

# **Climate Response of** *Abies pindrow* in adjacent valleys of the Pir Panjal Range of Himalaya

<u>Uttam Pandey<sup>1</sup></u>, Naveen Gandhi<sup>1</sup>, H. P. Borgaonkar<sup>1</sup>

<sup>1</sup>Indian Institute of Tropical Meteorology, Dr. Homi Bhabha Road, Pashan, Pune

#### Introduction

> The Kashmir valley is bowled-shaped, extended in an NW-SE direction, and bounded by the Pir Panjal and Zanskar mountain ranges.

> Western disturbances dominate the region, but their intensity varies in the different valleys of the Pir Panjal Range of Kashmir Himalaya.

> The region received snowfall in harsh winters due to the western disturbances.

> However, the influence of the climate on tree growth is different throughout the valley due to changes in microclimate.

## **Climate of the Kupwara and Gulmerg**



Time span for available climate data

### **Study Area**



#### **Tree-ring Chronology**



**Kupawara:** 39 years **Gulmarg** : 49 years Therefore, to understand the long term climate variability requires proxy records such as **Tree-rings**, Varves, lake sediments, Speleothem etc

#### **Tree-ring Sample Collection**



#### Methodology



5. Chronology development









- Tree rings are annually resolved
- A calendar year can be assigned to each ring
- Show a continuous record
  - Trees have widespread distribution
- Earlywood

\_atewood

Partial cross-section of a coniferous tree



Processing of sample



6. Climate vs. Tree-ring

chronology

2. Counting and plotting of each ring



3. Cross-dating by

Skeleton plot method

4. Measurement of tree-rings



7. Climate (temperature, drought, river discharge and snow fall reconstruction)

Conclusions

> Kupwara and Gulmerg, both valleys, are affected by the western

disturbances. Still, the response of the tree growth with the adjacent

climate station differs due to changes in elevation and

geomorphological characteristics in the region, even in the adjacent

valleys.

➤ Total 454 years (AD 1560-2015) ➤ Total 401 years (AD 1604-2004) long long tree-ring width chronology developed based on 39 cores from 25 living trees.

tree-ring width chronology developed based on 93 cores from 51 living trees

Express Population Signal threshold (≥ 0.85) back to AD 1726



Express Population Signal threshold ( $\geq 0.85$ ) back to 1835

> Conifers Tree rings of different valleys of the Pir Panjal Range

behave heterogeneity with the region's climate.

Sample depth should be increased to remove the random noise and

get an adequate significant climate signal to reconstruct climate

beyond existing instrumental climate records.

 $\succ$  Therefore, developing a tree-ring network for individual valleys is

necessary to understand long-term climate variation beyond

instrumental climate records.