

Outburst Floods and Morphology of Colonia and Baker Rivers, Patagonia: climate change, extreme flood impacts and sustainable hydropower

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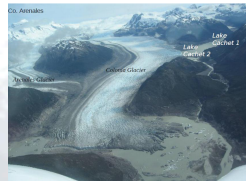


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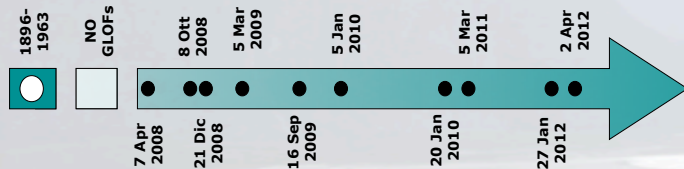
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1 Glacial Lake Outburst Floods:

sudden and often catastrophic release of a considerable volume of glacial melt water, produced by the failure of an ice dam or by subglacial flow

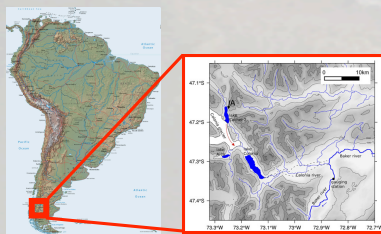


A NEW CYCLE OF GLOFs



AIM: to investigate floods and sediment effects of extreme floods, using Colonia GLOFs as convenient case study ("field lab") monitored by ground and remote sensing, and inform flood hazard analysis that includes flow and sediment impacts

2 STUDY SITE

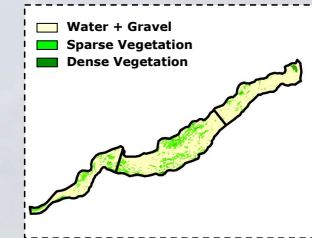
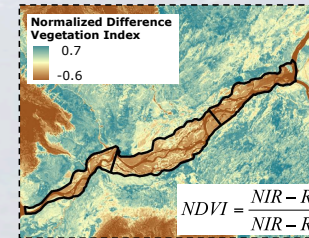
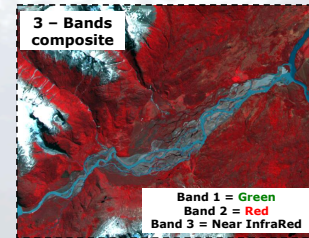


Characteristics of Rio Colonia
Average discharge = 110 m³/s
Length = 20 km
Maximum width ~1500 m
Discharge during GLOF ~ 4000 m³/s



- US\$7 billion mega dam project: reservoir sedimentation
- GLOF frequency: op. to predict & study extreme flows that usually occur every 100's of years several times a year!

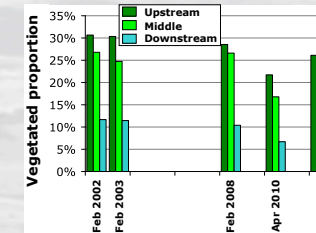
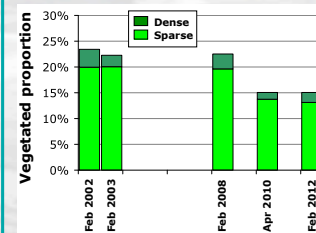
3 METHOD: ASTER Multi-spectral images - VNIR



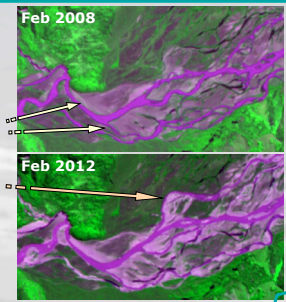
5 IMAGES

- 3^o Feb 2002
- 22^o Feb 2003
- 4^o Feb 2008
- 5^o Apr 2010
- 22^o Feb 2012

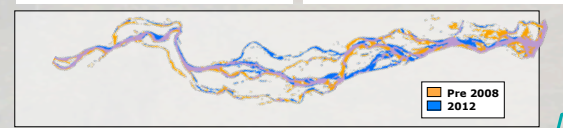
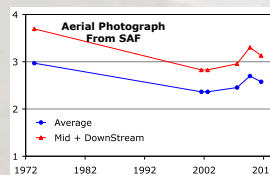
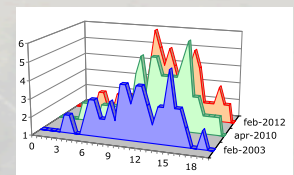
4 RESULTS: Changes in vegetation pattern



Vegetation has been eroded
1) along channels
2) where new branches have been activated



5 RESULTS: Braiding index & channel mobility



6 CONCLUSIONS

- In the last 4 years we observed a decrease of vegetation cover (by 30%) and a simultaneous increase of the braiding index
- This sequence of GLOFs is an ideal case to study the effect of different (and extreme) discharges on braiding, flood risk and sediment flux

ONGOING WORK

- River bed topo surveys, estimate bedload
- Suspended sediment, flood hazard, reservoir feasibility
- Vegetation studies, sensor network