CLAIMS

1. A method for processing video data, comprising: obtaining 360-degree video data including a plurality of video frames, each video frame of the plurality of video frames including a spherical representation of video data for each video frame; segmenting a video frame from the plurality of video frames into a top region, a middle region, and a bottom region, the top region including a first circular area of the spherical representation, the bottom region including a second circular area of the spherical representation that is opposite on the spherical representation from the first circular area, wherein the middle region includes an area of the spherical representation not included in the top region or the bottom region; and mapping, using a cylindrical equal area projection, the middle region to one or more rectangular areas of an output video frame, the mapping including selecting a pixel location in the output video frame, determining a point on the spherical representation that corresponds to the pixel location using a mapping for converting a two-dimensional rectangle to a three-dimensional sphere, sampling a pixel at the point on the spherical representation, and assigning the sampled pixel to the pixel location in the output video frame.

2. The method of claim 1, wherein the video frame is segmented at a first latitude above an equator of the spherical representation and a second latitude below the equator, wherein the first latitude and the second latitude are equidistant from the equator, wherein the top region is above the first latitude, and wherein the bottom region is below the second latitude.

3. The method of claim 1, wherein the middle region includes two-thirds of the area of the spherical representation.

4. The method of claim 1, wherein the middle region includes a left view, a front view, and a right view, wherein the left view is placed in the output video frame adjacent to the front view, and wherein the right view is placed adjacent to the front view.

5. The method of claim 1, wherein the middle region includes a back view, wherein the bottom region is placed in the output video frame adjacent to the back view, and wherein the top region is placed adjacent to the back view.

6. The method of claim 1, further comprising: mapping the top region into the output video frame; and mapping the bottom region into the output video frame.

7. The method of claim 1, wherein the output video frame has a three-by-two aspect ratio.

8. A video coding device comprising: a memory configured to store 360-degree video data including a plurality of video frames, each video frame of the plurality of video frames including a spherical representation of video data for each video frame; and a processor configured to: segment a video frame from the plurality of video frames into a top region, a middle region, and a bottom region, the top region including a first circular area of the spherical representation, the

bottom region including a second circular area of the spherical representation that is opposite on the spherical representation from the first circular area, wherein the middle region includes an area of the spherical representation not included in the top region or the bottom region; and map, using a cylindrical equal area projection, the middle region to one or more rectangular areas of an output video frame, the mapping including selecting a pixel location in the output video frame, determining a point on the spherical representation that corresponds to the pixel location using a mapping for converting a two-dimensional rectangle to a three-dimensional sphere, sampling a pixel at the point on the spherical representation, and assigning the sampled pixel to the pixel location in the output video frame.

9. A non-transitory computer-readable medium having stored thereon instructions that, when executed by one or more processors, cause the one or more processors to perform operations including: obtaining 360-degree video data including a plurality of video frames, each video frame of the plurality of video frames including a spherical representation of video data for each video frame; segmenting a video frame from the plurality of video frames into a top region, a middle region, and a bottom region, the top region including a first circular area of the spherical representation, the bottom region including a second circular area of the spherical representation that is opposite on the spherical representation from the first circular area, wherein the middle region includes an area of the spherical representation not included in the top region or the bottom region; and mapping, using a cylindrical equal area projection, the middle region to one or more rectangular areas of an output video frame, the mapping including selecting a pixel location in the output video frame, determining a point on the spherical representation that corresponds to the pixel location using a mapping for converting a two-dimensional rectangle to a three-dimensional sphere, sampling a pixel at the point on the spherical representation, and assigning the sampled pixel to the pixel location in the output video frame.

10. An apparatus, comprising: means for obtaining 360-degree video data including a plurality of video frames, each video frame of the plurality of video frames including a spherical representation of video data for each video frame; means for segmenting a video frame from the plurality of video frames into a top region, a middle region, and a bottom region, the top region including a first circular area of the spherical representation, the bottom region including a second circular area of the spherical representation that is opposite on the spherical representation from the first circular area, wherein the middle region includes an area of the spherical representation not included in the top region or the bottom region; and means for mapping, using a cylindrical equal area projection, the middle region to one or more rectangular areas of an output video frame, the mapping including selecting a pixel location in the output video frame, determining a point on the spherical representation that corresponds to the pixel location using a mapping for converting a two-dimensional rectangle to a three-dimensional sphere, sampling a pixel at the point on the spherical representation, and assigning the sampled pixel to the pixel location in the output video frame.

11. A method for processing video data, comprising: obtaining 360-degree video data including a plurality of video frames, each video frame from the plurality of video frames including a two-dimensional representation of video data for each video frame; identifying one or more

rectangular areas of a video frame from the plurality of video frames; and mapping, using a cylindrical equal area projection, the one or more rectangular areas into a middle region of a spherical representation of the video data, the spherical representation further including a top region and a bottom region, wherein the middle region is located between the top region and the bottom region, the mapping including selecting a point on the spherical representation, determining a pixel location in the video frame that corresponds to the point using a mapping for converting a three-dimensional sphere to two-dimensional rectangle, sampling a pixel from the pixel location, and assigning the sampled pixel to the point on the spherical representation.

12. The method of claim 11, wherein the top region includes a surface of the spherical representation above a first latitude of the spherical representation, wherein the bottom region includes a surface of the spherical representation below a second latitude of the spherical representation, wherein the first latitude and the second latitude are equidistant from an equator of the spherical representation.

13. The method of claim 11, wherein the one or more rectangular areas include two-thirds an area of the video frame.

14. The method of claim 11, wherein the one or more rectangular areas include a left view, a front view and a right view, wherein the left view is located adjacent to the front view, and wherein the right view is adjacent to the front view.

15. The method of claim 11, wherein the one or more rectangular areas include a back view, wherein a first rectangular area including a bottom view is adjacent to the back view, and wherein a second rectangular area including a top view is adjacent to the back view.

16. The method of claim 11, further comprising: mapping a first rectangular area of the video frame into the top region; and mapping a second rectangular area of the video frame into the bottom region.

17. The method of claim 11, wherein the video frame has a three-by-two aspect ratio.

18. A video coding device comprising: a memory configured to store 360-degree video data including a plurality of video frames, each video frame from the plurality of video frames including a two-dimensional representation of video data for each video frame; and a processor configured to: identify one or more rectangular areas of a video frame from the plurality of video frames; and map, using a cylindrical equal area projection, the one or more rectangular areas into a middle region of a spherical representation of the video data, the spherical representation further including a top region and a bottom region, wherein the middle region is located between the top region and the bottom region, the mapping including selecting a point on the spherical representation, determining a pixel location in the video frame that corresponds to the point using a mapping for converting a three-dimensional sphere to two-dimensional rectangle, sampling a pixel from the pixel location, and assigning the sampled pixel to the point on the spherical representation.

19. A non-transitory computer-readable medium having stored thereon instructions that, when executed by one or more processors, cause the one or more processors to perform operations including: obtaining 360-degree video data including a plurality of video frames, each video frame from the plurality of video frames including a two-dimensional representation of video data for each video frame; identifying one or more rectangular areas of a video frame from the plurality of video frames; and mapping, using a cylindrical equal area projection, the one or more rectangular areas into a middle region of a spherical representation of the video data, the spherical representation further including a top region and a bottom region, wherein the middle region is located between the top region and the bottom region, the mapping including selecting a point on the spherical representation, determining a pixel location in the video frame that corresponds to the point using a mapping for converting a three-dimensional sphere to two-dimensional rectangle, sampling a pixel from the pixel location, and assigning the sampled pixel to the point on the spherical representation.

20. An apparatus, comprising: means for obtaining 360-degree video data including a plurality of video frames, each video frame from the plurality of video frames including a two-dimensional representation of video data for each video frame; means for identifying one or more rectangular areas of a video frame from the plurality of video frames; and means for mapping, using a cylindrical equal area projection, the one or more rectangular areas into a middle region of a spherical representation of the video data, the spherical representation further including a top region and a bottom region, wherein the middle region is located between the top region and the bottom region, the mapping including selecting a point on the spherical representation, determining a pixel location in the video frame that corresponds to the point using a mapping for converting a three-dimensional sphere to two-dimensional rectangle, sampling a pixel from the pixel location, and assigning the sampled pixel to the point on the spherical representation.

21. The video coding device of claim 8, wherein the video frame is segmented at a first latitude above an equator of the spherical representation and a second latitude below the equator, wherein the first latitude and the second latitude are equidistant from the equator, wherein the top region is above the first latitude, and wherein the bottom region is below the second latitude.

22. The video coding device of claim 8, wherein the middle region includes two-thirds of the area of the spherical representation.