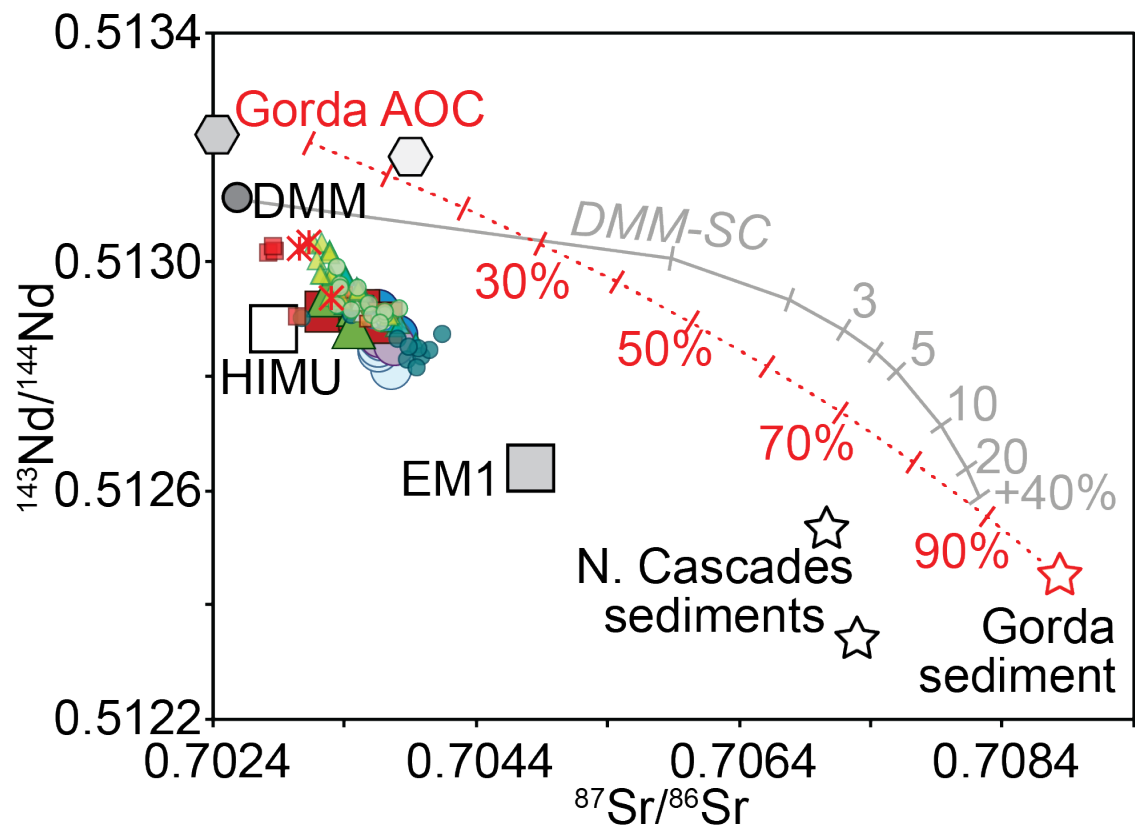
# Inputs



<i>This study:</i>			<i>Previous work:</i>		
● CAB	▲ LKT	★ Gorda sediment	<u>California</u>	<u>Crater Lake</u>	<u>Newberry</u>
● CABA	■ IPB	○ Gorda AOC	● CAB	○ CAB	● CAB
● CAA			▲ LKT	▲ LKT	▲ LKT

*Previous Cascades data: Jicha et al. (2009), Rowe et al. (2009), Mitchell & Asmerom (2010), Mullen et al. (2017), Walowski et al. (2016), Carlson et al. (2018)*

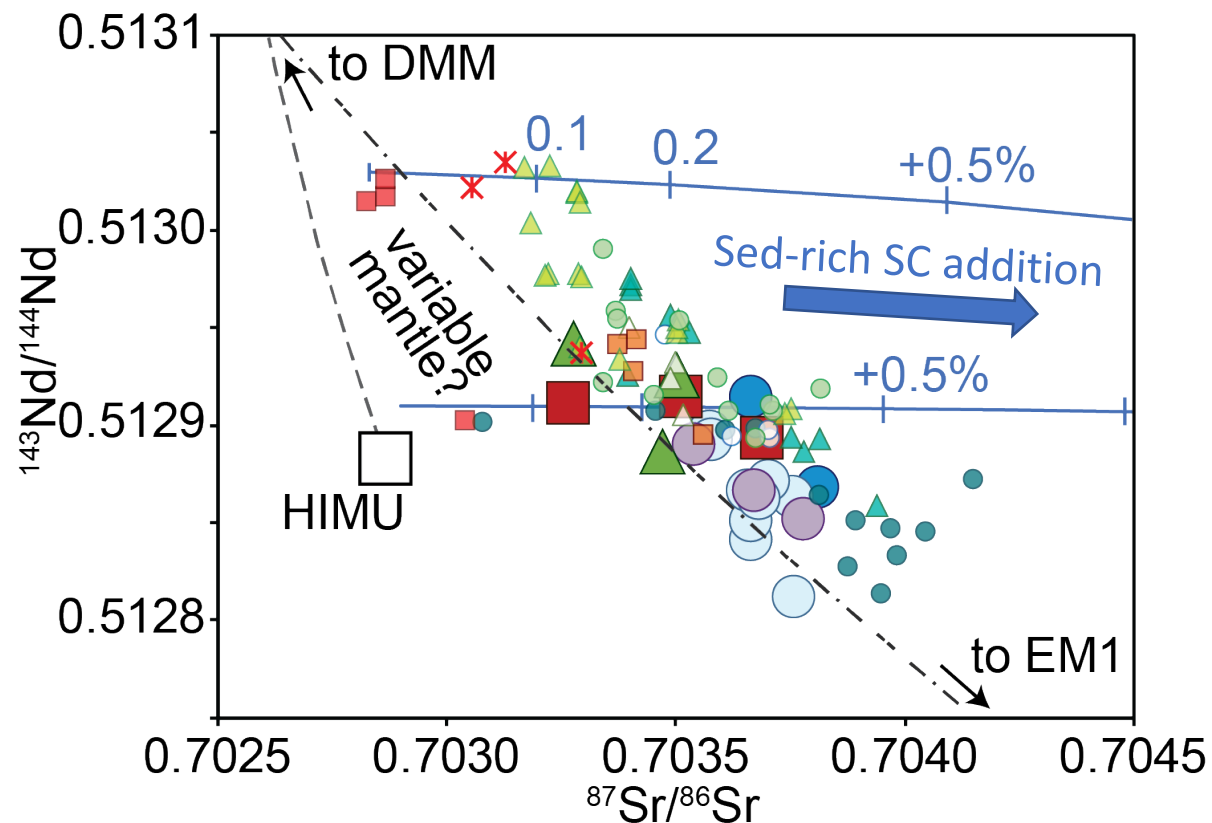
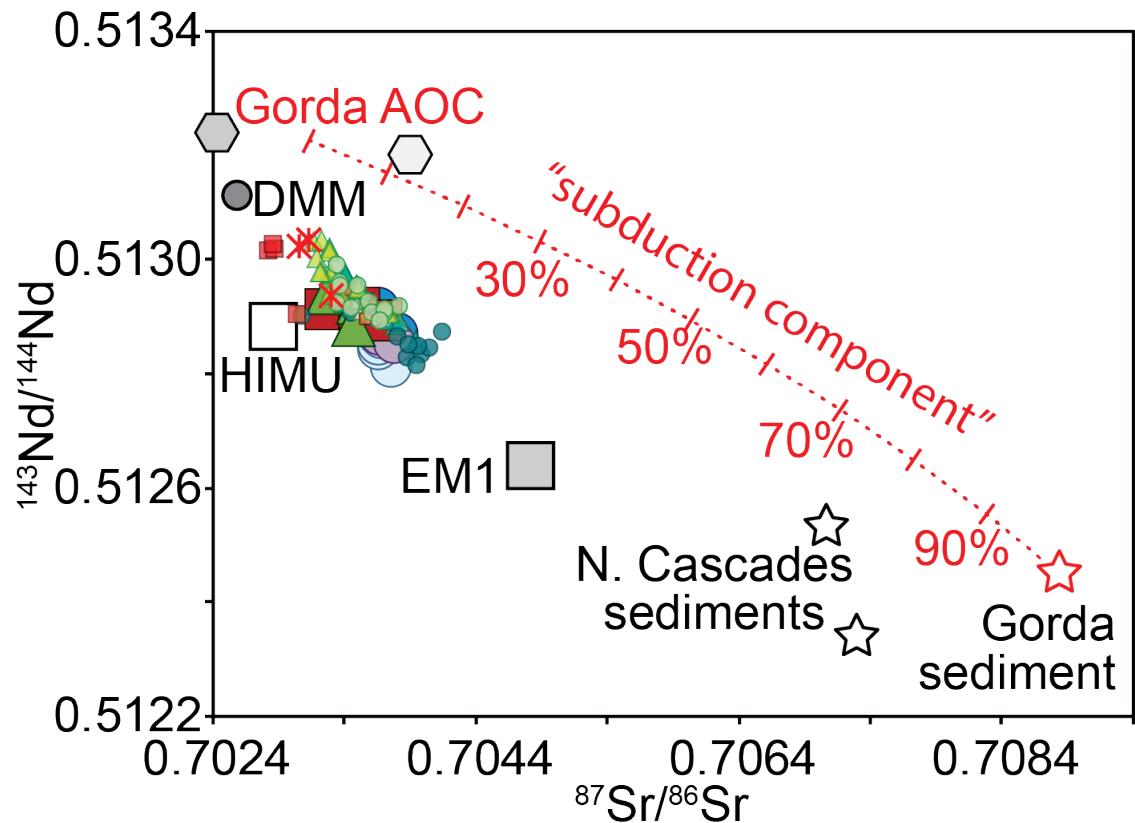
# Inputs



<i>This study:</i>			<i>Previous work:</i>		
● CAB	▲ LKT	☆ Gorda sediment	California	Crater Lake	Newberry
● CABA	■ IPB	☆ Gorda AOC	● CAB	○ CAB	● CAB
● CAA			▲ LKT	▲ LKT	▲ LKT

*Previous Cascades data: Jicha et al. (2009), Rowe et al. (2009), Mitchell & Asmerom (2010), Mullen et al. (2017), Walowski et al. (2016), Carlson et al. (2018)*

# Inputs



This study:			Previous work:		
● CAB	▲ LKT	☆ Gorda sediment	● CAB	○ CAB	● CAB
○ CABA	■ IPB	◻ Gorda AOC	▲ LKT	△ LKT	▲ LKT
● CAA					

Previous Cascades data: Jicha et al. (2009), Rowe et al. (2009), Mitchell & Asmerom (2010), Mullen et al. (2017), Walowski et al. (2016), Carlson et al. (2018)



# Key observations

- Variably enriched mantle exerts strong control on isotopic composition of arc magmas
- Subduction contributions are minimal (<2 %), sediment-rich (50-90% sed), decrease northward into central Oregon

