Supplememntary information on datasets

Supraglacial features of debris covered glaciers in the Himalaya from Landsat spectral umixing and Pleiades

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This dataset contains the spectral unmixing output files for the debris covered glacier surfaces based on Landsat-8 OLI imagery and Pleiades imagery of 2015. Files are provided for two domains, the Khumbu reference region of Nepal and the greater Himalaya region (76.3 to 92.6° W and 26.3 to 34.2° N), which covers covering most area from Himachal/Jammu and Kashmir border to Bhutan Himalaya.

- **Landsat images**

  LS8_yyyymmdd_latYYlongXXXX_rRRpPPP_vmsk_topshad_rad_srefdem_stdsref.kea

  - Surface reflectance images of Landsat-8 OLI scenes from Collection 1 Level 1 (L1TP), atmospherically and topographically corrected using the ARCSI routine, supplied in .kea format. These can be converted to GeoTifs using the GDAL command.
  - Projection is UTM (zones depending on the image), from the original Landsat L1TP files
  - The file naming convention, which is a standard output from ARCSI routine, include the image date ("yyyy" = year, mm = "month", "dd" = day), latitude ("YY") and longitude ("XXXX") of the image center, path/row ("PPP" = path, "RRR" = row), and the output products generated by ARCSI ("rad" = radiation, "topshad" = topographic shadows, "srefdem" indicates the use of elevation data, "stdsref" = standardized surface reflectance)

- **Examples of fractional files for the Khumbu:**

  LS8_20150930_r41p140_frac_files. zip

  - Raster format (GeoTiffs)
  - Non-normalized fractional water, light and dark debris and vegetation maps for the Khumbu reference image (Sept 30, 2015) output from the linear mixing model routine used to produce binary maps of surfaces with values ranging from 0 to 1 (0% to 100% pixel coverage)

- **Binary surface maps for the Himalaya**:

  Himalaya_L8_raw_binary_surface_maps.zip

  - Vector format (ArcGIS shapefiles)
  - Raw, unprocessed binary maps of ponds, vegetation debris, ice and clouds over the debris covered glacier tongues in the Himalaya around the year 2015 (binary files)
  - Derived from tresholding the fractional maps using a variable threshold (see publication)
  - Maps in this pre-release version have not been manually corrected for misclassified areas due to confusion of classes, and the ice and cloud classes are not highly accurate
  - These are not the final coverages of these surfaces over the domain and should not be used as such
  - The supraglacial pond maps will undergo manual corrections and the datasets will be updated on this page

- **Dataset for analysis, glacier-by-glacier:**

Himalaya_SDC_LS_for_analysis_gt1km2_with_frac_and_debris_attributes.txt

  - original glacier attributes are from the SupraGlacial Debris Cover dataset (Sherler et al 2018), based on the RGI. See Scherler et al for code explanation.
  - updated with the preliminary fractional cover of each surface (in %) on a glacier-by-glacier basis
  - contains only debris covered tongues >1 km2
  - debris covered attributes were calculated from the ALOS Global Digital Surface Model (AW3D30 DEM) for each debris covered tongue in this study
    - DC_area_km2 = recalculated debris covered area
    - DCmin = minimum debris cover elevation (meters)
    - DCmax = maximum debris cover elevation (meters)
    - DCrange = altitudinal range (meters)
    - DCmed = median elevation (meters)
    - SLmean = mean slope (degrees)
    - SLrange = slope range (degrees)
    - SLmin = min slope (degrees)
    - SLmax = max slope (degrees)