"Peru Hydrology"

Characterizing subsurface structure using seismic refraction surveys in the Cordillera Blanca, Peru

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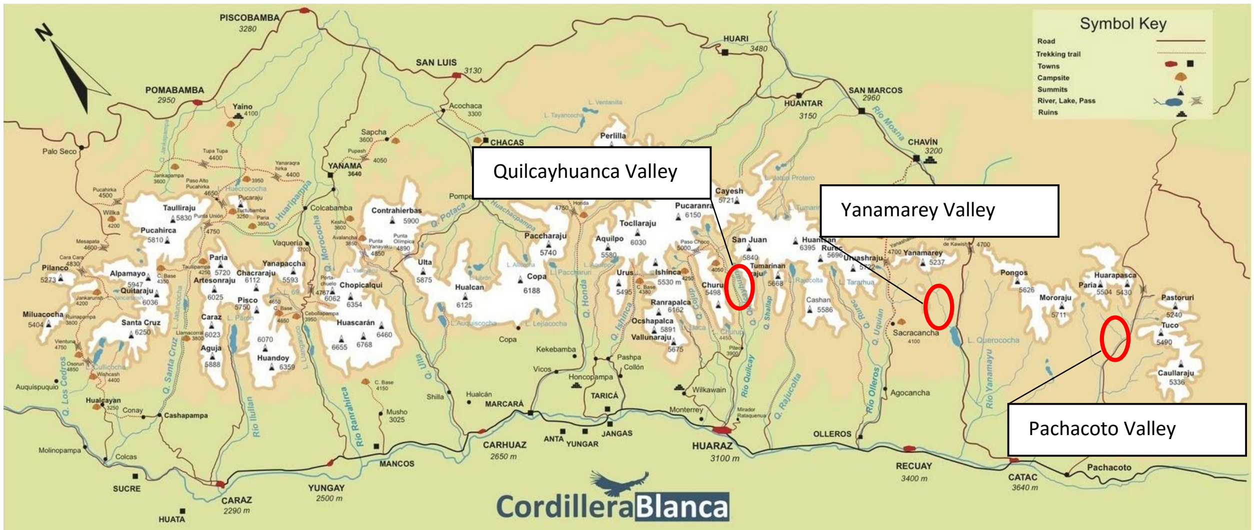
Location: 3 alpine valleys in the Cordillera Blanca, Peru: Quilcayhuanca, Yanamarey, Pachacoto



Purpose of study: http://www.thehikinglife.com

(1) Image depth to bedrock at valley floor
(2) Determine depth to, and thickness of, buried talus layers in glacio-lacustrine sediment matrix

Details of study (all single lines):

Quilcayhanca: 7 transects (named Quilcay1.sgy - Quilcay7.sgy)

Yanamarey: 5 transects (named Yana1.sgy - Yana5.sgy)

Pachacoto: 2 transects (named Pacha1.sgy, Pacha2.sgy)

Length of each transect: 117.5m (48 geophones)

Spacing for all transects: x=2.5m

seismic source: 6kg sledge

Stacking: 10 stacks at each shot

Sampling rate: .25ms

Record length: 3000ms

Shot coordinates:

Latitude	Longitude	Elevation (m)	time	Line-position
-9.883248964	-77.240593	4326.217773	2015-08-02T14:49:05Z	PACHA1-X0
-9.88205798	-77.24037096	4286.84375	2015-08-02T14:43:19Z	PACHA1-X120
-9.882709002	-77.24043097	4322.394531	2015-08-02T14:47:24Z	PACHA1-X60
-9.883235972	-77.24055997	4337.108398	2015-08-02T17:39:49Z	PACHA2-X0
-9.882964985	-77.24161902	4324.286133	2015-08-02T17:36:37Z	PACHA2-X120
-9.883088032	-77.24110303	4330.578613	2015-08-02T17:38:19Z	PACHA2-X60
-9.466121038	-77.37721601	3929.140137	2015-07-23T15:28:34Z	QUILCAY1-X0
-9.465746032	-77.37821697	3908.12915	2015-07-23T19:26:15Z	QUILCAY1-X117.5
-9.465932027	-77.37769101	3912.743652	2015-07-23T19:29:42Z	QUILCAY2-X0
-9.467286039	-77.37881301	3927.849121	2015-07-24T15:34:25Z	QUILCAY3-X0
-9.467602959	-77.37985798	3914.596924	2015-07-24T15:38:23Z	QUILCAY3-X120
-9.467446972	-77.37932598	3916.814941	2015-07-24T15:36:48Z	QUILCAY3-X60
-9.467576975	-77.379862	3915.843018	2015-07-24T17:37:57Z	QUILCAY4-X0
-9.467847962	-77.38067999	3938.596924	2015-07-24T17:35:08Z	QUILCAY4-X120
-9.467746038	-77.38037104	3912.762207	2015-07-24T17:36:35Z	QUILCAY4-X60
-9.465728011	-77.37771599	3926.029785	2015-07-25T14:50:12Z	QUILCAY5-X0
-9.466256993	-77.37870103	3922.825439	2015-07-25T14:45:51Z	QUILCAY5-X120
-9.465977959	-77.37818998	3924.539062	2015-07-25T14:47:30Z	QUILCAY5-X60
-9.466486992	-77.37921903	3913.704834	2015-07-25T16:46:00Z	QUILCAY6-X0
-9.467370026	-77.37982596	3939.89917	2015-07-25T16:42:10Z	QUILCAY6-X117.5
-9.466903992	-77.37955397	3913.063721	2015-07-25T16:44:38Z	QUILCAY6-X60
-9.466050966	-77.37711702	3923.243652	2015-07-25T19:28:54Z	QUILCAY7-X0
-9.465690963	-77.37809996	3914.030273	2015-07-25T19:24:18Z	QUILCAY7-X117.5
-9.46588601	-77.37759696	3918.208008	2015-07-25T19:26:02Z	QUILCAY7-X60
-9.673015997	-77.28968102	4346.334473	2015-07-29T15:24:23Z	YANA1-X0
-9.674044037	-77.28936402	4347.900879	2015-07-29T14:55:58Z	YANA1-X120
-9.673544979	-77.28951196	4352.983398	2015-07-29T15:18:46Z	YANA1-X60
-9.674294991	-77.28922103	4358.710449	2015-07-29T19:02:00Z	YANA2-X0
-9.674473023	-77.288382	4347.118652	2015-07-29T19:06:12Z	YANA2-X117.5
-9.674259033	-77.28886798	4345.070312	2015-07-29T19:04:08Z	YANA2-X60
-9.674677039	-77.288281	4353.464355	2015-07-29T20:45:21Z	YANA3-X0
-9.674778963	-77.28852902	4351.250977	2015-07-29T20:42:46Z	YANA3-X30
-9.674882982	-77.28876899	4352.312012	2015-07-29T20:38:29Z	YANA3-X60
-9.676159965	-77.29310797	4326.33252	2015-07-30T14:49:42Z	YANA4-X0
-9.676281	-77.29183903	4334.25	2015-07-30T14:45:59Z	YANA4-X120
-9.676187038	-77.29255099	4324.026367	2015-07-30T14:48:02Z	YANA4-X60
-9.676199025	-77.29184498	4320.474121	2015-07-30T17:53:52Z	YANA5-X0
-9.676992036	-77.29112397	4320.384766	2015-07-30T17:50:18Z	YANA5-X120
-9.676615018	-77.29147702	4323.147461	2015-07-30T17:45:40Z	YANA5-X60

Project Summary:

As tropical glaciers rapidly recede in response to climate change, the storage and discharge of groundwater will play an increasing role in regulating river baseflow, particularly during the dry season, when stream flow is currently sustained predominantly by glacial melt. Little is understood regarding the hydrogeologic processes controlling base flow characteristics of low-gradient proglacial valleys of the Cordillera Blanca in Northwestern Peru, which has the world's highest density of tropical glaciers. To better understand the processes of groundwater storage and discharge in proglacial meadows, we completed seismic refraction surveys in three representative valleys of the Cordillera Blanca range: the Quilcayhuanca, Yanamarey, and Pachacoto valleys. The locations of survey transects were chosen based on locations of previous sediment core sampling, GPR lines, and quantification of groundwater-surface water interaction derived from dye and temperature tracing experiments. The seismic surveys consisted of 48 vertical component geophones with 2.5 m spacing. Across the three representative valleys a total of 15 surveys were conducted, covering a distance of 1800 m in cross, down, and oblique-valley directions. The knowledge of hydrogeologic structure derived from seismic refraction surveys will provide crucial boundary conditions for future groundwater models of the valleys of the Cordillera Blanca.