

Receiver Function Analysis of the Magmatic Plumbing System Beneath Okmok Volcano

Madeleine Tan¹, Helen Janiszewski², and Jeroen Ritsema¹

¹University of Michigan

²University of Hawaii at Manoa

November 24, 2022

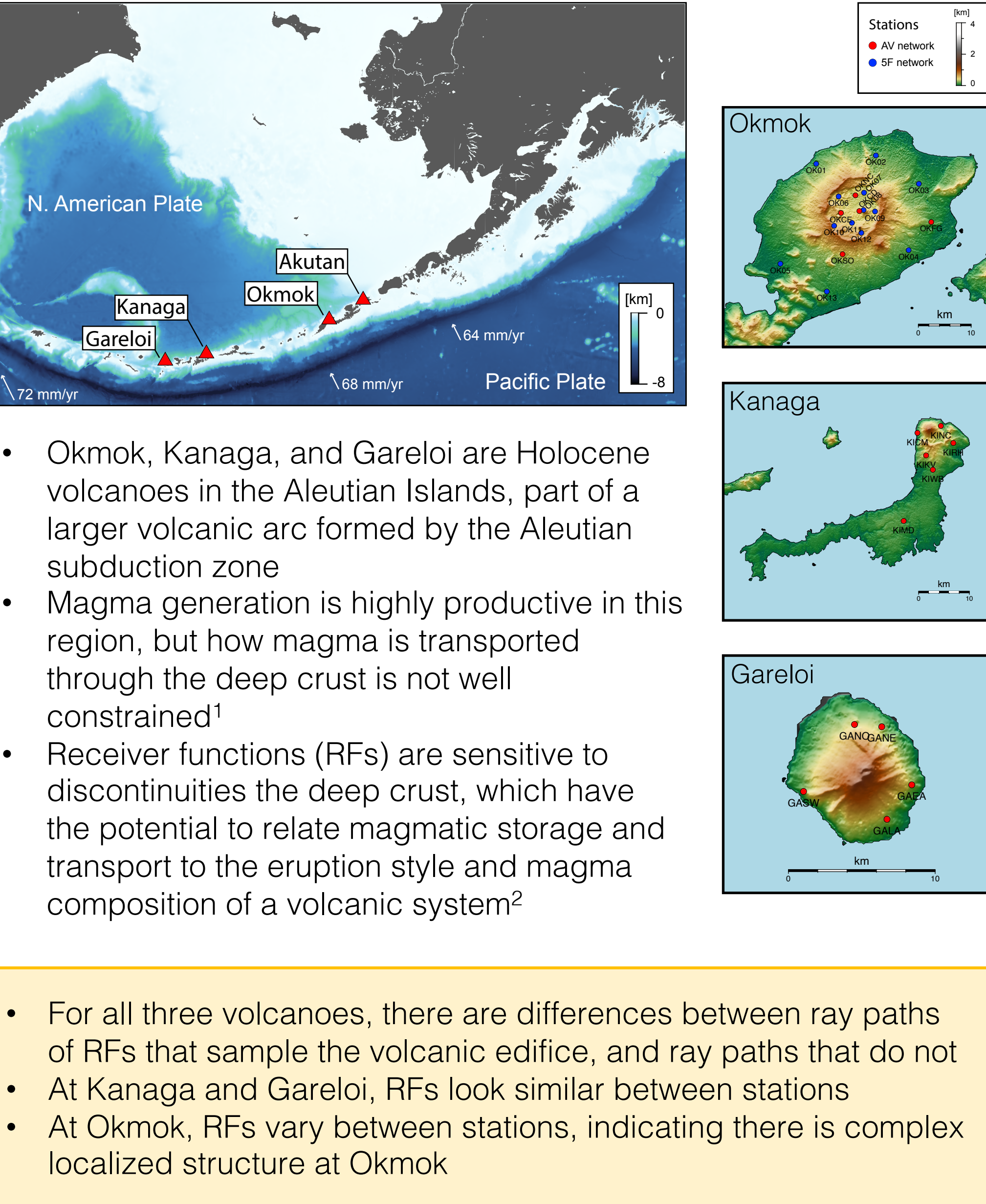
Abstract

Okmok volcano on Umnak Island, Alaska is one of the most hazardous, explosive volcanoes in the Aleutians. Most recently, it erupted in 2008. Previous seismic imaging of Okmok's large caldera system revealed complex magmatic structures in the upper 5 km beneath the caldera but magma transport at larger depths remains poorly constrained due to reduced imaging resolution. Using receiver function analysis of waveforms, we aim to chart sharp boundaries in the crust beneath Okmok and the surrounding region in order to understand its deeper crustal magmatic system. We have calculated receiver functions for M6 and larger teleseismic earthquakes between 2008 and 2021 recorded by permanent networks AV and AK, and between 2015-2016 at temporary network 5F. We observe Ps arrivals that are consistent with a Moho depth of ~40km, particularly at stations outside the caldera. At some stations, we observe that receiver functions calculated for incoming rays pointing towards the volcano are different from those pointing away from the volcano. However, there is significant variability in the receiver functions, even for overlapping ray paths in the mid-to-deep crust (> 10 km). This suggests complex crustal structure with heterogeneity that may be spatially localized beneath individual stations. Furthermore, receiver functions for stations inside Okmok caldera are more reverberatory than those outside the caldera, indicating that the structure, likely predominantly in the upper crust, beneath these two regions is different.

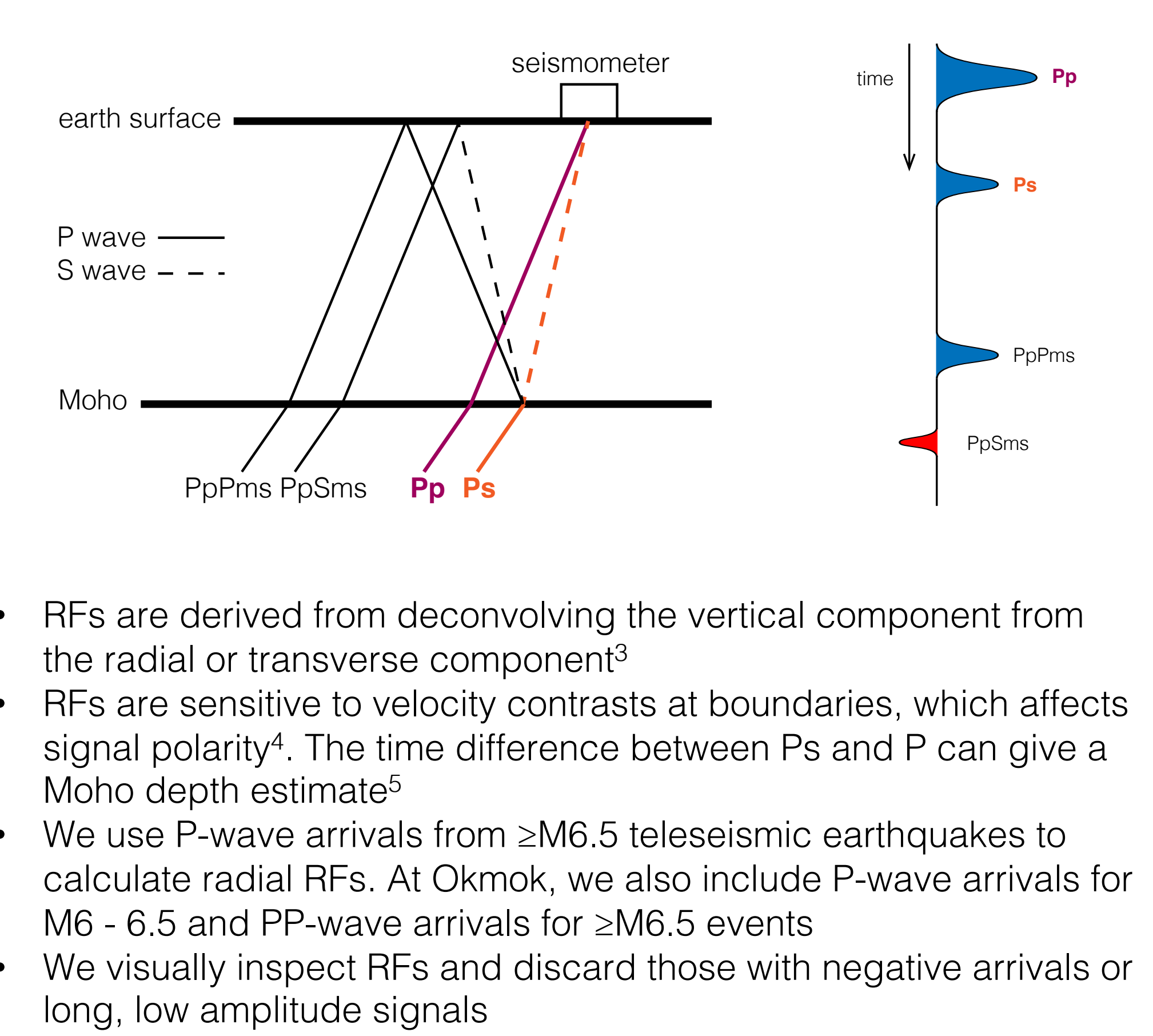
Using receiver functions to image magmatic plumbing structure beneath Okmok volcano

Madeleine Tan¹, Helen Janiszewski², Jeroen Ritsema¹ | ¹University of Michigan, ²University of Hawai'i at Mānoa

1. Summary



2. Methods and data



Volcano	Network	Data range	Total RFs after quality control	RFs per station after quality control
Okmok	AV; 5F	2008-2021	383	2-103
Kanaga	AV	2019-2021	120	12-26
Gareloi	AV	2019-2021	121	21-26

3. Results

