

IEEE Computer Society
Hyderabad Chapter IEEE
Hyderabad Section

Report on “Representation and topology – based clustering methods for spatial Data Analysis and Visualization.”

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Date & Time: 16th August 2020 from 06:30 pm to 07:30 pm

Speaker Details: Leila De Floriani

IEEE fellow

2020 IEEE Computer Society President

Description: The webinar “Representation and topology – based clustering methods for spatial Data Analysis and Visualization” is quite interesting and fascinating because there were no webinars related to this topic previously which at the first point have attracted a huge audience and Leila de floriani mam just awesome in delivering the content she wanted to in this session she first started her talk giving a small brief about her and her works which were inspiring to the young and upcoming generations.

IEEE COMPUTER SOCIETY
Hyderabad Section Chapter

IEEE CS Hyderabad Chapter

Webinar on

Representation and topology-based clustering methods
for **Spatial Data Analysis and Visualization**

Leila De Floriani
IEEE Fellow
2020 IEEE Computer Society President

Register at: bit.ly/CSHYDWEBINARI

16th August 2020 | 6:30 PM - 7:30 PM

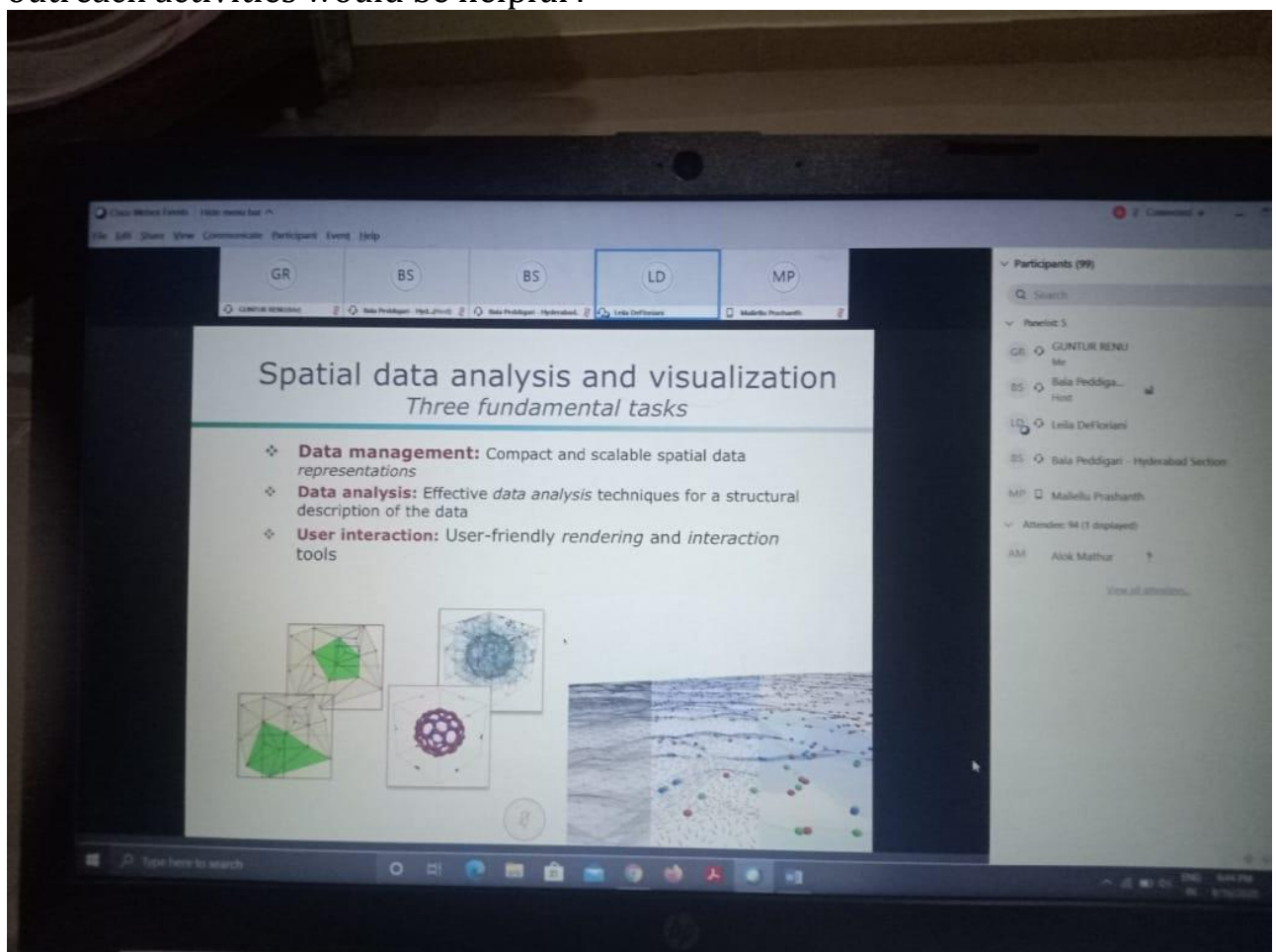
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Then she have started the session saying that geographic visualization, refers to a set of tools and techniques supporting the analysis of geospatial data through the use of interactive visualization. She said that spatial data analysis and visualization mainly includes three tasks such as

1. **Data management**
2. **Data analysis**
3. **User interface**

And she have clearly explained how the three tasks are inter related and how do they interpret she have also mentioned that Data Analysis is the process of bringing order and structure to collected data. It turns data into information teams can use but whereas Data visualization is the process of putting data into a chart, graph, or other visual format that helps inform analysis and interpretation. She also meant that geospatial tools to environmental problems of local significance, and to disseminate geospatial tools and knowledge to the larger island community through education and outreach activities would be helpful .

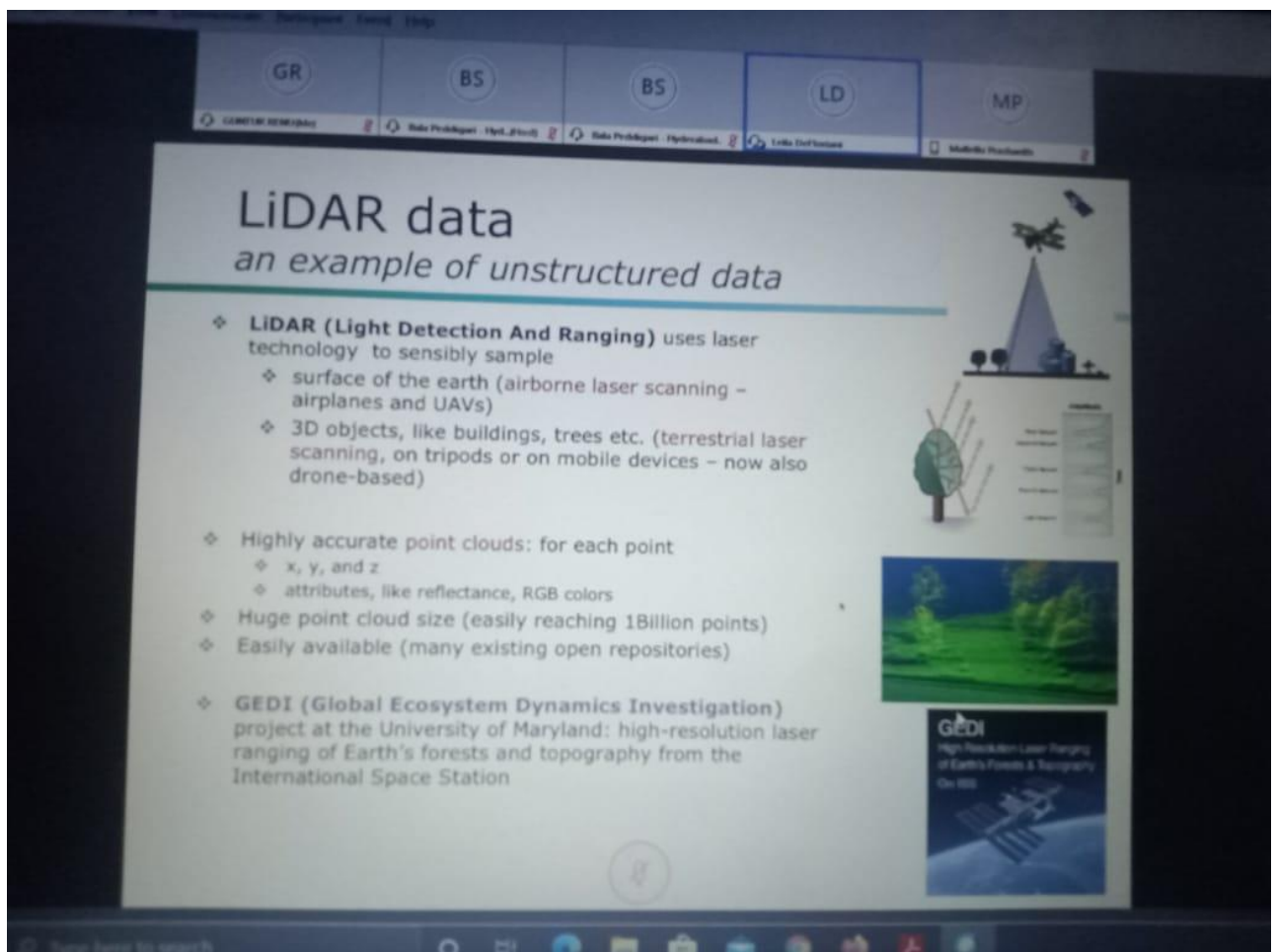


She have clearly explained about the LIDAR data which is Light Detection and ranging data which uses laser technology to sensibly sample

1. Surface of the earth (airborne laser scanning- airplanes and UAV's)
2. 3D objects like buildings, trees etc. (terrestrial laser scanning ,on tripods or on mobile devices – now also drone- based)

She mentioned that this LIDAR data is an example of unstructured data and has a huge point cloud size (easily reaching 1 Billion points)

She have also said that the GEDI (Global Ecosystem Dynamics investigation) project at the university of Maryland: high –resolution laser ranging of Earth's forests and topography from international space station .



She have explained about the Modular mesh data structures based on the stellar decomposition which include the

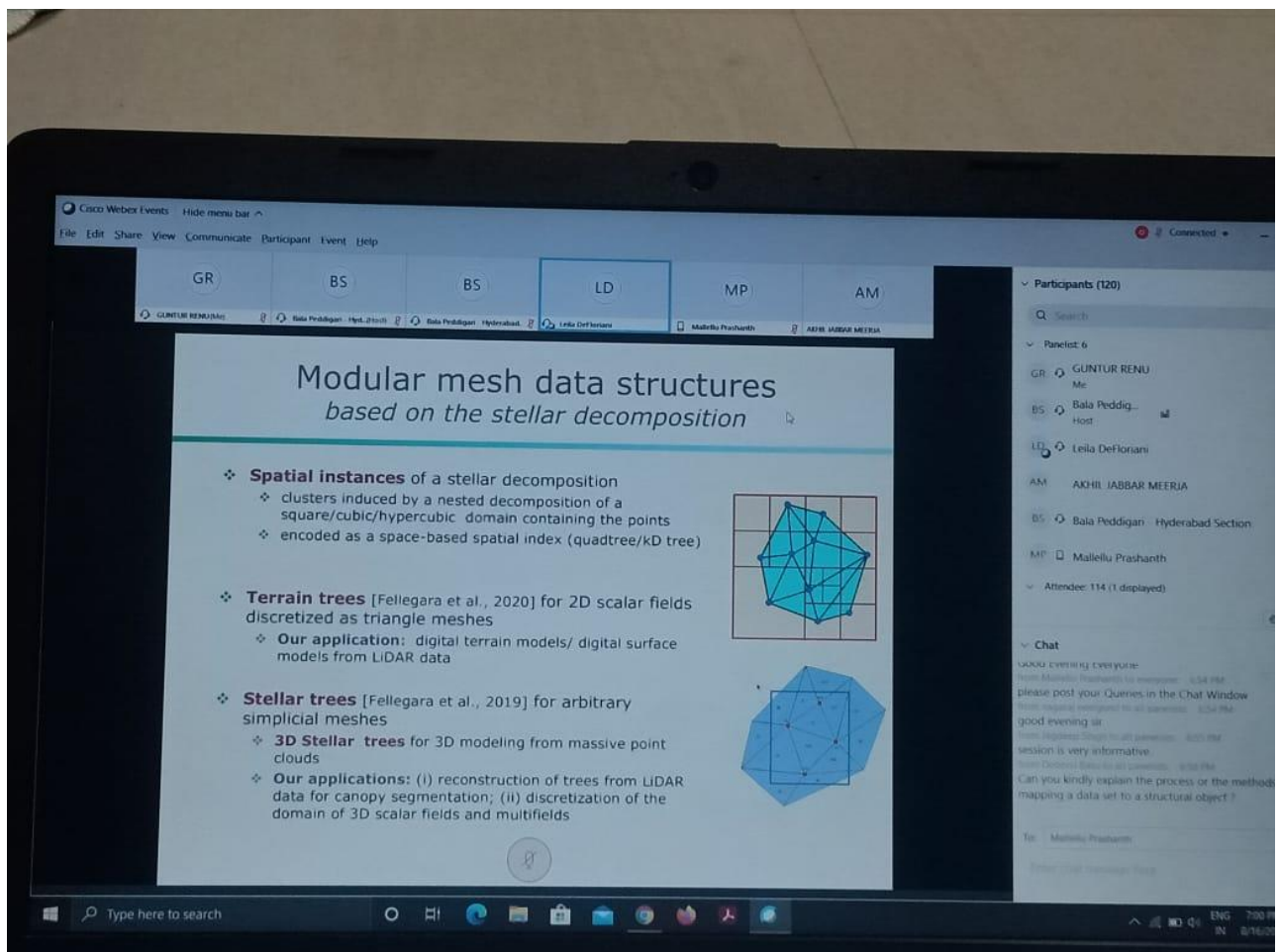
Spatial instances of a stellar decomposition

Clusters induced by a nested decomposition of a square/cubic/hypercubic domain containing the points which is encoded as a space – based spatial index (quadtree/kD tree)

She gave brief and clear description about the Terrain trees as well as Stellar trees and their applications as well .

After the session ended we have shown the glimpse of IEEE CS Hyderabad section events during this pandemic and she was impressed and glad for the works being done and gave us good appreciations.

And the session ended with a question and answer session from the participants followed by the vote of thanks.



SOME MORE SNAPS FROM THE WEBINAR

The presentation slide is titled "From single scalar fields to multifields". It contains the following content:

- ❖ **Multifields:** data equipped with a multi-valued function $F = (f_1, f_2, \dots, f_k)$, e.g., temperature and pressure
- ❖ **Objective:** a new framework for the analysis, and tracking of topological features in multifields
 - ❖ based on the generalization of the Forman's combinatorial approach for single fields
- ❖ **Our work:** definition of a discrete gradient (plus critical cells) compatible with a multifield
 - ❖ the discrete gradient has arrows where the input fields "agree", critical cells otherwise

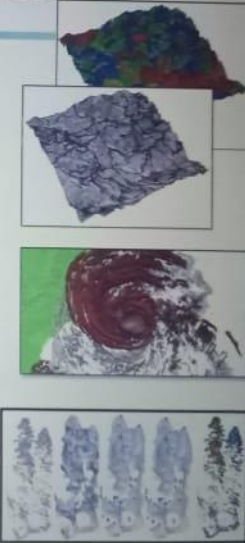
Visualizations on the right side of the slide:

- Original bi-variate dataset:** A vertical label for two heatmaps. The top heatmap is labeled "First scalar field" and the bottom one is labeled "Second scalar field".
- Discrete gradient:** A vector field visualization showing arrows on a grid, representing the discrete gradient of the multifield.

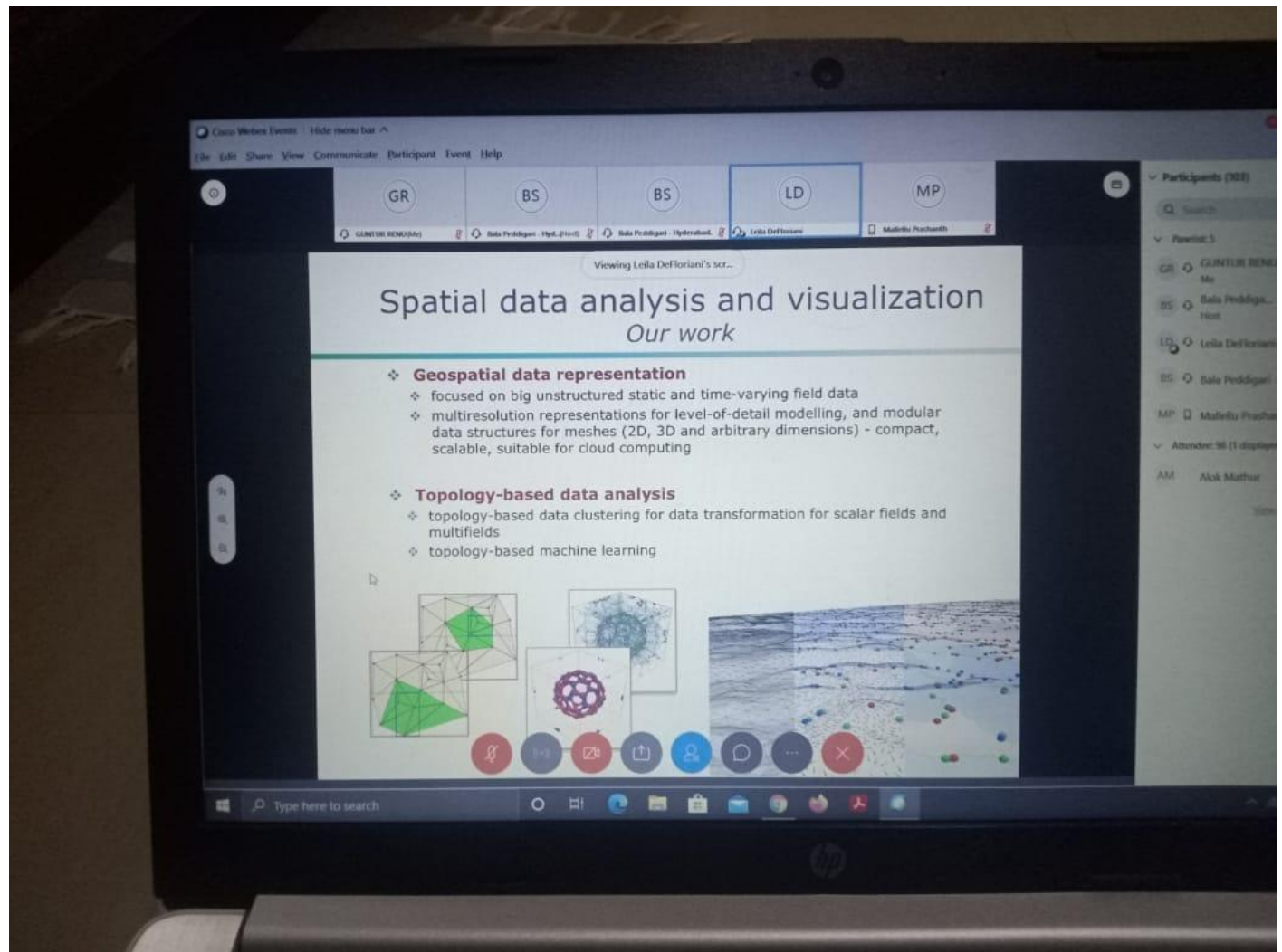
Our current applications

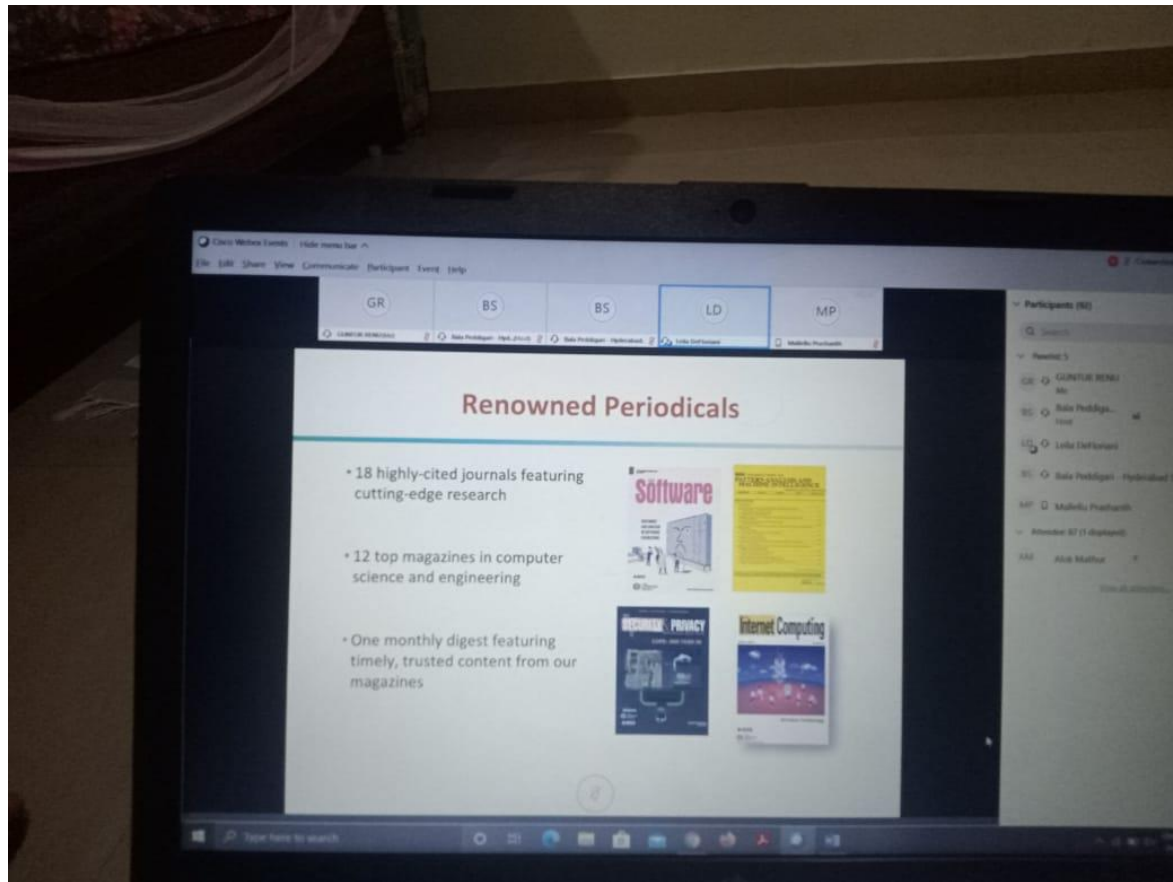
- ❖ Large **terrain modeling** and **analysis** from LiDAR data
- ❖ **Multifield data** analysis and visualization for atmospheric and oceanic data
- ❖ **Topo-bathymetric data** analysis for marine navigation and geomorphometry
- ❖ **Canopy segmentation**: massive-scale tree mapping and reconstruction from airborne and terrestrial LiDAR acquisitions
- ❖ **Vessel route** and **map reconstruction** from GPS trajectories
- ❖ Topology-based algorithms for social network analysis (**migration networks**)

Funding from **NSF** (National Science Foundation) and **NOAA** (National Oceanic and Atmospheric Administration)



The slide is part of a presentation in a software interface. At the top, there is a menu bar with 'File', 'Edit', 'Share', 'View', 'Communicate', 'Participant', 'Event', and 'Help'. Below the menu bar, there are five circular icons labeled 'GR', 'BS', 'BS', 'LD', and 'MP'. The 'LD' icon is highlighted. Below these icons, there are five tabs: 'CENTURUS REMEDIATION', 'Bala Peddigan - Hyd_2 (ort)', 'Bala Peddigan - Hyderabad', 'Linda Deflorana', and 'Mallika Pruthi'. The main content area shows the slide titled 'Our current applications'. To the right of the slide, there is a 'Participant' list with names and status icons. Below the participant list, there is a 'Chat' window with messages. At the bottom of the screen, there is a Windows taskbar with a search bar and several application icons.





On a whole that was a wonderful session.

THANK YOU,