# CIDER 2018 Seismology Tutorial 2: Exploring Seismograms

Getting started

- **Go to the virtual machine and log in under 'seismology'**
- **Open a terminal and cd Desktop/sannecottaar-seismo**
- **Update the code from github with git pull origin master**
- **Now open the code with jupyter notebook Seismology\ Tutorial\ 2.ipynb &**

Introduction

The earthquake provided occurred on 25th of December 2016 on the subduction zone in Southern Chili at a depth of 38 km. It has a Mw 7.6. Data are provided across Alaska, the northwestern US, and some stations in Canada. These represent angular distances of 90 to 130° from the earthquake, and azimuths between 300 and 360°.
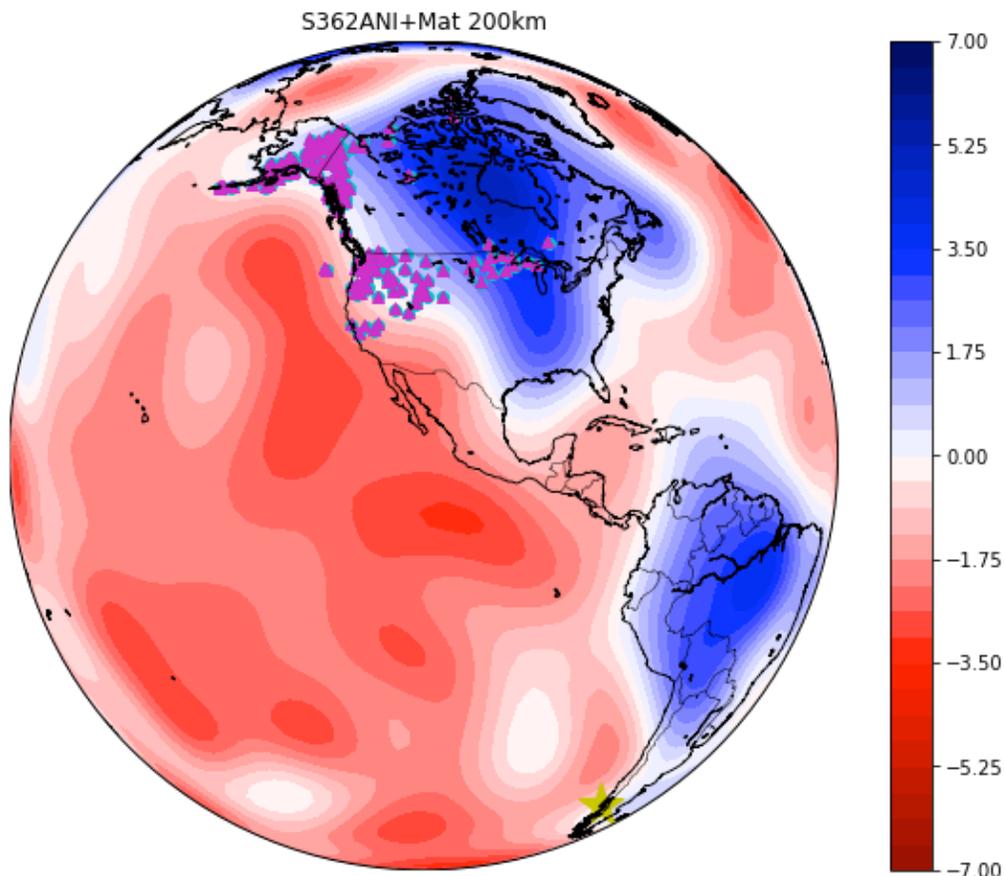
Figure 1 Map showing earthquake station geometry. Background shows lateral shear wave velocity variations (%) at 200 km depth from S362ANI (Moulik & Ekstrom 2016). Yellow star- earthquake location. Purple triangles - seismic receivers. Cyan dots- SKS pierce points at 200 km right beneath the stations.

Seismo-detectives goals

2-pointers:
- How the presence of depth phases (i.e. 'pP', and 'sP'). Are they at their predicted times? Is the depth of the earthquake correct?
- Show which of the synthetics look more like the real data. Why?

3- pointers:
- Observe a P-to-s converted phase from the 410.
- Observe a SS precursor from the 660.
- Observe a reflection from the inner-core boundary
- Show evidence travel time variations across the Large Low Rigidity Province (LLRP).   +2 points if you measure the travel time delay for S waves across the LLRP boundary and for P waves (think about the different wavelength resolution).

4-pointers:
- Show evidence for P or S-wave travel time variations between the slower western US and the faster velocities in the craton beneath the Eastern US.
- Show waveform evidence for the presence of anisotropy.

5- pointer:
- Show evidence for a (yet-to-be-published) mega-ULVZ beneath the Galapagos

Found anything else? We will give you points, if we think it is cool.