



What is GLORIA?

• The **Global Observation Research Initiative in Alpine Environments** is an international research network whose purpose is to assess climate change impacts on vegetation in alpine environments worldwide.



• Protocol was developed by a network of international scientists based in Vienna, Austria.

• Eventual implementation calls for 66 target regions globally



• Currently 38 active target regions, but only 4 in North America.

GLORIA in North America:

• 4 target regions comprise the North American Chapter to date and are located in the Northern Rocky Mountains, MT, and the Eastern Sierra Nevada and White Mountains, CA.

• 7 additional target regions are anticipated to be installed by the end of the 2006 summer season.

North American Chapter Goals:

• Promote establishment of baseline GLORIA sites which are well-distributed throughout western North American mountain regions.

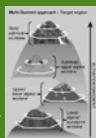


• To encourage additional alpine plant monitoring through extended research projects related to the baseline GLORIA areas

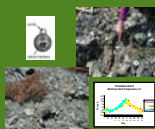
• Coordinate large-scale analyses once sites are established

Protocol:

• Selection of 4 similar summits covering zonal differences of subalpine to nival that are likely to be sensitive to climatic change.



• Temperature loggers buried to assess long term change



• Intense photo documentation procedures followed.



• Intensive vegetation plots are set up and monitored every five years.



• Data entered into international database, available to other researchers

Plans for the future of North American GLORIA:

• Continue a working relationship with CIRMOUNT (Consortium for Integrated Climate Research in Western Mountains) and the International GLORIA Program

• Install new Target Regions in western North American mountains

- 7 additional Target Regions are anticipated to be installed in 2006
 - Coastal Mountains, British Columbia, Canada
 - North Cascades, Washington, USA
 - Coast Mountains, Alaska, USA
 - San Juan Mountains, Colorado, USA
 - Central Rocky Mountains (Niwot LTER), Colorado, USA
 - South Cascades, California, USA
 - Lake Tahoe Basin, Sierra Nevada, California, USA

• Develop a research approach for extending Target Regions to investigate other aspects of alpine ecology

- Documentation of species composition and vegetation structure downslope in each cardinal direction from GLORIA sites (esp lowest summit)
- 100 m transect across slope and parallel to slope with point counts, belt transects for species lists

• Coordinate fund-raising to support installation and analysis of existing and new GLORIA sites in North America

Established North American Sites:

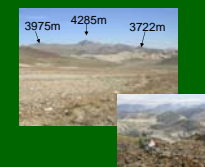
Glacier National Park Northern Rocky Mountains, MT



White Mountains, CA Dolomite



White Mountains, CA Granitic/ Volc



Sierra Nevada, CA



Initial Results:

	Number of Species:					
	Summit				Region	
	Low	Mid 1	Mid 2	High	Exotic	Total
Rocky Mtns	51	82	59	39	1	136
Sierra Nevada	38	36	13	22	0	65
White Mtns.	25	26	21	7	1	54

Northern Rocky Mountains

- High species diversity
- Slope and aspect are important diversity factors
- Scouring winds are particularly associated with aspect
- 5 species were common throughout
 - *Smelowskia calycina* var *americana*
 - *Polemonium viscosum*
 - *Erigeron compositus* var *glabratus*
 - *Potentilla fruticosa*

Sierra Nevada (SN) vs. White Mountains (WM)

- 65 taxa SN, 54 WM, 25 in common
- Only one non native species, found in SN
- Greater species diversity found in lower than higher summits
- Aspect not a strong determinant
- 2 major structural elements: widespread, cosmopolitan montane group (Sierran/Great Basin) + alpine flora (ground hugging/cushion plants)

White Mountains Granitic (WIM) vs. Dolomite (WDS)

- 19 new species on WDS not found on WIM summits
- Abundant species were common between WIM & WDS
 - *Elymus elymoides* was ubiquitous
 - *Erigeron gracilipes*, *Phlox condensata*, and *Erigeron pygmaeus* were dominant members of the alpine mat-forming community
- Shrub/subshrub community abundant on WIM, missing on WDS
- No exotic species found within plots