

# PROGRAM AND ABSTRACTS



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**PAGES**  
PAST GLOBAL CHANGES

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#### **Abstract:**

Paleoclimate research offers an overview of Earth's climate change over the past 65 million years or longer, but our knowledge of paleoweather (i.e., extreme weather events occurring in days or even hours and minutes) is almost absent because current paleoclimatic reconstructions rarely provide information with temporal resolutions shorter than a month. Recently, our studies found that the Giant Clam shells from tropical western Pacific have clear daily growth bands and can provide daily to hourly resolution biogeochemical proxies records, including daily growth rate, hourly elements/Ca ratios, and fluorescence intensity. These ultra-high resolution proxies can clearly record the activities of past extreme weather events, for example, tropical cyclones during the summer-autumn and cold surges during the winter, indicating that Giant Clam shells have the potential to be used as an unprecedented archives for paleoweather reconstructions. The fossil shells living in different geological times can be built as a Geological Weather Station network to lengthen the modern instrumental data and investigate the weather-timescale extreme events under various climate conditions.

**Keywords:** Tridacna shell, daily growth bands, ultra-high resolution, biogeochemical proxies, weather-timescale extreme events

#### **East Asian summer monsoon over the past millennium**

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#### **Abstract:**

The East Asian summer monsoon determines the summer precipitation pattern in East Asia, home to approximately one-quarter of the world's population, and its variability is thus of broad interest for both the scientific community and the general public. However, it is difficult to reconstruct the EASM strength for eastern China over the past millennium using the precipitation-sensitive proxy evidences because the relationship between monsoon strength and precipitation intensity in China can be complex and vary between regions. Here, we reconstructed a wind-based EASM index over the past millennium. The reconstructed EASM index represents the simultaneous changes of the Meiyu precipitation and the southwesterly wind anomalies in East China, and is also significantly related to the first leading mode of the summer precipitation in China. Based on the reconstructed EASM index, we find that the EASM variability is primarily correlated with the Indo-Pacific Tripole (IPT) mode of the summer tropical sea surface temperature anomalies.

**Keywords:** East Asian summer monsoon, Tree ring, Speleothem, Historical document, Past millennium

#### **Dendrogeomorphology of the avulsion event on the Pedregoso Creek alluvial fan (Argentina, Puelo Lake) triggered by the historic 1960 earthquake**

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#### **Abstract:**

The most intense earthquake worldwide ever measured occurred in Valdivia, Chile, in May 1960. Its occurrence resulted in ecosystem's impacts on the Argentine Andean region in northwest Patagonia during and after the event. A known case is the Tsunami in Lake Nahuel Huapi that destroyed the Bariloche port. On the

other hand, less is known about the Pedregoso Creek (PC) flood in the north bayhead of the Puelo Lake. Historical local farmers who used to cross the PC recall that after the quake, small natural water bodies placed in the middle basin got undammed leading to a big flood in the lower basin. As a result, a channel avulsión took place in the PC alluvial fan and the location of its rivermouth changed drastically. Nowadays, the flood and the avulsion event is still recognizable in the alluvial fan due to a lower forest density that had slowly reestablished on the paleochannel sector. With this framework, we are conducting dendrogeomorphological studies in the alluvial fan in order to characterize the event, explore other conditions present during 1960th (e.g. above average annual precipitation) and analyze the channel's subsequent migration dynamics. For this purpose, we estimated forest density (tree/ha) and took increment core samples at multiple sampling points (distanced 50 m) along three arcuate transects that radially dissect all the Pedregoso alluvial fan. After the land survey, we zonificated the alluvial fan in six different sectors. The sectors were characterized by the forest maximum density value and the minimum potential tree establishment date of the last fluvial activity (oldest dated tree established), as follow: 1) the active PC channel with no trees; 2) a fluvial semi-active sector with 152 trees per ha and a minimal establishment date of 1987; 3) a fluvial inactive zone with 962 trees per ha and an establishment date of 1967; 4) the paleochannel sector, active before the earthquake and the flood events, with 337 trees per ha and an establishment date of 1973; 5) a paleochannel middle fluvial bar sector, with 429 trees per ha and an establishment date of 1963, and finally; 6) an undisturbed forest sector with 1975 trees per ha and an establishment date of 1832. These results, with no intermediate dated sector between the undisturbed (1832) and the paleochannel (1963) sectors, may preliminary suggest that the avulsión event was unique over the last two centuries. The younger sectors (2 and 3) are reflecting a gradual channel migration to the north side of the alluvial fan after the avulsion. Future work will continue surveying higher areas of the basin looking for lost small water bodies (damms), directed dendrogeomorphological sampling to reinforce the dating of the avulsion event and, lastly, analyzing instrumental climatic data to establish whether the earthquake took place on

a wet year resulting in an increased level of the Puelo Lake.

**Keywords:** Patagonia, Andean Range, fluvial dendrogeomorphology, channel, flood

### **Analysis of the last 75 years of floods in a high-resolution sedimentary record from the Tschingelsee (Swiss Alps)**

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#### **Abstract:**

Linking instrumental records with paleorecords such as lake and fluvial sediments can be a difficult task. For the calibration and correlation of different time series it is necessary to achieve high resolution sedimentary records with a robust geochronological model within comparable physiographic boundary conditions. Furthermore, there may exist differences between the temporal resolution of different types of records, and frequently, instrumental data are limited to a period no longer than 100 years, whereas the paleorecords usually exceed by far this time period.

In this work, we present the sedimentary and geochemical record of the Tschingelsee lake, located in the Bernese Oberland (46°33.170'N; 7°44.661'E). The lake was formed after a debris flow event, that occurred during the night of August 18 to 19 of 1972, which dammed the river outlet and contributed to the flooding of most of the Tschingel valley floor. After the lake formation, a river delta was growing on the upper part of the valley and currently the lake is almost completely covered by sediments. The excellent location of this lake, placed close to the Kiental meteorological station, and the exceptional high-resolution sedimentary records, which include varve-like layers, are favourable factors that contribute to a close correlation of the hydrological events between sedimentary and instrumental records.

The results from this work include a sedimentary analysis of a 4 meters long core, which presents facies of different granulometry