

**WORLD METEOROLOGICAL ORGANIZATION**

**COMMISSION FOR INSTRUMENTS  
AND METHODS OF OBSERVATION**

**TASK TEAM ON REVISION OF THE INTERNATIONAL  
CLOUD ATLAS  
Fourth Session**

**Hong Kong, Hong Kong, China**

**24 to 28 October 2016**



**FINAL REPORT**

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## GENERAL SUMMARY

### 1. ORGANIZATION OF THE SESSION

#### 1.1 Opening of the Session

1.1.1 The Fourth Session of the CIMO Task Team on the International Cloud Atlas (TT-ICA-4) was opened at 09:00 hours on Monday, 24 October 2016, at the Hong Kong Observatory, Hong Kong, China.

1.1.2 Mr Kit-Chi Tsui, Assistant Director, welcomed the participants on behalf of the Hong Kong Observatory.

1.1.3 Mr Steve Cohn, chairman of the Task Team on the International Cloud Atlas welcomed the participants to the meeting, that is expected to be the last physical meeting of the team.

#### 1.2 Adoption of the Agenda

1.2.1 The session approved the proposed meeting agenda.

#### 1.3 Working Arrangements of the Session

1.3.1 The session agreed on details concerning the organization of its work, including working hours.

1.3.2 The list of participants at the session is provided at [Annex I](#).

## 2. REPORT OF THE CHAIR

2.1 Dr Cohn, the chairman of the TT-ICA, presented a brief report summarizing the activities of the task team since TT-ICA-3 in September 2015, focusing on the most recent developments (see [Annex II](#)). He recalled that until March 2016, most of the time was spent on finalizing the text, while since then focus has been put on the design of the website and on the imagery.

2.2 He thanked all the participants for their strong involvement throughout the year and for their participation at the 35 webex teleconference sessions that took place since the last physical meeting of the team in September 2016.

## 3. FINALISATION OF THE TEXT OF THE UPDATED CLOUD ATLAS

### 3.1 Main Text

3.1.1 The meeting recalled that the text had been submitted for review to all WMO Members. Upon consideration of their comments on the text, the text had been edited by a WMO editor. The meeting reviewed the changes of text proposed by the WMO editor. A few additional errors were found by the participants and corrected. These included among others: the definition of a meteor (to acknowledge it includes also photometeors), the fact that hail can only happen in association with cumulonimbus, simplification of the text related to spouts. The meeting then agreed on a final version of the text that was provided to the Hong Kong Observatory to populate the website and that will be submitted for approval to the WMO President by the WMO Secretariat.

3.1.2 The meeting agreed that next to the definition of the genera, an image of the genera should be included. It also decided to include the corresponding cartoon next to these definitions. The meeting requested that the cartoons be loaded as images in the image submission site.

3.1.3 The meeting noted that in the previous version of the ICA, regulatory text was highlighted in different ways in different parts of the document: using either bold headings, or italic text in the definitions. The meeting recommended to use a unique way of identifying regulatory text throughout the new edition and further recommended to use grey-shaded boxes for that purpose.

3.1.4 The meeting debated on whether Table 1 should be kept in the document, removed or shifted to a later part. It recognized that removing this table or shifting it would be a major change that was not supposed to happen at this stage of the update process, as Members had already been consulted on the content of the new ICA. The meeting therefore decided to keep it in the Atlas and to recommend reconsidering this decision in a possible later update of the ICA.

3.1.5 The meeting recalled that in the process of revising the text, the notes describing older practices had been removed as they had no relevance anymore.

3.1.6 In conducting its work, the TT had agreed that the text would be focused on the work of a visual observer. Therefore, satellite imagery was only included as metadata, but not taken into account to carry out a visual observation. In the context of tornadoes, a similar approach was followed, recognizing that a visual observer does not have access to radar data to classify the various types of tornadoes.

3.1.7 The meeting recognized that the section relevant to spouts had been significantly improved in the current version. However, the team noted that in a future revision of the ICA, the definition of spouts, funnel clouds and tornadoes may have to be revisited.

3.1.8 The meeting recognized that in view of the limited time available to carry out the update of the ICA text, some sections could still benefit from further revision, which could be taken into account in a later edition of the ICA. The meeting noted in particular that the following areas/sections would benefit to be updated in a further edition:

- Consider whether Table 1 needs to be kept, removed, or shifted to Section 3.2.
- Consider whether tornado and funnel cloud should be defined.
- Consider adding imagery to the glossary.

- Given limited time before this edition is released, there may be benefit to add additional imagery in a future edition. This is to fill in any gaps that this TT was not able to cover. Gaps could be in climate zone coverage or rare clouds or other meteors, or to otherwise provide more examples of some cloud types or features.]

## 3.2 Glossary

3.2.1 The meeting thoroughly reviewed all the proposed entries of the glossary. In doing so, it recalled that the ICA glossary is meant to include terms relevant to the visual observation of clouds that are used in popular language, but that are not defined in the ICA text. The glossary is not meant to include all terms related to cloud physics, nor to forecasting, nor to duplicate definitions provided elsewhere in the ICA. In particular, this resulted in a choice of not including terms that are primarily derived from radar or satellite representations.

3.2.2 A break-out group fully revised the glossary during the meeting, reviewing all the definitions and scrutinizing the source of the definitions, trying to have as few sources as necessary. The revised version of the glossary was shared with all the TT-ICA members. The meeting requested all the TT-ICA members to perform a final check of the glossary and to provide comments, if any, by 4 November 2016, so that it could then be provided to the WMO editors.

3.2.3 The meeting recognized the difficulty of sourcing images for all the glossary terms. The meeting agreed that it should not be a priority to search for such images at this stage, but that this should be kept for a potential future update of the ICA.

## 4. WEBSITE STRUCTURE AND FUNCTIONALITY

4.1.1 HKO provided access to a preliminary version of the website, so that the TT could review its structure. The meeting was pleased with the current state of the ICA.

4.1.2 Each of the meeting participants had independently reviewed the website and made proposals to be considered by the TT. The meeting reviewed each of the comments and decided whether the TT as a whole was supporting them and if so, how they should be implemented. The HKO programmers were present for this discussion and advised the TT on the feasibility of implementing the proposals. The final decisions made by the TT in knowledge of the programmers feedback, were put in writing and provided to them for implementation.

4.1.3 The meeting recommended among others, the following points:

- Put title “International Cloud Atlas” in the website top banner.
- The ICA website entry page should be attractive and include a short introductory video (to be available at least for a duration of one year) and a “Skip intro” button should be available on that introductory page. The introductory page should also provide information on how the regulatory text is highlighted in the ICA website.
- Section numbers need to be identifiable. It was proposed to include them in a light manner by either putting them right-hand justified at the level of the titles, and/or by highlighting them when moving the mouse over the title.
- Include the preface under the “About” tab.
- Include the flowcharts under the “Observing Clouds” tab. (Sub-menu should be in the following order: 1) 10 genera, 2) Clouds seen from the surface, 3) Coding, 4) Clouds seen from aircraft)
- More text should be displayed on each page.

4.1.4 The meeting welcomed the offer from Mrs Rae to verify by mid-November whether the “Next” and “Previous” button available at the bottom of each page should be removed from some of them, or replaced with a different text.

4.1.5 The HKO programmers implemented some of the proposed changes already during the week of the meeting, which enabled the participants to note the progress on the last day of the meeting, and to verify that it was feasible to implement most of the team’s proposals.

4.1.6 The meeting thanked HKO for its effort in developing the website and for having already implemented some of the requested changes.

## 5. IMAGERY

### *Current status of imagery*

5.1.1 The meeting was informed about the progress made by the image team towards finalization of the images for the ICA. Mr Bruhn showed to the participants how the image team uses the image editing tool, that is incorporated in the image submission site, to finalize the images. This process includes the review/selection of the images, the annotation of the image to highlight the different cloud features in it, the development of the caption, and the inclusion of additional metadata such as atmospheric soundings, weather charts, radar images, etc. Approximately 120 images were finalized at the time of the meeting.

5.1.2 The meeting was informed that Mr Frank Le Blancq is providing a substantial support to Mr Bruhn and Mr Anderson in doing the assessment of the images, and in developing the figure captions and finalizing the images for the website. The meeting thanked him for his contribution and recommended that his contribution be appropriately recognized and mentioned in the list of contributors to the development of this edition of the ICA.

5.1.3 The meeting was informed that Mr Matthew Clark from the UK Metoffice is willing to assist the image team as well and that he would likely do so by providing images from his own library, or by contributing to annotating the images. Another expert, who had expressed interest to support the image team, did not seem to be interested in contributing anymore.

5.1.4 The meeting was informed that most providers of metadata (such as weather charts, soundings, radar images) had agreed to their use on the condition that the sources be properly mentioned. In this context, the image team is trying to standardize the use of UK Metoffice charts for imagery from Europe.

5.1.5 HKO informed the meeting that the deadline for finalization of the images could be postponed to end of January 2017.

### *Finalization of the new imagery*

5.1.6 The meeting was informed that no appropriate submission had been received for several classifications. All TT-ICA members were urged to help in sourcing those images.

5.1.7 It was recognized that a large number of images had been sourced in different ways by TT members such as through social media, or through the WMO calendar submissions. Those images still need to be uploaded in the image database so that they could be considered by the judges. HKO offered to upload them. Mr Bruhn agreed to perform a rough assessment of these images to decide whether it would be worthwhile to source high-resolution version (if not available) and to take the time to upload them in the image submission site. Mr Bruhn performed an initial selection of the worthwhile images and explained to the HKO staff how to upload them in the system.

5.1.8 The meeting noted that searching for new imagery at this stage was negatively impacting on the ability of the image team to finalize the images that had already been sourced. It further noted that it was now critical to finalize as many of the available images as possible and that no new imagery should be search by TT members until 31 January unless that would not require any assessment from the image team members.

5.1.9 The meeting noted that only few time-lapses were available and agreed these should be searched as a priority. The meeting requested the TT members to search for high definition time-lapses and requested Mr Lovell to provide support to the team in assessing whether the quality and value of the time-lapses were sufficient, so that the TT members could follow-up and request permission for use of the time-lapses in the ICA, and requesting their authors to upload them in the image submission site.

**Imagery from 1987 edition**

5.1.10 The meeting was informed that the image team needed support to finalize the review of the images from the 1987 Vol. II edition. This requires checking the captions, checking the correctness of the positioning of the annotation boxes in the images and inserting the coding, and linking them to the correct primary image.

5.1.11 Mr Bruhn taught the participants of the break-out group “Finalization of the 1987 images” how to use the image editing tool to finalize them. The break-out group members then started the finalization of the images, each concentrating on one specific genera.

5.1.12 Mr Lovell identified those 1987 images that were relevant to orographic clouds, and to clouds as seen from aircrafts, and that could be used to be linked to those two sections that included very few links to images (see [Annex III](#)). He then started to include links to relevant images from these sections.

5.1.13 Each image from the 1987 edition has to be linked to the corresponding primary images of the new edition. It was noted that at the time of the meeting some of those primary images had not been sourced yet and that the team would have to decide in due time whether a 1987 image could be used instead.

5.1.14 The break-out group on “Correspondence between 1987 images and primary images” developed a list associating the best 1987 images to corresponding primary images (see [Annex IV](#)), and recommended that these images be visible from the image viewer. In some cases, several images from the 1987 edition correspond to a primary image, while in other cases, the 1987 edition does not include any image corresponding to some classifications.

5.1.15 The finalization of the 1987 images raised several questions and concerns that were addressed in the image subgroup, as well as later in plenary.

- Some primary images have no corresponding 1987 image, while others have several.
- When several 1987 images correspond to a primary image, should they all be provided with the primary image, or only the best one?
- Should all the 1987 images be included in the new edition?
- What to do with 1987 images that have errors, and/or typos?
- Is there value in including the 1987 images, or should rather more secondary images be included?
- Should 1987 images be accessible from the image gallery search engine, or only as metadata to a new image (providing the traceability to the former version of the ICA)?
- Should the 1987 image be accessible from the image gallery, but independently from the other images: having a separate button to search for them only.

5.1.16 The meeting considered possible ways to include the images from the 1987 edition of the ICA in the website. It recalled that it had originally planned to include them all to ensure traceability between editions on the way the classifications are interpreted. At its earlier meetings, TT-ICA had already noted the limitations of some of the images and that they would likely not all be suitable for inclusion in the new edition. The meeting had to recognize that some of the 1987 imagery was of poor quality and would not be appropriate for inclusion in the new ICA:

5.1.17 The meeting recognized that modifying the captions from the 1987 images would actually correspond to creating a new image and would have no value from a traceability perspective. The meeting therefore agreed that the 1987 images should either be used in the state in which they were published, or not used, but that in any case they should not be corrected as it would be much more valuable to invest the limited time of the TT-ICA members on new high-quality imagery rather than on old low-quality and low-resolution imagery. In this context, the meeting noted that the scan of the 1987 Vol II of the ICA was available online from the WMO library and should remain accessible in the future for reference/traceability purposes.

5.1.18 The meeting decided that only part of the 1987 images would be used in the new edition of the ICA, keeping only those images that are of sufficient quality (acceptable photographic quality and error-free). The meeting requested the Secretariat to inform the CIMO Management Group of



the decision of TT-ICA, not to include all the 1987 images in the new edition of the ICA, while ensuring a link to the complete 1987 Vol. II is available from the ICA website.

5.1.19 The meeting agreed that a 1987 image showing a number of key features can be used as metadata to several primary images.

5.1.20 The meeting decided that the 1987 images would be visible through the image viewer as metadata to primary images, but that they would not be directly accessible from the image library.

5.1.21 Mr Bruhn informed the meeting that he had started to develop a list of 1987 images that were of acceptable photographic quality and error-free and agreed to finalize this list of good 1987 images and share it with the team. Only those images from this list, that are error-free and of acceptable photographic quality should be allowed to be visible in the ICA website.

5.1.22 The meeting noted that the image database and the image gallery currently contains all the 1987 images. HKO agreed to ensure that only the images from this list of good 1987 images would be included in the final website, and would not be directly accessible from the gallery.

### ***Plan for finalization of the imagery***

5.1.23 The meeting considered the work required to finalize all remaining images by editing titles and providing captions and metadata for each, and assigned tasks to the TT members towards finalizing this work within a timeline that is consistent with the needs of the HKO web team.

5.1.24 The meeting agreed that:

- Mr Bruhn and Mr Anderson, together with the help of Mr Le Blancq would finalize the edition of the new images. Mrs Rae would support this process, when needed and requested by Mr Bruhn. It is planned that most of the primary images would be finalized by 31 December 2016, and that secondary images would be finalized by 31 January 2017.
- Mrs Campos, Mrs Rae, Mrs Thürig, and Mr Lovell, would finalize the editing of the 1987 images that are in the list of the good 1987 images.
- HKO will relabel the 1987 images to ensure only the good 1987 images remain accessible in the database.

## **6. ADDITIONAL ITEMS**

### **6.1 Agreement with HKO regarding development, operation and maintenance of the website**

6.1.1 The Hong Kong Observatory representative and the WMO Secretariat representatives discussed the required form and content of an agreement between WMO and HKO regarding the development and operation of the ICA website. It was agreed that the agreement would take the form of an exchange of letters. A first draft of the content was exchanged, reviewed and tentatively agreed on. The exchange of letters will be finalized following internal review within HKO and the WMO Secretariat.

### **6.2 Introductory video**

6.2.1 The meeting was invited to consider the requirements for an introductory video to the new cloud atlas that could be put on the homepage of the ICA website.

6.2.2 The meeting strongly supported the idea to develop an introductory video for the ICA website. It recommended that the speakers in the video should include the president of CIMO, Bertrand Calpini, as well as a member of the TT-ICA, and to cater for gender representation. The video should include many cloud images, as well as some time-lapses, a series of images seen in the image viewer and the cloud identification flowcharts. The video should explain how the website can help observers, mention the target audiences of the website, stress the importance of

standardization of terminology, and provide some explanation on the link of clouds to weather forecasting and climate.

6.2.3 Steve Cohn and Eliane Thürig-Jenzer agreed to develop a draft script for the video by end of November.

### **6.3 Preface to the new edition**

6.3.1 The meeting considered the way forward for completing the development of the preface to the new edition of the ICA. A draft version of the preface was available at the time of the meeting.

6.3.2 The meeting agreed that the preface should follow a similar structure to the ones of the previous editions, explaining the approach of the TT-ICA for the review of the Atlas, and summarizing the major changes and decisions made in updating the content of the ICA. The meeting requested all TT-ICA members to review the current draft version of the preface and to provide bullet points on any additional topic that should be included in it by 4 November 2016. Steve Cohn agreed to finalize the preface based on the inputs received by the TT-ICA members. The meeting noted that the major changes performed are already summarized in the powerpoint presentation held by George Anderson in side meeting of the Seventeenth World Meteorological Congress.

6.3.3 The meeting recommended that points that could be considered for a future update of the ICA should not be included in the preface, but should be part of a set of recommendations provided in a final report of the TT-ICA to the CIMO Management Group.

## **7. BREAKOUT GROUPS TO PROGRESS KEY TASKS**

7.1.1 The meeting considered which activities could be significantly progressed during the session and decided to spend a considerable part of the meeting into small parallel breakout groups to address these topics. The following breakout groups were formed: 1) Glossary, 2) Finalization of the 1987 images, 3) Correspondence between 1987 images and primary images, 4) Agreement between WMO and HKO, and website footer.

7.1.2 The breakout groups reported back to plenary on the progress achieved against each topic and on issues to be decided by the meeting. This provided opportunities for further discussions in plenary and the main points of these discussion and decisions are provided in the appropriate sections of this report.

## **8. SESSION SUMMARY AND PLAN FOR COMPLETION OF THE ATLAS**

8.1.1 The meeting reviewed the progress made during the meeting, the key decisions made, and developed a plan and timelines for completion of all tasks so that the atlas can become operational before World Meteorological Day 2017 (23 March). Key decision are provided under the relevant agenda items.

8.1.2 The meeting was informed that the HKO staff will have a webex session with the WMO web-manager to clarify some open issue in the week following the meeting.

8.1.3 It was agreed that HKO would implement the agreed changes to the website within the coming month and that the team should not interfere with them during this period. This will also include collating independent sections of text on individual webpages to make the amount of text seen on the screen attractive to the readers.

8.1.4 The meeting agreed that a contingency plan needed to be developed to deal with the primary images that could not be available by 31<sup>st</sup> January 2017. The meeting welcomed the offer from Mr Bruhn to develop a powerpoint presentation to be discussed at a later webex, proposing different options to deal with missing imagery.

8.1.5 The workplan of the team will be updated by the chairman to account for the progress made by the team.

## **9. DRAFT REPORT OF THE SESSION**

The session agreed to finalize its final report by correspondence.

## **10. CLOSURE OF THE SESSION**

The Session closed on Friday 28 October at 17:15.

## PARTICIPANTS

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### Chair report

1. Brief background: The CIMO Task Team on the International Cloud Atlas (TT-ICA) was formed during August 2014, consisting of members with diverse experience in cloud observations, and Secretariat participation and support. The committee is building on the work of the 2013 task team that evaluated the need for a revision and proposed specific steps and changes. The TT-ICA works primarily through individual and small subgroup efforts, with frequent meetings via WebEx. Our last in-person meeting took place September 2015 in Pretoria, South Africa.
2. It was agreed to have a face-to-face meeting of the TT-ICA in Hong Kong, China, in October 2016. We are indebted to Dr C.M.Shun, the Permanent Representative of Hong Kong, China with WMO, for hosting the meeting, and to TT-ICA member Mr Tam Kwong Hung for his considerate and thoughtful local planning.
3. Since October 2015 TT-ICA has advanced its work primarily on Work Plan Tasks 3 through 9. About 35 WebEx meetings were conducted to discuss and communicate within the task team. This rate of weekly or biweekly reporting reflects the hard work and continuing enthusiasm of the TT. Progress and status of the tasks will be reported by task leads. TT-ICA continues to benefit from invaluable efforts and large time commitments from all members. *The Chair greatly appreciates the dedication and persistence shown by all Task Team members.*
4. Progress was made in all areas. Noteworthy accomplishments were:
  - For much of the first half of the past year all team members worked to update and modernize the ICA text. This continues to the present as the team responds to editorial comments from WMO. A significant recent milestone was addition of linking information for the web format, linking between sections of the text and to images.
  - A major milestone was crossed when the near-final text was submitted for a three-month comment period to all Permanent Representatives. Responses were collected and no objections were received, so the President of WMO will now be requested to approve the text on behalf of WMO Members.
  - The text has been edited by WMO Publications and the Team is in the process of reviewing the final version.
  - The new Glossary is now nearly complete, with over 200 entries, and will be a major enhancement to the ICA.
  - Requirements for the website function were refined and formalized, based on expert team members expectations and “user cases”.
  - Also over this past year a web-based environment was created for team members to evaluate submissions. This was led by the Hong Kong Observatory (HKO) and guided by the task team. WMO is indebted to HKO for this contribution, following their work on the web-based image submission portal.
  - To date, approximately 1000 users have registered on the web portal, enabling them to submit images for consideration, and over 2000 images have been submitted through the site.
  - The improved Cloud Identification Decision Aid has been further enhanced as small recommendations for improvement have arisen.
  - The image set from the current ICA has been annotated in the new format, and these reference images will be made available in the new version of the ICA.

- The team emphasis in the second half of the past year has been split between securing and finalizing new images, and working with HKO during the creation of the website.
  - Image work included increasing the rate of image submission through the portal, evaluation and selection of the best images, and creation of descriptive captions for these images. Each of these goals has been more difficult than anticipated, but progress continues with many images (yet still a fraction of the total) now near-final and ready for inclusion in the new atlas.
  - The latest team effort, through the contributions of the HKO, is the building of the website. This is well underway, and expected to continue in tandem with selection of new images.
5. Goals for our meeting this week may be adjusted based on the sense of the group, but expected are:
- a. Update all members of our TT on the current status of each activity.
  - b. Finalize the ICA text, including addressing all comments from WMO editors. Passing the text to HKO for implementation within the website.
  - c. Finalize all Glossary definitions, including links. Passing this also to HKO for website implementation.
  - d. Discuss as a team and with the Hong Kong Observatory website the structure and function of the website to date. Agree on required changes, if any. Agree on plans and future interactions necessary to complete the website.
  - e. As a full group, review all images/captions that have been finalized by the Image subgroup. Report on each team members progress sourcing new images within assigned genera.
  - f. Address a number of additional tasks that require team discussion and decisions including, as examples, a plan for an introductory video and written preface.
  - g. Create a plan and timeline for the TT to address remaining image needs, including sourcing, selecting, and captioning.
  - h. Draft a report of the meeting.
-

Imagery from 1987 to illustrate orographic clouds and clouds as seen by aircrafts

orographic images				
P.15.4.3 Ac lenticularis	PR.128 p126 Fohn wall-rotor clouds and orographic Ac len			
P.15.7.3 Sc lenticularis	PR.129 p127 Orographic Sc and Ac _wave clouds	PR.131 p129 Orographoc Sc		
P.15.9.4 Cu fractus	PR.127 p125 Cu fra	PR.132 p130 Cu fra - Cu hum +Ac		
aviation images				
P.16.1.2 Ci uncinus	PR.133 p133 Ci terminating in hooks and tufts			
P.16.4.2 Ac stratiformis thick	PR.134 p134 Continuous mainly stratiform cloud layer	PR.138 p138 Continuous stratiform cloud layer penetrated by isol Cb		
P.16.4.3 Ac lenticularis	PR.135 p135 Lenticular Ac + Cu + Cs	PR.136 p136 Orographic Ac + As (standing lee waves)	PR.137 p137 Orographic clouds	
P.16.5.2 As opacus	PR.139 p139 Stratiform cloud above flight level			
P.16.7.1 Sc stratiformis	PR.140 p140b Stratocumulus	PR.141 p140t Bkn mainly stratiform cloud layer	PR.145 p144 Orographic Sc	
P.16.7.1 Sc stratiformis	PR.142 p141 Broken layers of mainly stratiform clouds	PR.143 p142 Strat clouds..	PR.146 p145 Dissipating Sc	
P.16.9.1 Cu humilis	PR.149 p148 Cu_rows_sheets	PR.152 p151 Bands of Cu spiralling in towards a hurricane		
P.16.9.2 Cu mediocris	PR.147 p146 Orographic clouds_smoking mountain	PR.150 p149 Comparison of Cu development over land and over sea in summer		
P.16.9.3 Cu congestus	PR.148 p147 Blowing dust_smoke + Cu	PR.153 p152 Concentric cloud masses in a tropical cyclone		
P.16.10.2 Cb capillatus	PR.159 p158 Cb cloud complex	PR.158 p157 Isolated Cb amidst scattered Cu	PR.154 p153 Isolated Cb	PR.151 p150 Widespread Cu_isolated Cb and A
P.16.10.2 Cb capillatus	PR.155 p154 Scattered Cu over the sea_isolated Cb	PR.156 p155 Isolated Cb amidst Cu clouds of extensive vertical development		
P.16.10.2 Cb capillatus	PR.160 p159 Cb + Cu on a squall line	PR.157 p156 Scattered Cu_isolated Cb		



Correspondence between 1987 images and primary images

PR.002 p4 Cu hum + haze	P.9.1 Cu humilis
PR.004 p6 Cu med + Cu fra	P.9.2 Cu mediocris
PR.005 p7 Cu con	P.9.3 Cu congestus
PR.010 p12 Cu con prae	P.9.9 Cu praecipitatio
PR.014 p15 Cu con to Cb cal transition	P.10.19 Cb cumulogenitus
PR.015 p16 Cb cal	P.10.1 Cb calvus
PR.017 p18 Cb cal prae	P.10.3 Cb praecipitatio
PR.020 p21 Sc cumulogenitus from Cu med	P.7.23 Sc cumulogenitus
PR.023 p24 Sc str opa und	P.7.1 Sc stratiformis
PR.024 p25 Sc str tra	P.7.7 Sc translucidus
PR.025 p26 Sc str tra per	P.7.8 Sc perlucidus
PR.026 p27 sc str opa mam + Sc len	P.7.14 Sc mamma
PR.027 p28 St neb und	P.8.5 St undulates
PR.028 p29 St neb	P.8.1 St nebulosus
PR.030 p31 St fra + Cu fra pan of bad weather below As	P.8.8 St fractus wetwx
PR.034 p35 Sc str per +Cu med	P.7.27 Cu and Sc
PR.036 p37 Sc str opa + Cu con	P.7.9 Sc opacus
PR.038 p39 Isol Cb cap + C con + Cu med	P.10.2 Cb capillatus
PR.039 p40b Cb cal pil + Cb cap	P.10.12 Cb pileus
PR.041 p41 Cb cap inc	P.10.5 Cb incus
PR.043 p43 Cb cap prae arc	P.10.7 Cb arcus
PR.050 p48 Cb cap with mamma in anvil	P.10.6 Cb mamma
PR.051 p49 As tra	P.5.1 As translucidus
PR.057 p55 Ns	P.6.0 Ns
PR.059 p57 Ac str tra per	P.4.7 Ac translucidus
PR.062 p60 Ac len dup + Cs fib	P.4.10 Ac duplicatus
PR.067 p65 Ac len	P.4.3 Ac lenticularis
PR.069 p67 Ac str lac	P.4.13 Ac lacunosus
PR.070 p68 Ac str per und	P.4.11 Ac undulates
PR.073 p71 Ac str und rad tra per	P.4.8 Ac perlucidus
PR.074 p72 Ac cumulogenitus + Cu con	P.4.23 Ac cumulogenitus
PR.077 p75 Ac str opa	P.4.2 Ac stratiformis thick
PR.077 p75 Ac str opa	P.4.9 Ac opacus
PR.081 p79 Ac cas + Cu con	P.4.4 Ac castellanus
PR.082 p80 Ac cas vir	P.4.14 Ac virga
PR.085 p83 Ac flo (b/w)	P.4.5 Ac floccus
PR.091 p89 Ci fib + Ci unc	P.1.3 Ci fib and unc
PR.093 p91 Ci unc + Ci fib	P.1.1 Ci fibrates
PR.094 p92 Ci unc ver	P.1.10 Ci vertebratus
PR.095 p93 Ci spi vir	P.1.4 Ci spissatus
PR.096 p94 Ci flo	P.1.7 Ci floccus
PR.098 p96 Ci flo vir + Cc flo	P.2.4 Cc floccus
PR.109 p105 Ci unc	P.1.2 Ci uncinus

PR.100 p98b Formation and dissipation of Ci spi cbgenitus	P.1.5 Ci spissatus cumulonimbogenitus
PR.101 p98t Formation and dissipation of Ci spi cbgenitus 5 min later	P.1.5 Ci spissatus cumulonimbogenitus
PR.102 p99b Formation and dissipation of Ci spi cbgenitus 6 min later	P.1.5 Ci spissatus cumulonimbogenitus
PR.103 p99t Formation and dissipation of Ci spi cbgenitus 5 min later	P.1.5 Ci spissatus cumulonimbogenitus
PR.111 p107 Ci fib dup	P.1.11 Ci duplicatus
PR.114 p110 Cs	P.3.13 Cs invading covering
PR.116 p112 Cs neb	P.3.3 Cs nebulosus
PR.118 p114 Cs fib	P.3.2 Cs fibrates
PR.121 p117 Cc str und (b/w)	P.2.1 Cc stratiformis
PR.122 p118 Cc str lac	P.2.6 Cc lacunosus
PR.123 p119 Cc str und lac	P.2.5 Cc undulates
PR.124 p120 Cc len (b/w)	P.2.2 Cc lenticularis
PR.125 p123 Conjoined orographic clouds	P.7.3 Sc lenticularis
PR.128 p126 Fohn wall-rotor clouds and orographic Ac len	Nil
PR.129 p127 Orographic Sc and Ac _wave clouds	Nil
PR.132 p130 Cu fra - Cu hum +Ac	Nil
PR.133 p133 Ci terminating in hooks and tufts	Nil
PR.134 p134 Continuous mainly stratiform cloud layer	Nil
PR.135 p135 Lenticular Ac + Cu + Cs	Nil
PR.136 p136 Orographic Ac + As (standing lee waves)	Nil
PR.137 p137 Orographic clouds	Nil
PR.141 p140t Broken mainly stratiform cloud layer	Nil
PR.144 p143 Sc_roll cloud_under As	P.7.6 Sc volutus
PR.145 p144 Orographic Sc	Nil
PR.146 p145 Dissipating Sc	Nil
PR.147 p146 Orographic clouds_smoking mountain	Nil
PR.149 p148 Cu_rows_sheets	Nil
PR.150 p149 Comparison of Cu development over land and over sea in summer	Nil
PR.152 p151 Bands of Cu spiralling in towards a hurricane	Nil
PR.154 p153 Isolated Cb	Nil
PR.155 p154 Scattered Cu over the sea_isolated Cb	Nil
PR.156 p155 Isolated Cb amidst Cu clouds of extensive vertical development	Nil
PR.158 p157 Isolated Cb amidst scattered Cu	Nil
PR.159 p158 Cb cloud complex	Nil
PR.160 p159 Cb + Cu on a squall line	Nil
PR.163 p164 Nacreous clouds	P.10U.1 Nacreous
PR.164 p165 noctilucent clouds	P.10U.3 Noctilucent
PR.165 p166 Condensation trails_contrails	P.1.15 Ci homogenitus
PR.166 p167 Condensation trails_contrails	P.1.16 Ci homomutatus
PR.167 p168 Cloud produced by the Victoria Falls	P.9.19 Cu cataractagenitus

PR.168 p169 Cloud formed by volcanic eruption	P.9.16 Cu flammagenitus
PR.169 p173t Fog	P.11.1.1 Fog
PR.170 p173b Fog banks	P.11.1.1.4.1 Sea fog
PR.176 p176t Ground fog	P.11.1.1.3.1 Shallow fog / ground fog
PR.177 p176b Steaming water	P.11.1.1.5.1 Steam fog / sea smoke / Arctic sea smoke
PR.178 p177 St and fog in valley	P.11.1.1.6 Upslope fog
PR.179 p178 Snow shower from a Cb	P.11.2.5 Snow
PR.182 p180 Snow pellets	P.11.2.7 Snow pellets
PR.183 p181 Hail	P.11.2.9 Hail
PR.184 p182 Small hail	P.11.2.10 Small hail
PR.185 p183 Spray	P.11.3.3 Spray
PR.187 p184t Dew	P.11.4.2.1 Dew proper
PR.189 p185t Hoar frost	P.11.4.4.1 Hoar frost proper
PR.190 p186 Advection hoar frost	P.11.4.4.2 Advection hoar frost
PR.191 p187 Rime	P.11.4.5 Rime
PR.192 p188l Soft rime on tree	P.11.4.5.1 Soft rime
PR.194 p189 Hard rime	P.11.4.5.2 Hard rime
PR.196 p190r Glaze on wire netting	P.11.4.6 Glaze
PR.197 p191r Strong spout	P.11.5.2 Waterspout
PR.199 p192 Funnel cloud not reaching the ground	P.11.5 Vortices (Spouts)
PR.200 p193l Small tornado	P.11.5.1.2 Rope tornado
PR.205 p195 Smoke layers	P.12.1.3 Smoke
PR.207 p196b Wall of sand	P.12.2.2 Dust Storm or Sandstorm
PR.208 p197 Dust devil	P.12.2.3 Dust devil / dust whirl / sand whirl
PR.209 p198 Halo phenomena	P.13.1.1 Small (22 degree) halo
PR.210 p199 Halo phenomena	P.13.1 Halo Phenomena
PR.211 p200 Corona	P.13.2 Corona
PR.212 p201 Irisation	P.13.3 Irisation / Iridescence
PR.214 p202t Glory	P.13.4 Glory
PR.215 p203 Rainbow	P.13.5 Rainbow
PR.216 p204t Crepuscular rays	P.13.11.4 Crepuscular rays
PR.218 p205 Lightning from Cb prae	P.14.1.1 Lightning
PR.219 p206 Polar Aurora	P.14.3 Polar Aurora